Land4Climate

NbS Alternative Financing:
a guide for practitioners

*Click on any box and you will be brought **to the page** of that section*

What is it? | Who is it for? | How can it be used?

Alternative Financing Types for NbS

Brief explanation of each type with two practical examples

- Corporate or Community Green Bonds
- Impact Investing
- Payment for Ecosystem Servies
- Corporate Social Responsibility Funding
- Carbon Market Participation
- Green Real Estate Development
- Land Swaps
- Community Crowdfunding
- Philanthropic Funding and Foundations

Detailed Case Studies

A deep-dive into selected financial instruments, for each case study: key facts, summary, operational details, how it's working and references.

- Water Fund for Life and Sustainability Fund, Columbia
- Landscape and Recreational Values Trading – 'Ruka-co-governance' Model, Finland
- "Adopt a green spot" Initiative, Italy
- Creating and Trading Carbon Credits on the Voluntary Market - Climate Impact X (CIX), Singapore
- Combined Afforestation Funding, India
- Biodiversity-improvement Farming Practices, Austria

Glossary | Resources and References

What's next?

Visit our website for information on a serious game which will test some of these alternative financing types.

Introduction

What is it?

Are you a practitioner implementing a natural-based solution (NbS)? Are you looking for alternatives to public funding? If so, you have come to the right place!
This interactive guide is for professionals implementing small scale NbS measures in search of alternative or complementary funding beyond public subsidies. It can be used as a learning resource to get an overview of different types of alternative financing for NbS - light blue section on "Alternative Financing Types for NbS". This resource also serves as a guide to more practical experiences and insights on implementing these alternative financing instruments through detailed case studies - light green section entitled "Detailed Case Studies".

This document was written by UJEP, BOKU, and TUDO, and edited by DEN Institute as part of research activities in the EU Horizon Project LAND4CLIMATE.

Who is it for?

This guide is for **practitioners**. By practitioners we mean any professional – individual or organisation - involved in implementing nature-based solutions (NbS) including municipalities, local authorities, public administration offices, Non-Governmental Organizations, public bodies (e.g. national park authorities, water body/river basin authorities, local land management authorities etc.) and private contractors. **The key target audience is those who are ready to implement NbS and are looking for inspiration on sources of alternative financing (other than public funds)**.

How to use it?

This guide has been designed with various entry points in mind. **It aims to be dynamic and interactive in its access routes via hyperlinks both within the document (green highlighted text) and external to the document (orange underlined text).**
The preceding cover page provides a table of contents to the various sections of the guide with embedded hyperlinks. It is designed to help you navigate the document. Click on any box and you will be brought **to the page** of that section. You may need to scroll down to find the relevant part.
The "Alternative Financing Types for NbS" (light blue section) offers a "quick scan" of the types of alternative financing providing a broad overview of the options. Each type has a brief description and two examples of how these approaches work in practice with external links to find out more.
The "Detailed Case Studies" (light green section), on the other hand, offers a comprehensive walkthrough of the implementation of these alternative financing approaches. Starting with some key facts, these case studies are then structured around these topics: summary, operational details, how is it working and references.
This guide concludes with three resources: a glossary listing all relevant terms highlighted in green in the document with their definitions, a handful of additional resources for inspiration and a reference list signposting all sources used.
At the end of each page you will find the button  , clicking on it will take you back to the cover page with the document navigation.

Context and Structure

Natural-based Solutions (NbS) are fast becoming an alternative or supplement to the suite of grey infrastructure measures to adapt to or mitigate against climate risks and increase climate resilience. As defined by the EU Commission, NbS are "solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience. Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions."[1]

The landscape for financing and supporting NbS implementation is rapidly evolving. Municipalities, non-governmental organizations, private contractors, public bodies and other entities or individuals can consider many tools beyond traditional public funding. By engaging with private investors, businesses, and the community, they can tap into diverse revenue streams and create sustainable partnerships that benefit both the environment and the local economy.

Many privately or communally funded initiatives are emerging where businesses and investors are eager to support environmentally sound projects - especially those that align with their sustainability goals or help offset environmental impacts (Papari et al. 2024). For example, companies may invest in ecosystem restoration, reforestation, or regenerative agriculture as part of their climate or biodiversity commitments. NbS promise to not only meet environmental, social, and governance (ESG) targets but also enhance their public image and long-term resilience (Toxopeus and Polzin, 2021).

At the same time, investors and green finance institutions are increasingly looking for projects that deliver measurable environmental and social benefits alongside a financial return. This creates opportunities for land users, municipalities, and local organizations to access funding - especially when they can demonstrate how their work contributes to outcomes like carbon sequestration, water quality improvement, or biodiversity conservation (den Heijer and Coppens, 2023).

Contrarily, when private finance enters NbS implementation without strong governance and transparency, the risk of greenwashing, inequity, and ineffective outcomes increases significantly. One key risk is called carbon leakage, where reducing emissions by carbon sequestration in one area leads to increased emissions elsewhere - undermining the overall climate benefit (Stavins et al., 2023). Another concern is the misuse of NbS in marketing and real estate development, where green labels are applied without delivering meaningful environmental outcomes. Martín-Breen and Martínez (2021) demonstrate how developers often use NbS language to promote housing projects, despite offering minimal green infrastructure in practice - amounting to greenwashing. A particularly stark example is seen in Africa (Uganda), where a carbon offset project led to the displacement of communities and ecological harm, despite being marketed as a climate-friendly intervention. Corson and MacDonald (2014) argue that such cases reflect the "virtual" nature of many offset projects, where the promised environmental benefits are more symbolic than real.

These include: Corporate or community green bonds; Impact investing; Payments for ecosystem services; Corporate Social Responsibility funding; Carbon market participations; Green real estate development; Land swaps; Community crowdfunding; and Philanthropic funding and foundations.

After this "quick scan" of alternative financing types, six real-world examples from different regions around the globe are presented, showcasing both urban and rural implementation settings. The goal is to illustrate how these strategies can be adapted to different contexts and highlight the importance of non-governmental funding sources in driving sustainable solutions. The information was gathered as part of the systematic review of the academic literature focused on NbS implementation with the support of different types of instruments.

[1] Retrieved from https://research-and-innovation.ec.europa.eu/research-area/environment/nature-based-solutions_en (28 May 2025).

Alternative Financing Types for NbS

Corporate or Community Green Bonds

Private companies are issuing green bonds to fund environmental projects. Municipalities or other providers can collaborate with private companies or create joint ventures to issue green bonds, where investors (including private individuals and institutions) provide capital in exchange for returns tied to the success of the project. Bonds can be also issued by municipalities or local entities to directly engage the community. Local investors, including individuals and businesses, can invest in bonds to fund projects that benefit the local environment and economy.

Example: The City of Gothenburg, Sweden, issued green bonds to finance a series of environmental projects, including sustainable public transport systems, energy-efficient buildings, and green infrastructure. The bonds raised over SEK 1 billion (around EUR 96 million) to fund these initiatives. (Goteborg, 2022). ***How It Works***: Investors purchase the bond, and the finances are used specifically for green projects. The city repays the bond over time with interest from the revenue generated through the projects (e.g., energy savings, reduced transportation costs, etc.) (UN, 2023).

- *Find out more here.*

Example: The Arkansas Rural Green Bond Initiative (USA) has issued bonds to fund rural infrastructure projects such as sustainable agriculture practices, water management, and renewable energy installations. These bonds attract private investors interested in supporting rural sustainability while generating financial returns. ***How It Works***: Similar to municipal green bonds, these bonds are issued specifically to finance green projects in rural areas. Investors purchase the bonds, and the funds are used to support projects like flood mitigation, sustainable agriculture, or rural energy systems (CARKW, 2021).

- *Find out more here.*

Impact Investing

There are two types of impact investing, private impact investing and blended finance.
Private Impact Investors: Impact investors are private individuals or firms that seek to achieve measurable environmental or social impact alongside financial returns. These investors might be interested in funding NbS that can provide both a social return (such as improving local biodiversity, enhancing water management) and a financial return (e.g., energy efficiency savings or eco-tourism revenue). Municipalities or other entities can connect with these investors through networks or specialized impact investment funds.
Blended Finance: This strategy involves combining private investment with philanthropic, concessional funding or public sources to reduce risks for private investors and attract more capital. It's a way to use private capital for public good without direct public subsidy. For example, private investors might fund a green project with some risk-reducing guarantees from philanthropic sources.

Example: Alliance of Bioversity International and the International Center for Tropical Agriculture has partnered with rural farmers to integrate sustainable farming practices such as agroforestry into their agricultural activities. Agroforestry combines trees and shrubs with crops or livestock to enhance productivity and sustainability. The organization has used blended finance (a combination of public and private funds) to support farmers' transitions to these more sustainable practices. ***How It Works***: Private investors, alongside public sector funds or NGOs, invest in agroforestry projects, helping rural farmers shift from traditional practices to more sustainable, green methods. This can be structured as a cooperative or partnership model (CIAT, 2025).

- *Find out more here.*

Example: The Althelia's Sustainable Ocean Fund, launched by Althelia Ecosphere in partnership with the European Investment Bank (EIB) and the Global Environment Facility in 2016, supports the sustainable marine economy, including seafood production and marine conservation. ***How it works***: The fund combines public and private capital, including an approximate EUR 23 million commitment from the EIB, on top of the private investment from impact investors and philanthropic foundations. It provides financing and technical assistance to small and medium-sized enterprises in sustainable blue environment and economy (Green Finance Institute, undated).

- *Find out more here.*

Payment for Ecosystem Services

Payment for Ecosystem Services (PES) includes a variety of arrangements through which the beneficiaries of environmental services reward farmers or landowners with incentives for managing their land to provide these services.

Private Sector PES Schemes: In exchange for maintaining or restoring ecosystems (like wetlands, forests, or water catchments), municipalities or other entities can engage private companies, especially those with sustainability goals (e.g., water utilities, carbon offset programs, or agricultural firms), to pay for ecosystem services. PES agreements can provide ongoing revenue to municipalities while maintaining critical ecosystem functions like water filtration, carbon sequestration, and biodiversity conservation.

Biodiversity Offsetting: Companies that are publicly perceived to harm the environment (e.g. oil production companies, plastic packaging industry) can fund biodiversity protection measures elsewhere, in exchange for a permit to proceed with their activities. This type of "offsetting" can provide funding for green infrastructure or nature-based solutions to mitigate the environmental impacts of their operations.

Example: The Costa Rican PES Program is one of the world's most well-known PES systems. It allows private companies and individuals to pay for ecosystem services such as carbon sequestration, biodiversity conservation, and water regulation provided by landowners. Municipalities and private stakeholders engage in these agreements to maintain and restore natural ecosystems like forests. ***How It Works***: Private and public entities pay landowners to conserve ecosystems that offer valuable environmental services. The landowners, in turn, maintain or restore forests, wetlands, or watersheds, improving overall environmental conditions (EFD, 2018).

- *Find out more here.*

Example: Scolel Té Program in Mexico is a pioneering PES initiative that supports smallholder farmers in implementing sustainable land-use practices to sequester carbon. ***How it works***: Farmers develop reforestation plans in collaboration with and approved by AMBIO, a civil society organization that coordinates and implements the program including the sale of carbon certificates and credits in the voluntary carbon market (Ambio, 2023).

- *Find out more here.*

Corporate Social Responsibility Funding

Corporate Social Responsibility (CSR) is a business approach in which companies voluntarily take responsibility for their social, environmental, and economic impacts. It involves going beyond legal obligations and in case of NbS implementation it may have the following forms:

Corporate Sponsorships and Donations: Many corporations, especially those in industries like energy, construction, and retail, have CSR initiatives that focus on environmental sustainability. Municipalities and other entities can approach companies for sponsorships, grants, or donations to support green measures. Corporations may offer funds to implement projects like urban green spaces, stormwater management, or renewable energy installations.

Collaborative Projects with Businesses: Companies may be willing to co-fund green infrastructure projects as part of their sustainability commitments. For example, businesses could partner with municipalities to install green roofs or contribute to the creation of sustainable urban environments.

Example: Patagonia Inc., a company known for its environmental activism, channels its CSR funds into environmental conservation, including supporting nature-based solutions such as rewilding projects, forest conservation, and ecosystem restoration. They launched the "Patagonia Action Works" platform to connect people and organizations with environmental causes. One of Patagonia's key CSR projects was their support for the California Wildfires Restoration Fund, which focuses on reforesting and restoring ecosystems affected by the wildfires. The company has also invested in protecting watersheds and wetlands that are critical to local biodiversity. ***How It Works***: Patagonia, Inc. donates a portion of its profits to environmental causes and focuses on ecosystem restoration and conservation. They also fund projects aimed at protecting biodiversity, reducing carbon footprints, and promoting environmental sustainability through nature-based solutions (Patagonia, 2025).

- *Find out more here.*

Example: Unilever has developed wildlife corridors within its tea plantations to facilitate the safe migration of local wildlife. How it works: Utilizing Internet of Things (IoT) technologies, the company monitors animal movements and health in real-time, enhancing environmental reports and engaging consumers through transparent sustainability efforts. The project is funded by Unilever and implemented in collaboration with World Wildlife Fund.

- *Find out more here.*

There are certain differences between Corporate Social Responsibility and Environmental, Social and Governance strategies worth highlighted as listed in the table below.

Aspect	Corporate Social Responsibility (CSR)	Environmental, Social, and Governance (ESG)
Purpose	Build reputation, show ethical commitment	Assess sustainability and non-financial risks
Nature	Voluntary, values-driven	Data-driven, measurable, often regulatory-driven
Focus	Community, ethics, philanthropy	Environmental impact, social responsibility, governance
Audience	Consumers, employees, local communities	Investors, regulators, analysts
Assessment	Qualitative, often narrative-based	Quantitative, with measurable objectives and scoring
Standardisation	No unified or limited framework	Increasingly standardized
Examples	Charity donations, volunteering, ethical campaigns	CO_2 emissions tracking, board diversity, anti-corruption
Financial Impacts	Indirect and long-term	Direct influence on investment decisions

Source: Adapted from Park et al. 2023 and Albitar et al. 2022

Carbon Market Participation

There is a large variety of local, regional and international carbon markets where buyers and sellers of carbon offsets trade.

Voluntary Carbon Markets: Municipalities or other entities can engage in carbon offset programs by creating or restoring natural areas (like forests or wetlands) that sequester carbon. These efforts generate carbon credits, which can be sold on voluntary carbon markets to private buyers, such as corporations or individuals seeking to offset their emissions.

Carbon Credit Trading: If municipalities or other landowners implement Nature-based solutions like reforestation or sustainable land management, they could generate carbon credits that are traded on international or regional carbon markets. Private buyers (e.g., corporations with emissions reduction targets) purchase these credits, providing revenue for the municipality to reinvest in further green measures.

Example: Farmers in rural *Australia* can participate in carbon farming projects where they implement practices such as tree planting, soil carbon sequestration, and sustainable land management. These efforts generate carbon credits, which farmers can sell on the carbon market, providing a new income stream while helping mitigate climate change. ***How It Works***: Rural landowners or farmers implement practices that sequester carbon (such as planting trees or managing grasslands), and in return, they earn carbon credits. These credits can be sold to companies or individuals looking to offset their emissions (Australian Government, 2025).

- *Find out more here.*

Example: The California Carbon Market allows rural landowners in the United States to sell carbon credits generated from activities like reforestation, afforestation, and improved land management. This system incentivizes rural landowners to adopt green practices that benefit both the environment and their financial bottom line (ARB, 2025). ***How It Works***: It is a cap-and-trade system within which the Californian government sets an annual cap (limit) on total emissions from regulated sectors (e.g., electricity, oil & gas, industrial operations). The companies auction for allowances, and they are pushed to reduce their CO2 emissions and/or to buy carbon credits from those who adopt and register the carbon sequestration projects (State of California – California Air Resources Board, 2025).

- *Find out more here.*

Green Real Estate Development

Green real estate development is a concept that considers the social and environmental impacts of building projects; it focuses on decreasing their ecological footprint while improving the health and wellbeing of the occupants. Development projects may pursue high environmental standards to mitigate their environmental impacts through instruments such as:

Sustainable Real Estate Investment: Developers and investors are increasingly focusing on green and sustainable real estate projects, such as energy-efficient buildings, green roofs, or eco-districts. Municipalities can collaborate with private real estate developers to create green spaces or sustainable urban infrastructure, potentially accessing private capital for nature-based solutions.

Eco-Tourism Investments: Municipalities with natural assets (such as forests, wetlands, or coastlines) can attract private investment in eco-tourism ventures. Investors and developers might be interested in creating sustainable tourism projects, which can provide both environmental and financial returns, while funding green initiatives.

Example: Zuidas is a major urban district in Amsterdam, designed as a sustainable development area with a focus on green infrastructure, energy efficiency, and innovative architecture. The project integrates green roofs, renewable energy infrastructure, and efficient public transportation systems, making it an exemplary eco-district. The development integrates green infrastructure such as green roofs, permeable surfaces, and urban forests to manage stormwater and enhance biodiversity.

These features help mitigate heat island effects and improve air quality. ***How it works***: Private developers were attracted through incentives, including tax benefits and sustainability-focused guidelines, to fund the construction of buildings with environmental certifications like Leadership in Energy and Environmental Design (LEED) and Building Research Establishment Environmental Assessment Method (BREEAM) (Una, 2021).

- *Find out more here.*

Example: Royal Society for the Conservation of Nature (RSCN), through its division Wild Jordan, has successfully integrated eco-tourism with conservation efforts. By partnering with private investors and donors, the RSCN developed sustainable tourism projects within Jordan's nature reserves. These initiatives include eco-lodges and guided tours that offer visitors immersive experiences while generating revenue for conservation and supporting local communities. The income from these ventures is reinvested into preserving the natural environment and funding community development projects. ***How it works***: The municipality or conservation organization identifies areas with significant ecological and tourism potential. Collaborations are formed with private entities interested in developing eco-friendly tourism facilities, such as eco-lodges, guided nature tours, and educational centers. Projects are designed to minimize environmental impact, adhere to conservation principles, and provide authentic experiences that attract eco-conscious tourists. Income generated from tourism activities is allocated to fund ongoing conservation efforts, maintain infrastructure, and support local communities through employment and social projects (RSCN, Undated).

- *Find out more here.*

Land Swaps

Land swaps (also called land exchanges) are agreements where two parties exchange parcels of land without using money, usually to achieve better land use, conservation, or development outcomes. They are used to enable the implementation of nature-based solutions in locations where they deliver the greatest ecological, social, or economic benefit. The goal is to align land ownership or use rights with desired nature-based solutions outcomes such as ecosystem restoration, floodplain reconnection, reforestation, or biodiversity protection.

Example: To establish the Nämdöskärgården National Park, the Swedish Environmental Protection Agency required ownership of specific land and water areas. ***How it works***: A land swap was executed between the agency and The Archipelago Foundation, wherein the foundation exchanged land in the proposed national park area for property within another nature reserve. This exchange facilitated the creation of the national park, ensuring the protection of valuable ecosystems (NBSpolicy, 2025).

- *Find out more here.*

Example: In Long Beach, a land swap was executed between the Los Cerritos Wetlands Authority (LCWA) and a private energy company. How it works: The LCWA transferred a 5-acre parcel to the company in exchange for a 150-acre portion of the Synergy Oil Field. This exchange enabled the restoration of significant wetland areas, establishment of a mitigation bank, and increased public access, while consolidating oil operations to a smaller footprint (Georgetown Climate Center, 2020).

- *Find out more here.*

Community Crowdfunding

Crowdfunding is a method of raising money from a large number of individuals, typically via online platforms, each contributing small amounts to collectively fund a project (Find out more here). Platforms like GoFundMe, Kickstarter, or Indiegogo allow different actors to raise funds from individuals or community groups for specific green projects. There are campaigns for projects like planting trees, creating green spaces, or developing sustainable infrastructure. These campaigns can engage local citizens, businesses, and even international supporters who want to contribute to climate resilience efforts.

Some regions have local crowdfunding platforms that are focused on community-driven initiatives. These platforms often align with specific sustainability goals and allow actors (e.g. municipalities) to directly raise funds for green solutions.

Example: The 'Green Heart' Project in the UK raised money through crowdfunding to build an urban forest. ***How it works***: The money collected via the public campaign went towards planting trees, installing sustainable landscaping, and other green infrastructure that helps mitigate urban heat islands and improve biodiversity (Green Heart, 2025).

- *Find out more here.*

Example: Parklets in San Francisco are small public spaces created by transforming parking spaces into mini parks. These initiatives were funded through crowdfunding campaigns where local residents and businesses contributed to the creation of parklets in their neighborhoods. ***How It Works***: The crowdfunding platforms allow local communities to raise money for specific environmental projects. Individuals can contribute small amounts, and in exchange, they may receive recognition or benefits like the use of the parklet (Manual, 2020).

- *Find out more here.*

Philanthropic Funding and Foundations

Numerous private foundations, both large and small, fund environmental projects focused on climate resilience, biodiversity conservation, and sustainability. These foundations may provide grants, but they often also support public-private partnerships and innovative funding models like blended finance or impact investing. Wealthy individuals or family foundations focused on environmental issues may be open to funding green initiatives at the local level known as individual philanthropy. Engaging local philanthropists or even well-known figures in environmental sustainability could provide additional funding.

Example: The Land Trust Alliance (USA) works with rural landowners to create conservation easements on their properties. These contracts protect rural land from development in exchange for tax benefits and sometimes for payments from private foundations or corporations interested in preserving natural resources. How It Works: Landowners sign an agreement, voluntarily agreeing to restrict certain land uses (like commercial development) in exchange for compensation (such as tax deductions or financial incentives). These arrangements preserve biodiversity and ecosystem services in rural areas (LTA, 2025).

- *Find out more here.*

Example: American philanthropist Gregory C. Carr has committed over $100 million over 35 years to restore Mozambique's Gorongosa National Park. His efforts focus on biodiversity conservation and supporting local communities with healthcare, education, and sustainable agriculture, forming a public-private partnership with the Mozambican government. How it works: The restoration of the national part is done via direct personal involvement of Mr. Carand his foundation, including contractual arrangements with governmental bureaus and project implementation with local communities (DeHaan, 2023).

- *Find out more here.*

Detailed Case Studies

The goal of this section is to provide a deeper understanding of selected financial instruments, focusing on their specific features and the challenges encountered during real-world implementation.
This section explores existing or pilot schemes for implementing NBS, highlighting their innovative features and approaches. It examines different methods for securing funding and transferring these funds from donors to NbS providers. Additionally, it delves into strategies for addressing the challenge of proving the impacts of NbS to justify expenditures, often using co-benefit and no-harm approaches. This section also covers technical and design solutions aimed at ensuring the security of payment mechanisms and guaranteeing the transparency and long-term durability of these financial instruments. Finally, it emphasizes the importance of involving key actors to increase trust and legitimacy in these schemes, ensuring their success and sustainability.

Water Fund for Life and Sustainability Fund, Columbia

Location: Cauca Valley, Colombia
Timeframe: Started in 2009 – until now
Status: Implemented, on-going
Financing type: Payment for Ecosystem Services / Corporate Social Responsibility
NbS measures:

- Paramos (high altitude Andean grasslands) and forest conservation;
- Paramos and forest restoration;
- Fencing of riparian buffers; and
- Cattle-ranching and agriculture best-management practices.

Measures are implemented to enhance biodiversity and to retain sediments.
Benefits: NBSs improve livelihoods and quality of life of upstream communities; biodiversity conservation; improving living conditions in terms of reducing operational and financial risks related to water availability for irrigation in dry seasons (Vogl. et al. 2014).

Alliance of Bioversity International and CIAT. (2010). Cauca Valley. Available at: https://flic.kr/p/83Wsry

Case study summary

The Cauca Valley Water Fund in southwestern Colombia was developed and implemented as a response to the conservation and water supply challenges in the catchment already in the early 1980s (Vogl. et al. 2014). The initiative is based on a voluntary payment scheme (fees were based on the water concessions) funded by farmers (growing and producing sugar crane) with the goal to fund reforestation, awareness raising and stream protection (Vogl et al. 2014). In 2009, the associations introduced the so-called Agua por la Vida y la Sostenibilidad (APLV) – Water for Life and Sustainability – fund. The idea was proposed by The Nature Conservancy in 2008 to ASOCAÑA, the Sugar Cane Farmers and Mills Association and consists of three principal organizational features: (i) a governance mechanism for joint planning and decision-making, (ii) a financial mechanism that mobilizes and pools resources from multiple sources and (iii) a watershed management mechanism for the prioritization of conservation and improved management activities.

Operational details

Governance mechanism: The fund operates through a multi-institutional governing body that includes public and private partners, as well as local community representatives. This body is responsible for decision-making and supporting project implementation on the ground.

Financing mechanisms: The Water Fund receives contributions from various private and public funders, including ASOCAÑA, local sugar mills, ECOPETROL, PAVCO Pipelines, SAB-Miller Bavaria, and international organizations like USAID and UNICEF. ASOCAÑA initially allocated $1.8 million to cover operational costs and fund conservation projects. The fund also benefits from public contributions from the Corporación Autónoma Regional del Valle del Cauca and local municipalities. The collected financial resources are provided to farmers for NBS implementation and maintenance and improved farming practices.

Watershed mechanism: Implementation involves prioritizing conservation sites using hydrologic models and cost analysis to identify the most effective investment alternatives. Farmers receive support to improve cattle ranching management practices, increasing their productivity through silvo-pastoral systems. Additionally, farmers are involved in restoration and conservation activities, receiving income for their work and support for communal nurseries (for seedlings). The fund has meanwhile reached around 6,160 hectares through activities like conservation, restoration, and best management practices, involving 1,491 families in the watersheds.

Monitoring is conducted by CENICAÑA (a research center associated with the local sugar industry) with support from local communities, following a protocol designed by The Nature Conservancy and supported by USAID. The monitoring focuses on hydrologic, biological, and socioeconomic components.

Providers of funds:

- **Private funders/companies**: mainly ASOCANA but also ECOPETROL, PAVCO Pipelines, SAB-Miller Bavaria;
- **Non-profit private funders**: The Nature Conservancy, local water users' associations and indigenous councils;
- **National public funds**: funds from the governmental agency in charge of the promotion of the regional development in Colombia; National Park Las Hermosas and the local municipalities; and
- **International public funds**: Global Environment Facility, USAID and UNICEF.

Consumers of funds:

- **Farmers and local communities**: Farmers receive financial support to improve their cattle ranching management practices through silvo-pastoral systems, which enhance productivity and income. Additionally, farmers involved in restoration and conservation activities receive income for their workdays and support for communal nurseries, which can become small local businesses;
- **Technical secretary and operational costs**: ASOCAÑA allocated $1.8 million to cover operational costs, the technical secretary's salary, and funding for conservation projects; and
- **Monitoring activities**: CENICAÑA, with support from local communities, conducts monitoring activities following a protocol designed by TNC and supported by USAID, which contributed $300,000 to this work.

Technical support/intermediaries:

- The Nature Conservancy played an important role in proposing the fund and providing technical support, including designing monitoring protocols and conducting feasibility studies;
- CENICAÑA research center provided technical support for monitoring activities, including hydrologic, biological, and socioeconomic component;
- A partnership called „Natural Capital Project" including Stanford University, University of Minnesota, TNC, and WWF provided scientific tools and models like InVest and RIOS to identify priority conservation areas and predict ecosystem service provision; and
- International Center for Tropical Agriculture collaborated with The Nature Conservancy to carry out necessary studies and develop a strategic plan for the Water Fund.

How is it working?

Evaluation: The performance of the Water Fund is evaluated through scientific monitoring and stakeholder feedback. It has shown benefits in erosion control and groundwater recharge, with significant returns on investment expected in the long term.

Challenges:

- Complex security issues that need to be considered in the monitoring process;
- Challenge of balancing the cost and rigor of methods to monitor impact;
- Need to engage local communities in the monitoring process without losing scientific rigor; and
- Funding not contractually guaranteed.

Enablers:

- Strong support from sugar cane industry, that recognizes the water risks associated with their business, especially the need to maintain irrigated agriculture;
- Companies like ECOPETROL, PAVCO, and SAB-Miller Bavaria contribute to the fund driven by Corporate Social Responsibility interests, aiming to build good relationships with local communities and support environmental initiatives;
- Use of hydrologic models and scientific tools (like InVest and RIOS) to identify priority conservation areas and effective investment alternatives; and
- Collaboration between various stakeholders, including public and private partners, local communities, and international organizations, fosters a comprehensive approach to watershed conservation.

References and sources to learn more

- Bremer, Leah L., et al (2016). "One size does not fit all: Natural infrastructure investments within the Latin American Water Funds Partnership." Ecosystem Services 17: 217-236. https://www.sciencedirect.com/science/article/pii/S2212041615300681
- Kang, Shiteng, et al (2023). "Investing in nature-based solutions: Cost profiles of collective-action watershed investment programs." Ecosystem Services 59: 101507. https://www.sciencedirect.com/science/article/pii/S2212041622001036
- The Nature Conservancy (2013). Case studies on Remuneration of Positive Externalities - Water for Life and Sustainability Water Fund Cauca Valley, Southwestern Colombia. Retrieved from https://openknowledge.fao.org/server/api/core/bitstreams/948659c6-cdef-463c-bc54-a0d45e027d54/content
- Vogl, Adrian et al (2015). "Science-based investment targeting for the Water for Life and Sustainability Fund, Colombia." https://naturalcapitalproject.stanford.edu/sites/g/files/sbiybj25256/files/media/file/waterfund_case_study_cauca_22sep2015_eng.pdf

Landscape and Recreational Values Trading – 'Ruka-co-governance' Model, Finland

Location: Ruka Kuusamo (Finland)
Timeframe: Research and implementation in 2011–2014
Status: Pilot implemented
Financing type: Payment for Ecosystem Services
NbS measures:

- Forest preservation; and
- Changed forest management.

Benefits: Biodiversity, recreational values (enhancement of landscape beauty, access to nature)

viiviseppanen. (2011). Ruka Kuusamo. Available at: https://flic.kr/p/arnfZs

Case study summary

The Landscape and Recreational Values Trading (LRVT) was developed and implemented as a pilot co-governance framework through action research. The scheme is based on Payments for Ecosystem Services. Timber production from privately owned forests is in conflict with the high recreational value of the area. The scheme is implemented as a compensation payment to private forest owners for maintaining the recreational (and related, i.e. aesthetics, biodiversity) ecosystem services.

Operational details

Area and economic setting: The Ruka-Kuusamo area is located in northeastern Finland, close to the border with the Republic of Carelia in Russia. Two sectors dominate the economy. Firstly, the region represents a popular nature tourism area with 440,000 overnights annually, creating 800 work places (FTEs) in the Municipality of Kuusamo and annual turnover of 100 million €. Secondly, the forest-based sector with 530 employees creates annual turnover of 170 million €. 'Ruka-co-governance' research intervention focused on the 17,000 hectare forest area around the Ruka tourist resort, offering 185 km of official hiking routes, 500 km of cross-country skiing routes, as well as 350 km of canoeing routes.
Land ownership and planning: In contrast to the prevailing situation in northeast Finland, where the majority of land is owned by the state, 80% of the land in Kuusamo is private (family owners). Within the 'Ruka-co-governance' study area, land is owned by about 400 family forest owners. The overall land use in the region is organized and steered by local master plans and local detailed plans, as in other Finnish municipalities, according to the Land Use and Building Act (132/1999). The majority of the masterplan area is allocated to agriculture and forestry use, but in most of the area so-called "land-use permission" is required to ensure that landscape quality, from the perspective of other land uses is not severely affected. The Land Use and Building Act (1999) states that tree felling or any other corresponding action that alters the landscape cannot be carried out without a permit. No mandatory forest management planning procedure exists for private forests, but the state-funded regional forest inventory produces information and recommendations (eService platform Metsään.fi).
Key actors: Main key actors are forest private owners (turnover), tourism entrepreneurs (turnover), local government and authorities (moderating the governance model and guidelines), NGOs and environmental groups (participatory research and biodiversity conservation).
Money flows: The model basically applies the mechanism of Payment for Ecosystem Services (PES), in which forest owners are compensated for maintaining landscape and recreational values. The main characteristics are being voluntary, private, with multiple money providers and receivers involved, focused on one ecosystem service and mediated.
Providers of funds: Recreation services companies, tourists are providers of funds (i.e. buyers of

ecosystem services).
Consumers of funds: Forest owners are consumers (i.e. providers of ecosystem services).
Technical support/intermediaries: This role is mainly provided by the local municipality, who leads the negotiations between the entities.

How is it working?

Evaluation: The implementation is based on a set of technical (feasibility analysis) and institutional (compliance, order, mechanism, logic, indicators, affect, legitimacy) evaluation criteria. In the ex-post project evaluation, 20% of the owners indicated that they have changed their forest management practices according to new information and 79% said they were interested in changing their forestry measures but would need more information (Tikkanen et al., 2017).
Challenges:

- Norms – expectation on what is good forest management, whether forest should be open to all and with free entry (which would contradict compensation to forest owners) and on who should decide on the management;
- The need for enough contributors and providers to ensure the ecosystem impact;
- LRVs are not explicitly defined; and
- Location of forests being saved from cutting is important to sustain the high recreation value.

Enablers:

- Design of the scheme through participatory process and careful planning (local forest management guidelines, estate-level forest management planning, and landscape work permission procedure);
- High willingness to pay for and provide landscape and recreation values (LRVs); and
- Well-functioning organisations of forest owners and nature tourism organisations and emerging local cooperative culture.

References and sources to learn more

- Forest Europe Growing Life (Undated). Landscape and Recreational Values Trading. Retrieved from https://foresteurope.org/wp-content/uploads/2017/08/Finland-CS_recreation.pdf
- Konu, H. – Luke Natural Resources Finland (2020). "Designing a new solution to support forest landscapes in a tourism destination – Landscape and Recreation Value Trade in Ruka-Kuusamo". Presentation Slides for SOBIO DAYS 2020. Retrieved from https://sites.uef.fi/sobio/wp-content/uploads/sites/254/2020/12/Henna-Konu_Designing-a-new-solution-to-support-forest-landscapes-in-a-tourism-destination-%E2%80%93-Landscape-Value-Trade-in-Ruka-Kuusamo.pdf
- Tikkanen, J., Hokajärvi, R., Hujala, T., Kurttila, M. (2017) Ex ante evaluation of a PES system: Safeguarding recreational environments for nature-based tourism. Journal of Rural Studies 52: 42–55 https://www.sciencedirect.com/science/article/abs/pii/S0743016716303850

"Adopt a green spot" Initiative, Italy

Location: Milan, Italy
Timeframe: From 2005 ongoing
Status: Implemented
Financing type: Payment for Ecosystem Services / Corporate Social Responsibility Funding
NbS measures: Greenery (e.g. tree and vegetation planting, green roofs, etc.) in urban areas
Benefits: Resident Engagement; development of local green spaces; flexible participation; community empowerment: financial contributions enable motivated individuals to care for urban greenery; and sustainable urban developments.

Rab Lawrence. (2021). Bosco Verticale Milan. Available at: https://flic.kr/p/2mBzRgN

Case study summary

The "Adopt a green spot" initiative in Milan represents an innovative Payment for Ecosystem Services (PES) model that effectively mobilizes community resources for urban green space management. This user-financed PES scheme operates through voluntary agreements between the Municipality and various stakeholders, including companies, condominiums, NGOs, private citizens, and educational institutions.
The model features two distinct agreement types: sponsorship agreements, where stakeholders provide financial resources while the Municipality handles implementation; and collaboration agreements, where participants directly engage in green area maintenance. Since its 2005 launch, Milan has established 502 agreements managing over 292,399 m^2 of green areas, with collaborations (415) significantly outnumbering sponsorships (87).

Operational details

Stakeholder engagement: The Milan PES model involves diverse stakeholders, creating a multi-actor governance framework. Participants include companies (17% of agreements), condominiums (40%), NGOs (10%), private citizens (11.5%), and universities/schools (8%). Each stakeholder brings different motivations and capabilities - companies seek public recognition and branding opportunities, condominiums aim to improve their neighborhood aesthetics, while citizens often participate through direct environmental stewardship.
Governance mechanism: The initiative operates through a voluntary agreement system with two distinct formats: sponsorship agreements and collaboration agreements. Sponsorships constitute a traditional "buyer-seller" relationship where stakeholders provide resources while the Municipality implements activities. Collaborations represent a more active engagement model where participants directly manage green areas. The Municipality serves as the natural resource provider while participants function as beneficiaries of ecosystem services. This flexible approach accommodates different stakeholder needs and capabilities, with standardized agreements reducing transaction costs and streamlining participation processes.
Financial mechanism: The model demonstrates financial sustainability through its dual funding approach. Sponsorship agreements generate financial resources (representing 57% of total investments) that the Municipality allocates toward green space maintenance. Collaboration agreements (covering 43% of investments) reduce municipal expenditure by transferring maintenance responsibilities to participating stakeholders. The average investment varies significantly by location and agreement type. Sponsorship investments concentrate in central areas, while collaboration investments distribute more evenly across districts. This spatially differentiated financial pattern enables effective resource distribution throughout the urban ecosystem.

Spatial distribution insights: The initiative demonstrates clear spatial patterns - sponsorships concentrate in the city center where companies predominate, while collaborations flourish in residential areas through citizen and condominium participation. This flexible approach addresses diverse stakeholder needs and capabilities, allowing those wanting active involvement to directly care for green spaces, while others can contribute financially.

Implementation Steps:

- Identify appropriate green areas for the initiative;
- Define agreement types and requirements;
- Engage potential stakeholders,
- Sign formal agreements;
- Implement green area improvements or maintenance; and
- Monitor and evaluate outcomes.

The diagram below summaries the key operational details of the scheme.

"Adopt a green spot"
Payment for Ecosystem Services (PES):

- Voluntary agreement system;
- Sponsorship and collaboration agreements for green area management.

Benefits

- Reduced maintenance costs for green areas;
- Improved aesthetics and environmental quality;
- Public recognition for participating stakeholders,
- Better air quality and reduced pollution;
- Climate regulation and flood risk reduction; and
- Increased citizen involvement in local environment.

Who Can Participate

- Companies
- Private Citizens
- NGOs
- Condominiums
- Universities/Schools[2]

Benefits

Sponsorship	**Collaboration**
Financial support	Direct management
Municipality implementation	Hands-on involvement
Public recognition	Community engagement

Spatial Distribution Insights

- Sponsorships tend to concentrate in the city center
- Collaborations - more common in residential areas
- Companies typically invest in the city center
- Citizens and condominiums prefer to engage in residential areas

Implementation Steps

1	2	3	4	5	6
Identify green areas	Define arrangement	Engage stakeholders	Sign agreement	Implementation action	Monitor & evaluate

[2] Universities tend to be minor actors compared to the others because they own their campuses, where they can adopt measures. They join the initiative by adopting green areas within their neighborhoods through collaboration agreements to improve their aesthetics, while companies prefer to adopt green areas located in the proximity of the city center choosing sponsorship agreements to gain public visibility and recognition.

How is it working?

Evaluation: The initiative's success is demonstrated by its implementation scale: 502 agreements (87 sponsorships and 415 collaborations) managing 292,399 m^2 of green areas. Financial analysis reveals total investments of €7,487,477.63 for collaborations and €9,867,363.38 for sponsorships, with an average investment of 25.6 €/m^2. Investment intensity varies significantly across the urban landscape, peaking at 130.07 €/m^2 in central areas while decreasing in peripheral zones. Spatial analysis conducted through GIS mapping tracks agreement distribution across districts and identifies investment patterns based on distance from the city center. This data-driven approach ensures transparent evaluation and provides valuable metrics for municipalities seeking to replicate this successful urban green space management model.

Challenges: The main barrier is implementation of PES at urban scale (e.g., transaction costs, different socio-cultural background of stakeholders, etc.) through the definition of two types of agreements adopted by different stakeholders (citizens, condominiums, business, NGOs, universities) in different areas of the city (from central areas of the city to commercial and residential ones). The second barrier is standardization of the agreements facilitates the management of large number of contracts and substantially reduces administration costs for the Municipality.

Enablers: Enablers of the initiative are (1) flexibility of the voluntary agreements designed in order to meet the needs of various stakeholders; (2) variety of green areas included in the initiative (in particular the prevalence of small size areas allow the participation of stakeholders with low economic capacity); (3) public recognition through the advertising plate which makes it possible to attract firms and (4) low transaction costs borne.

References and sources to learn more

- Croci, E., Lucchitta, B., & Penati, T. (2022). An urban PES model for diffused green areas requalification and maintenance in Milan. Environmental Science & Policy, 130, 47-60. https://www.sciencedirect.com/science/article/abs/pii/S1462901122000314

Creating and Trading Carbon Credits on the Voluntary Market - Climate Impact X (CIX), Singapore

Location: Singapore
Timeframe: Planning on-going from 2020
Status: Not implemented
Financing type: Carbon Market Participation
NbS measures:

- Carbon sequestration through forest and wetland preservation;
- Recovery; and
- Reforestation programs.

Benefits: Ciodiversity preservation, social co-benefits, and equity in communities.

Catherine Poh Huay Tan. (2022). Lorong Halus Wetland. Available at: https://flic.kr/p/2nvjLn6

Case study summary

The Climate Impact X (CIX) is a platform designed to facilitate transactions in the voluntary carbon market. It uses cutting-edge financial technology (FinTech) to streamline the trading and management of carbon credits. The primary objective of the CIX is to increase transparency, efficiency and accessibility within the carbon market ecosystem.
The CIX acts as a centralised exchange connecting various stakeholders, including project developers, corporate buyers, investors and market intermediaries. By providing a standardised framework for trading carbon instruments, it reduces market fragmentation and promotes trust among participants.
One of the key features of the CIX is its emphasis on the use of digital tools, such as blockchain technology. This ensures a secure and immutable record of transactions, enhancing the credibility of carbon credits traded on the platform. In addition, the platform offers sophisticated analytics and reporting tools, enabling participants to make informed decisions based on real-time data.
The Climate Impact X is designed to be a centralised marketplace for carbon credits, providing a standardised platform where different stakeholders can interact. CIX consists of two main platforms: an exchange and a project marketplace. The Exchange is designed for large deals involving large corporations and institutional investors, while the Project Marketplace focuses on smaller, individual projects. This setup allows more companies, including those with smaller budgets or specific sustainability goals, to participate in the voluntary carbon market (VCM).
By supporting nature-based solutions (NbS) projects, companies can use the marketplace to meet their sustainability goals in a way that is consistent with their values. This dual-platform approach helps bridge the gap between large buyers and smaller project developers. It also addresses the challenge of scaling up the voluntary carbon market (VCM), which has been a major hurdle in its current form.

Operational details

The core idea is to use FinTech solutions to increase market transparency and simplify transactions, thereby enabling efficient trading and ensuring the credibility of carbon offsets. By integrating blockchain technology, the CIX ensures secure, tamper-proof transaction records. This fosters trust among participants.
The platform also includes analytics and reporting tools, enabling stakeholders to make data-driven decisions. It supports project developers by providing a direct link to corporate buyers, investors and intermediaries, reducing the need for complex, fragmented processes.
Financial flows within the CIX ecosystem primarily revolve around the buying and selling of carbon credits. Corporate buyers channel funds into projects through the exchange, providing developers with

revenue streams. These funds are then reinvested in new or ongoing emission reduction initiatives, such as implementation of NbS projects.
Ecosystem service flows include carbon sequestration and biodiversity protection, which directly contribute to climate change mitigation.

Providers of funds:

- Corporate Buyers - large companies, especially multinational corporations. They invest in carbon credits to align with environmental regulations, achieve net-zero targets, or enhance their corporate social responsibility (CSR) profiles; and
- Institutional Investors - these include investment firms, pension funds, and other financial entities that see carbon credits as a viable investment opportunity with potential environmental and financial returns.

Consumers of funds:

- Project developers for implementing NbS such as reforestation, renewable energy development, wetland restoration and other carbon reduction/sequestration initiatives.

Technical support/intermediaries:

- Singapore Stock Exchange that is ready to trade derivates/credits from CIX.

How is it working?

Evaluation: Not available, the scheme has been planned but has not been implemented.

Challenges:

- Profits from agriculture and logging is higher than the ones from preserving/restoring forests, so other instruments other than just voluntary forest carbon projects must be implemented to halt deforestation;
- High technical entry needed to set up the transparent trading system;
- So far, there is lack of scale, trust and liquidity necessary for efficient trading (e.g. matching an individual buyer and supplier will be time-consuming at the beginning);
- Carbon credits are highly heterogeneous products; and
- Lack of data decreases transparency of effects and the durability.

Enablers:

- Acknowledged need to bridge large-scale buyers of credits (done by multinational firms) and small-scale NbS project developers;
- Provision of information about financial risks and return-on-investment of projects that could incentivize investors (e.g. verification of carbon credits with emission reductions);
- Standardization of carbon credits based on common taxonomy (uniformity might help to start the market);
- Advanced FinTech solutions, including blockchain, ensure secure, transparent, and efficient transactions;
- Digital tools for monitoring, reporting, and verifying carbon credits add credibility and reduce transaction costs; and
- Increasing corporate commitments to net-zero goals creating a growing demand for high-quality carbon credits.

References and sources to learn more

- David, D., Yoshino, M., & Varun, J. P. (2022). Developing FinTech Ecosystems for Voluntary Carbon Markets Through Nature-Based Solutions: Opportunities and Barriers in ASEAN. In F. Taghizadeh-Hesary & S. Hyun (Ed.), Green Digital Finance and Sustainable Development Goals (s. 111–142). Springer Nature Singapore. https://doi.org/10.1007/978-981-19-2662-4_6
- DBS (2025): Climate Impact X. Retrieved from (20 April 2025): https://www.dbs.com.sg/corporate/solutions/climateimpactx

Combined Afforestation Funding, India

Location: Himalayan state of Uttarakhand, India
Timeframe: Model, considering timeframe of 20 years for the implementation and outcome analysis
Status: Not implemented, theoretical framework
Financing type: Green Bonds / Payment for Ecosystem Services
NbS measures:

- Afforestation, replacing degraded grasslands with oak trees.

Benefits: Flood risk reduction, stream water recharge, and augmented biodiversity.

solarisgirl. (2019). Trail. Available at: https://flic.kr/p/2fdMPzx

Case study summary

The proposed instrument integrates payments for ecosystem services (PES), green bonds, and catastrophe insurance into a cohesive framework aimed at fostering environmental resilience and sustainable land use practices. The aim is to address environmental degradation and mitigate risks such as flooding. PES is a mechanism that compensates upstream stakeholders, such as landowners or communities, for maintaining or improving ecosystem services that benefit downstream users. In the model, PES is linked to stream water recharge enhanced by afforestation, providing monetary incentives for land restoration.

Green bonds are financial instruments that fund environmentally beneficial projects. In the framework, green bonds are issued to finance the replacement of degraded grasslands with oak forests. This approach not only accelerates land restoration but also ensures that investors receive returns through PES-generated income and insurance-linked pay-outs. Catastrophe insurance mitigates financial risks associated with flooding events. The framework proposes that downstream hydropower plants purchase insurance, with premiums linked to flood risks reduced through afforestation. The proceeds from green bonds serve as collateral for potential insurance claims, creating a robust risk-sharing mechanism. The case study uses a dynamic optimization model to determine the optimal allocation of resources from green bonds while maximizing PES income and minimizing insurance pay-outs. Afforestation efforts funded by green bonds reduce runoff, enhance water recharge, and decrease flood hazards over time. As ecosystem resilience increases, PES incomes grow, and insurance premiums can be lowered, creating a self-sustaining loop of ecological and financial benefits.

Operational details

An innovative nature-based financing model integrates payments for ecosystem services (PES), green bonds and catastrophe insurance to promote sustainable land use and enhance the resilience of the environment and infrastructure. Designed for flood-prone areas in Uttarakhand, India, the scheme focuses on reforesting degraded grasslands with native oak trees.

An important role is played by a private manager who issues green bonds to raise capital for the reforestation effort. The degraded grasslands are replaced with oak forests, which help to reduce storm water runoff and increase stream water recharge. These ecosystem services benefit both local communities and critical infrastructure downstream - in particular hydroelectric power stations vulnerable to flash floods.

The scheme monetises these environmental benefits in two ways. First, downstream communities pay for increased water availability through a PES agreement. Second, the hydropower plant purchases flood insurance from the private manager, who uses the green bond funds as collateral for potential payouts in the event of a flood. The premiums paid by the power plant provide another source of income to support the afforestation project and repay the bond.

Several other actors play key roles in this system: private investors purchase the green bonds; the manager carries out the land restoration and manages the financial flows; the downstream community and the hydropower plant provide revenue through PES and insurance; and in some scenarios, a social planner (such as a local government) may intervene to optimise public benefits rather than profit. Model simulations show that higher PES prices, longer project durations and risk-based insurance premiums lead to greater afforestation and resilience benefits. Conversely, short timeframes and low PES revenues lead to weaker environmental outcomes.

Providers of funds:

- Private investors buy green bonds issued by the project manager. This is the main source of upfront funding for afforestation;
- Downstream communities pay for enhanced water supply through PES. This revenue helps repay bond investors over time;
- Hydropower plants pay insurance premiums to the project manager for flood protection. These payments also contribute to covering costs and maintaining the scheme's financial sustainability.

Consumers of funds: The primary consumer of funds in the scheme is the private project manager, who receives capital from green bond investors as well as ongoing payments from downstream communities and the hydropower plant. These funds are used to finance the afforestation of degraded grasslands, particularly by planting oak trees to enhance water retention and reduce flood risk. In addition to restoration activities, the manager uses the funds to pay bond interest and repay investors over time, ensuring the financial sustainability of the project. The manager also provides insurance coverage to the hydropower plant, using bond proceeds as collateral to cover potential flood-related damages. Lastly, a portion of the funds is allocated to cover the operational and administrative costs necessary for implementing and managing the project effectively.

Technical support/intermediaries: Bond certification agencies that verify and certify that the green bonds meet recognised environmental standards, which is essential to attract environmentally conscious investors.

How is it working?

Evaluation: Not foreseen - in this scheme, the evaluation will be primarily based on the results of modelling and scenario analysis.

Challenges:

- Not all green bond investments produce positive environmental results (for example, the Three Gorges Dam in China and the Girau Dam in Brazil show that green bonds can finance environmentally damaging projects if they are not properly designed or certified);
- The need for credible certification of green bonds can make green bonds less attractive to some investors due to lower returns;
- Time lag between afforestation and ecosystem service benefits, reducing short-term financial returns.
- Unlike public grants, green bonds require future repayment; if PES or insurance income is low, repayment becomes difficult; and
- Catastrophic events early in the project can undermine financial sustainability.

Enablers:

- Access to green bonds with adequate certification;
- Established PES mechanism;
- Support in building and connecting such complex markets from governments and non-governmental organisations; and
- A strong track record of successfully completing similar programmes in the past to demonstrate the viability of the project to investors.

References and sources to learn more

- Ranjan, R. (2024). Creating synergies between payments for ecosystem services, green bonds, and catastrophe insurance markets for enhanced environmental resilience. Land Use Policy, 136, 106970. https://doi.org/10.1016/j.landusepol.2023.106970
- Kovacs, E. K., Kumar, C., Agarwal, C., Adams, W. M., Hope, R. A., & Vira, B. (2016). The politics of negotiation and implementation: a reciprocal water access agreement in the Himalayan foothills, India. Ecology and Society, 21(2). http://www.jstor.org/stable/26270387(Existing PES scheme in Kangra district of Himachal Pradesh, India, the municipality of Palampur town compensated upstream villages for protecting their forests and enhancing water supply in the Bohal springs: Kovacs.)

Biodiversity-improvement Farming Practices, Austria

Location: Lassee, Lower Austria
Timeframe: Started in 2023 - ongoing
Status: Implemented, ongoing
Financing type: Crowdfunding
NbS measures: Fragmentation of the agricultural landscape, changed farming practices, restoration of wildlife habitats
Benefits: Flood and drought risk management, carbon sequestration, biodiversity enhancement

Asar Studios. (2015). Austria. Available at: https://flic.kr/p/83Wsry

Case study summary

The community crowdfunding scheme initiated in Lower Austria represents an innovative model of payment for ecosystem services that effectively facilitates the implementation of NBS aimed at enhancing current biodiversity levels. This initiative is supported by the Austrian Rural Development Programme, known as ÖPUL (Agrarumweltprogramm), which mandates that 7% of cropland be allocated to biodiversity-friendly areas during the current funding period. The funding scheme is based on an informal, voluntary agreement between the local hunting association and farmers.
It comprises two distinct types of agreements: private sponsorships that cover various costs—such as the purchase, implementation, and maintenance of NbS—and informal collaboration agreements between hunters and farmers.

Operational details

Area and economic setting: The Marchfeld region is situated climatologically in a transitional zone between the Western European climate zone—characterized by mild winters and humid, relatively cool summers—and the more continental Eastern European climate provinces, which are marked by cold winters and hot, dry summers. Under these climatic conditions, stable crop yields during dry years can only be achieved through irrigation. Primarily, row crops and field vegetables are irrigated, with water drawn almost exclusively from the underlying groundwater body. The predominant irrigation method involves the use of small-area sprinklers. Approximately 81% of the agricultural area is used for arable farming, with major crops including cereals, vegetables, sugar beets, potatoes, rapeseed, and wine grapes (Hadatsch et al. 2000). The Marchfeld is regarded as an intensively cultivated agricultural landscape (Thaler et al. 2008). Prolonged dry periods are common, particularly during the summer months of June, July, and August.
Land ownership: The NbS is implemented on private-owned land used for agricultural purposes.
Governance Mechanism: The fund operates through the local hunting association including private partners. This body is responsible for decision-making and supporting project.
Financing mechanism: The funding scheme receives contributions from various private and public sources, including subsidies from regional authorities, individual contributions from hunters, and uncollected hunting leases, which generate between €5,000 and €10,000 annually.
Providers of fund: private people (community crowdfunding) and public administration through subsidies.
Consumers of funds: Farmers
Technical support/intermediaries: The local hunting association plays the crucial role within the realization of the funding scheme; they collect, provide individual payments as well as manage the implementation and maintenance of the NbS.

How is it working?

Evaluation: Not available

Challenges:

- Acceptance by the farmers;
- Difficulty reaching large-scale funding schemes; and
- Long-term funding.

Enablers:

- Hunting Association: Managing, financing, planting and maintenance of biodiversity stripes;
- Support by the federal state as Lassee acts a pilot region for alternative hunting practices;
- Informal agreement between hunters and farmers;
- Hunters manage the whole process from planning, buying, implementing and maintenance; and
- Direct communication with farmers.

References and sources to learn more

- Hadatsch et al. (2000): Potenziale der biologischen Landwirtschaft zur Entlastung des Natur- und Landschaftshaushaltes im Marchfeld. MONOGRAPHIEN, Nr. 127. Umweltbundesamt / Federal Environment Agency – Austria. https://www.umweltbundesamt.at/fileadmin/site/publikationen/M127.pdf
- Thaler et al. (2008): Climate change impacts on selected crops in Marchfeld, Eastern Austria. 28th Conference on Agricultural and Forest Meteorology. https://ams.confex.com/ams/28Hurricanes/techprogram/paper_138941.htm

Glossary

- **Blockchain technology** provides a secure, transparent, and tamper-proof way to track the creation, ownership, and retirement of carbon credits, helping prevent double-counting and improve trust in carbon markets.
- **Cap-and-trade system** is a carbon trading mechanism that sets a cap on total carbon emissions and allows entities to buy and sell emission allowances, incentivizing reductions where they are most cost-effective.
- **Carbon leakage** is the shift of greenhouse gas emissions from one country or region to another due to differences in climate policies, often it happens when businesses relocate production to avoid stricter emission regulations.
- **Crowdfunding** is a method of raising money from a large number of individuals, typically via online platforms, each contributing small amounts to collectively fund a project.
- **Fintech solutions** in carbon trading use digital technologies, such as blockchain, AI, and online platform, to streamline the buying, selling, and verification of carbon credits; improving market access, transparency, and efficiency for participants.
- **Green bonds** are debt securities issued to raise funds specifically for projects that deliver environmental benefits, such as renewable energy, sustainable forestry, or climate adaptation.
- **Green real estate development** is the planning, construction, and operation of buildings or communities designed to reduce environmental impact through energy efficiency, sustainable materials, and nature-based or climate-resilient solutions.
- **Greenwashing** is the practice of giving a false or misleading impression of environmental responsibility, often through marketing or branding, without making substantial sustainability efforts.
- **Impact investing** in connection to nature-based solution implementation is the allocation of capital to projects that generate both financial returns and measurable positive environmental outcomes, such as restoring ecosystems or enhancing climate resilience.
- **Joint venture** is a business arrangement in which two or more parties agree to pool resources and share ownership, risks, and profits to undertake a specific project or business activity.
- **Municipal green bonds** are bonds issued by local or regional governments (municipalities) to finance environmentally beneficial public project, such as green infrastructure, clean transportation, energy efficiency, or ecosystem restoration, while offering investors a fixed income return.
- **Nature-based Solutions (NbS)**, as defined by the EU Commission, "Solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience. Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions."[3]
- **Social return** is the positive societal impact generated by the investment, such as improved public health, community resilience, job creation, or enhanced access to green spaces, etc.

[3]Retrieved from https://research-and-innovation.ec.europa.eu/research-area/environment/nature-based-solutions_en (28 May 2025).

Additional Resources for Inspiration

Business Models for Financing Nature-based Solutions

Developed by the UNEP Copenhagen Climate Centre, this publication explores various business models and financing mechanisms for NbS. It provides insights into structuring projects to attract private investment and achieve financial sustainability.

MERLIN D3.5 – Diversifying Funding for Freshwater Restoration using Nature-Based Solutions: Lessons from the MERLIN Project

The report focuses on strategies to broaden funding sources for freshwater ecosystem restoration within the European Union. It underscores the necessity of diversifying financial inputs to scale up restoration efforts and meet EU policy objectives.

Nature-based Solutions Finance for nationally determined contributions (NDCs)

This UNDP report provides reference material and inspiration to further support the design and implementation of nature-based solutions (NbS) in nationally determined contributions, by enabling countries and local stakeholders to access various financing streams. It presents the importance of financing NbS for NDCs through public, private and philanthropic foundations. It also illustrates existing examples of financing from Asia & the Pacific.

Nordic NBS Policy Handbook

A practical guide designed to help policymakers and planners in the Nordic countries implement nature-based solutions effectively. The handbook provides examples, governance strategies, and enabling conditions, with a strong emphasis on cross-sectoral collaboration and stakeholder engagement.

Toolbox on Financing Nature-Based Solutions

Published by the Climate Policy Initiative (CPI), this report presents case studies utilizing blended finance to overcome investment barriers in NbS. It offers practical tools and strategies for scaling up NbS financing, including mechanisms like green bonds, carbon credits, and public-private partnerships.

References

- Albitar, K., Abdoush, T., Hussainey, K. (2022). Do corporate governance mechanisms and ESG disclosure drive CSR narrative tones? International Journal of Finance and Economics 28/4, p. 3876-3890. https://onlinelibrary.wiley.com/doi/full/10.1002/ijfe.2625
- Ambio (2023): Scolel'te Program. Retrieved from (30 May 2025): https://ambio.org.mx/en/programa-scolelte/
- ARB (2025): California Cap-and-Trade Program. Retrieved from (10 March 2025): https://ww2.arb.ca.gov/our-work/programs/cap-and-trade-program/about
- Australian Government (2025): Carbon Farming Outreach Program. Retrieved from (10 March 2025): https://www.dcceew.gov.au/climate-change/emissions-reduction/agricultural-land-sectors/carbon-farming-outreach-program
- Bremer, Leah L., et al (2016). "One size does not fit all: Natural infrastructure investments within the Latin American Water Funds Partnership." Ecosystem Services 17: 217-236. https://www.sciencedirect.com/science/article/pii/S2212041615300681
- CARKW (2021): Certified Green Bond. Retrieved from (10 March 2025): https://carkw.com/lake-maumelle/certified-green-bond/
- CIAT (2025): CGIAR Hub for Sustainable Finance (ImpactSF). Retrieved from (22 April 2025): https://alliancebioversityciat.org/cgiar-hub-sustainable-finance-impactsf
- Corson, C., & MacDonald, K. I. (2014). Virtual nature, violent accumulation: The "spectacular failure" of carbon offsetting at a Ugandan National Park. Geoforum, 56, 55–65. https://doi.org/10.1016/j.geoforum.2014.06.01
- Croci, E., Lucchitta, B., & Penati, T. (2022). An urban PES model for diffused green areas requalification and maintenance in Milan. Environmental Science & Policy, 130, 47-60. https://www.sciencedirect.com/science/article/abs/pii/S1462901122000314
- David, D., Yoshino, M., & Varun, J. P. (2022). Developing FinTech Ecosystems for Voluntary Carbon Markets Through Nature-Based Solutions: Opportunities and Barriers in ASEAN. In F. Taghizadeh-Hesary & S. Hyun (Ed.), Green Digital Finance and Sustainable Development Goals (s. 111–142). Springer Nature Singapore. https://doi.org/10.1007/978-981-19-2662-4_6
- DBS (2025): Climate Impact X. Retrieved from (20 April 2025): https://www.dbs.com.sg/corporate/solutions/climateimpactx
- DeHaan, Andrea (2023). Man on a Mission: USU Graduate Greg Carr Has Spent the Past 20 Years Leading Restoration Efforts in Mozambique's Gorongosa National Park Utah State University, Utah State Magazine. https://utahstatemagazine.usu.edu/environment/man-on-a-mission/
- den Heijer, C., & Coppens, T. (2023). Paying for green: A scoping review of alternative financing models for nature-based solutions. Journal of Environmental Management, 337. https://doi.org/10.1016/j.jenvman.2023.117754
- EFD (2018): The Costa Rica PES Program: the success, the challenges and its new opportunities of financing. Retrieved from (22 April 2025): https://www.efdinitiative.org/news/costa-rica-pes-program-success-challenges-and-its-new-opportunities-financing
- Ferretti-Gallon, K., & Parker, C. (2023). Paying for green: A scoping review of alternative financing models for nature-based solutions. Journal of Environmental Management, 342, 118292. https://doi.org/10.1016/j.jenvman.2023.118292
- Forest Europe Growing Life (Undated). Landscape and Recreational Values Trading. Retrieved from https://foresteurope.org/wp-content/uploads/2017/08/Finland-CS_recreation.pdf
- Georgetown Climate Centre (2020). Managing the Retreat from Rising Seas. Long Beach, California: Los Cerritos Wetlands Restoration and Land Swap. https://www.georgetownclimate.org/files/MRT/GCC_20_LosCerritos-3web.pdf?utm_source=chatgpt.com

- Goteborg (2022): City of Gothenburg Green Bond Framework. Retrieved from (22 April 2025): https://goteborg.se/wps/wcm/connect/52baf2dc-5f1d-4198-ba46-45d5a2a1d04d/City+of+Gothenburg+Green+Bond+Framework+2019-09-12-1.pdf?MOD=AJPERES
- Green Finance Institute (2025): GFI HIVE: Althelia Sustainable Ocean Fund. Retrieved from (26 May 2025): https://hive.greenfinanceinstitute.com/gfihive/revenues-for-nature/case-studies/sustainable-ocean-fund/
- Green Heart (2025): The Green Heart Project. Retrieved from (22 April 2025): https://greenheartsc.org/
- Gros, A., Hejnowicz, A. P., & Mukherjee, N. (2023). Paying for nature-based solutions: A review of funding and financing mechanisms for ecosystem services and their impacts on social equity. Sustainable Development, 31(2), 1–14. https://doi.org/10.1002/sd.2510
- Hadatsch et al. (2000): Potenziale der biologischen Landwirtschaft zur Entlastung des Natur- und Landschaftshaushaltes im Marchfeld. MONOGRAPHIEN, Nr. 127. Umweltbundesamt / Federal Environment Agency – Austria. https://www.umweltbundesamt.at/fileadmin/site/publikationen/M127.pdf
- Kang, Shiteng, et al (2023). "Investing in nature-based solutions: Cost profiles of collective-action watershed investment programs." Ecosystem Services 59: 101507. https://www.sciencedirect.com/science/article/pii/S2212041622001036
- Konu, H. – Luke Natural Resources Finland (2020). "Designing a new solution to support forest landscapes in a tourism destination – Landscape and Recreation Value Trade in Ruka-Kuusamo". Presentation Slides for SOBIO DAYS 2020. Retrieved from https://sites.uef.fi/sobio/wp-content/uploads/sites/254/2020/12/Henna-Konu_Designing-a-new-solution-to-support-forest-landscapes-in-a-tourism-destination-%E2%80%93-Landscape-Value-Trade-in-Ruka-Kuusamo.pdf
- Kovacs, E. K., Kumar, C., Agarwal, C., Adams, W. M., Hope, R. A., & Vira, B. (2016). The politics of negotiation and implementation: a reciprocal water access agreement in the Himalayan foothills, India. Ecology and Society, 21(2). http://www.jstor.org/stable/26270387
- LTA (2025): Land Trust Alliance. Retrieved from (22 April 2025): https://landtrustalliance.org/
- Manual (2020): San Francisco Parklet Manual. Retrieved from (22 April 2025): https://groundplaysf.org/wp-content/uploads/San-Francisco-Parklet-Manual.pdf
- Martín-Breen, P., & Martínez, M. (2021). Potential nature-based solutions and greenwashing to generate green spaces: Developers' claims versus reality in new housing offers. Land, 10(9), 952. https://doi.org/10.3390/land10090952
- NBSpolicy (2025). Nordic NBS policy handbook. Retrieved from (11 May 2025): https://www.nbspolicy.org/governance-levels/regional-level/land-exchange-swapping-properties-to-protect-or-restore-important-ecosystems?utm_source=chatgpt.com
- Papari, C.-A., Toxopeus, H., Polzin, F., Bulkeley, H., & Menguzzo, E.V. (2024). Can the EU taxonomy for sustainable activities help upscale investments into urban nature-based solutions? Environmental Science and Policy, 151. https://doi.org/10.1016/j.envsci.2023.103598
- Park, J.-G., Park, K.-R., Noh, H. M., & Kim, Y. G. (2023). Characterization of CSR, ESG, and Corporate Citizenship through a Text Mining-Based Review of Literature. Sustainability, 15(5), 3892. https://doi.org/10.3390/su15053892
- Patagonia (2025): Patagonia Action Works. Retrieved from (22 April 2025): https://www.patagonia.com/actionworks/home/choose-location/
- Perera, C., Toxopeus, H., Klein, S., & Merfeld, K. (2024). Enabling justice for nature-based solutions in real estate development. Nature-Based Solutions 6: 100148. https://www.sciencedirect.com/science/article/pii/S2772411524000399
- Ranjan, R. (2024). Creating synergies between payments for ecosystem services, green bonds, and catastrophe insurance markets for enhanced environmental resilience. Land Use Policy, 136, 106970. https://doi.org/10.1016/j.landusepol.2023.106970
- RSCN (undated): Who We Are. Retrieved from (26 May 2025): https://www.rscn.org.jo/overview?lang=en

- Unilever (2023): We're making it our business to protect and restore nature. Retrieved from (26 May 2025): https://www.unilever.com/news/news-search/2023/were-making-it-our-business-to-protect-and-restore-nature/
- State of California – California Air Resources Board (2025). Cap-and-Trade Program. Retrieved from (26 May 2025): https://ww2.arb.ca.gov/our-work/programs/cap-and-trade-program/about?utm_source=chatgpt.com
- Stavins, R. N., Rausch, S., & Harstad, B. (2023). Avoiding carbon leakage from nature-based offsets by design. iScience, 26 (12), 107416. https://doi.org/10.1016/j.isci.2023.107416
- Thaler et al. (2008): Climate change impacts on selected crops in Marchfeld, Eastern Austria. 28th Conference on Agricultural and Forest Meteorology. https://ams.confex.com/ams/28Hurricanes/techprogram/paper_138941.htm
- The Nature Conservancy (2013). Case studies on Remuneration of Positive Externalities - Water for Life and Sustainability Water Fund Cauca Valley, Southwestern Colombia. Retrieved from https://openknowledge.fao.org/server/api/core/bitstreams/948659c6-cdef-463c-bc54-a0d45e027d54/content
- Tikkanen, J., Hokajärvi, R., Hujala, T., Kurttila, M. (2017) Ex ante evaluation of a PES system: Safeguarding recreational environments for nature-based tourism. Journal of Rural Studies 52: 42–55 https://www.sciencedirect.com/science/article/abs/pii/S0743016716303850
- Toxopeus, H., & Polzin, F. (2021). Reviewing financing barriers and strategies for urban nature-based solutions. Journal of Environmental Management, 289. https://doi.org/10.1016/j.jenvman.2021.112371
- UN (2023): Retrieved from (22 April 2025): Gothenburg Green Bonds | Sweden https://unfccc.int/climate-action/momentum-for-change/financing-for-climate-friendly/gothenburg-green-bonds
- Una (2021): Polder Roof Zuidas. Retrieved from (22 April 2025): https://una.city/nbs/amsterdam/polder-roof-zuidas
- Vogl, Adrian et al (2015). "Science-based investment targeting for the Water for Life and Sustainability Fund, Colombia." https://naturalcapitalproject.stanford.edu/sites/g/files/sbiybj25256/files/media/file/waterfund_case_study_cauca_22sep2015_eng.pdf

Land4Climate

Funded by
the European Union

More Information

UNIVERZITA J. E. PURKYNĚ V ÚSTÍ NAD LABEM

BOKU Institute of Landscape Planning

technische universität dortmund

DEN DESIGN ENTREPRENEURSHIP INSTITUTE