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MAPPING THE LANDSCAPE FOR A NATURE ECONOMY

Authors:
Britta Rendlen (Independent advisor on sustainable finance)
David Uzsoki (International Institute for Sustainable Development)

Editors:
Eoghan O'Sullivan
Megan Eaves
Jessica Villat

Proofreader:
Deborah Murith

Graphic designer:
Claire Pauchet

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FOREWORD

Adrian Dellecker
Head of Strategy and Development, Luc Hoffmann Institute

In December 2019, economists at the IMF made a splash by estimating the value of the great whale at more than USD 2 million. There have been many nature valuation initiatives in the past, from The Economics of Ecosystems and Biodiversity (TEEB) to the World Bank's Wealth Accounting and the Valuation of Ecosystem Services (WAVES) and the United Nations' System for Environmental-Economic Accounting (SEEA).

The motivation behind all of these efforts is clear: since we live in a world motivated and driven by economic incentives, giving an economic value to nature should provide an incentive to preserve it.

As helpful as they are, these valuations will not in themselves enable nature to thrive as humanity pursues economic development. This is because there is rarely, if ever, a way to transform these valuations into actual currency that can be channelled back to investors. The great whale might be "worth" USD 2 million, but who will pay for this? If conserving whales and their habitats comes at a short-term cost, who will benefit financially from this up-front investment? Can we capture a real return on investment from nature?

As this report demonstrates, it is possible to come up with innovative financing mechanisms for conservation; indeed, many lean on these academic valuations. However, it is wickedly hard to come up with new revenue streams from conservation to fuel a nature economy.

The real question is not how a great whale is valued; it is how much we are willing to pay to ensure that whales survive and thrive. This report takes an important step towards creating a nature economy that bridges the gap between academic valuations of nature's benefits and the real-world transactions that are needed to fund conservation.

I hope readers will be stimulated to innovate further in this space and help kickstart a much-needed nature economy.

EXECUTIVE SUMMARY

This report provides an overview of financial transaction mechanisms and related enabling frameworks that aim to protect and restore nature.

The true value of the benefits that humans gain from nature is usually not reflected in economic transactions. Attaching a monetised value to these benefits is a necessary step towards addressing the massive gap between investment in activities that are harmful to nature and investment in those that protect nature.

Inventory of mechanisms

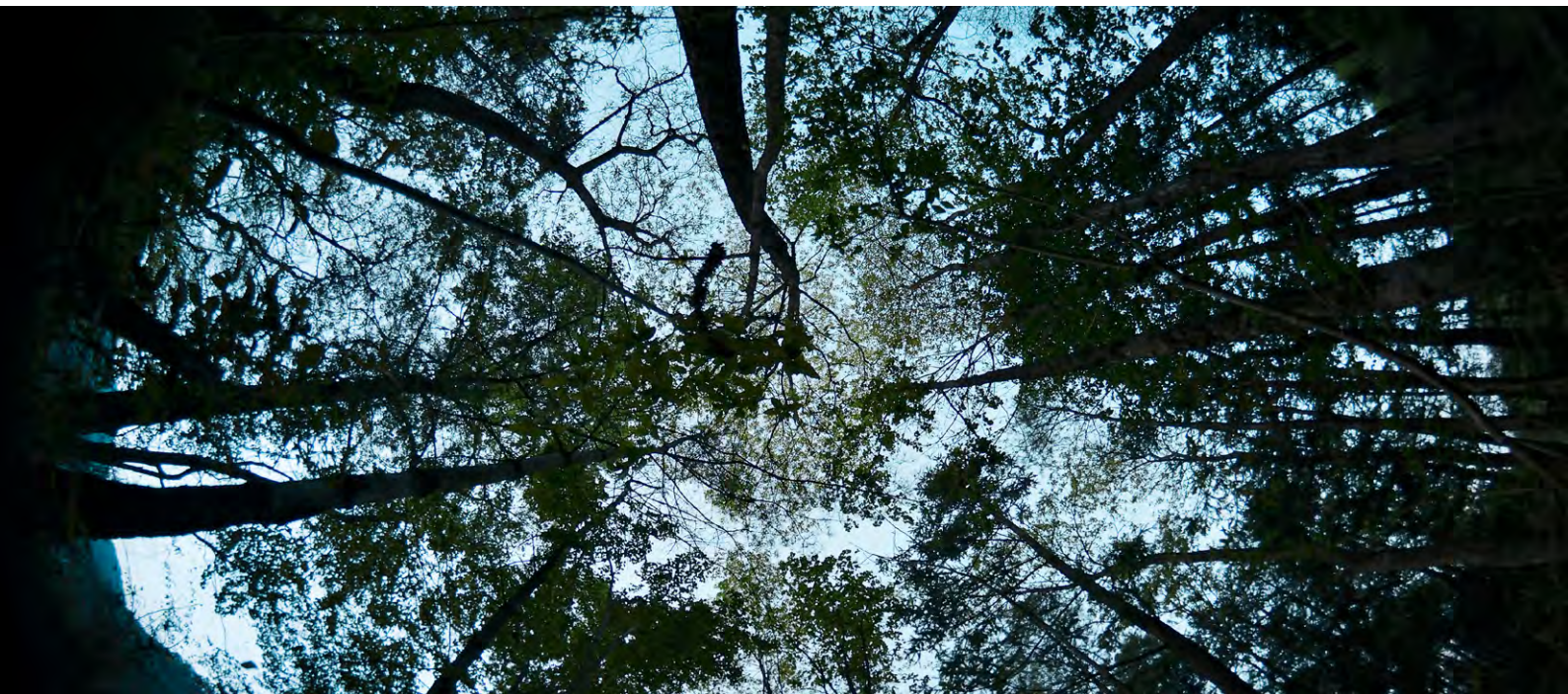
Each of the 23 mechanisms described in the report aims to assign monetary value to nature. While the mechanisms are typically quite complex, involving several different actors, the inventory provides a simplified high-level overview. Concrete examples are referenced in each case. Five different types of mechanism have been identified: fiscal interventions, regulatory instruments, new government-enabled markets, traditional market-based instruments and hybrid mechanisms.

The transaction mechanisms are built upon and enabled by a set of frameworks, standards and methodologies. The most relevant of these are set out in a series of tables where each is described in brief. These frameworks help by providing common approaches to, for example, accounting and valuation, as well as the global datasets and standards that are necessary if the transaction mechanisms are to be scaled up.

Ready to scale?

The innovative element across most of the transaction mechanisms is found in how they link the valuation of services provided by nature to beneficiaries who can pay for them. However, financial viability tends therefore to be more easily found in projects where there is high potential for private value capture. It is also noted that public and philanthropic funding still play a dominant role in the financing of nature-based projects.

By providing an inventory of transaction mechanisms and related enabling frameworks, this report aims to stimulate discussion and creative exploration towards enabling a nature economy. Future research should focus on testing how well these mechanisms perform in protecting nature. Most have not been implemented at scale: more certainty on how well they perform will be necessary before the largest capital providers begin to participate.



1. INTRODUCTION

Our planet is in a biodiversity[1] crisis. Wildlife populations have decreased drastically over recent decades and scientists warn that the sixth mass extinction is under way. At the same time, there is a massive funding gap when it comes to protecting and restoring global biodiversity.

Biodiversity and ecosystem services – the benefits that humans gain from the natural environment – are generally public goods whose true value is not reflected in economic transactions. Many believe that attaching a monetised value to these goods is an important prerequisite for addressing the funding gap: when biodiversity and ecosystem services are diminished or disappear completely because of human interference (e.g. pollution, logging, overfishing, etc.), there is usually no directly attributable financial cost associated with this loss.

At the root of this problem is the failure of markets and policies to account for social and environmental impacts – both positive and negative – of industrial or commercial activities. This results in the under-pricing of biodiversity risk and subsequent ripple effects on socio-economic risk.

The destructive force of climate-change-induced hurricanes and the global impacts of increasingly common zoonotic diseases – generally caused by the sharing of space by humans and domestic and wild animals – are making it painfully clear that functioning, intact ecosystems are not only an important basis for human wellbeing but also constitute 'good value for money' in that they keep economies running and healthcare costs low. Yet, the mismatch between who pays for interventions that preserve our ecosystems and who benefits from their preservation continues to present a major hurdle for humankind to tap into this value.

The COVID-19 pandemic is a case in point: according to the EcoHealth Alliance (2020), pandemics and other emerging zoonoses cause more than US$ 1 trillion in economic damage annually, while global strategies to prevent pandemics (including the preservation of ecosystems and wildlife) cost between US$ 22 and US$ 31 billion annually.

Towards a nature economy

This report maps the current landscape of transaction mechanisms and enabling frameworks that could contribute to the growth of a nature economy. Richard Lipsey defines economics as "the study of the use of scarce resources to satisfy unlimited human wants" (Vancouver Island University, n.d.). The nature economy juxtaposes the key element of "unlimited human wants" with the very limited and finite nature of our planet and its natural resources.

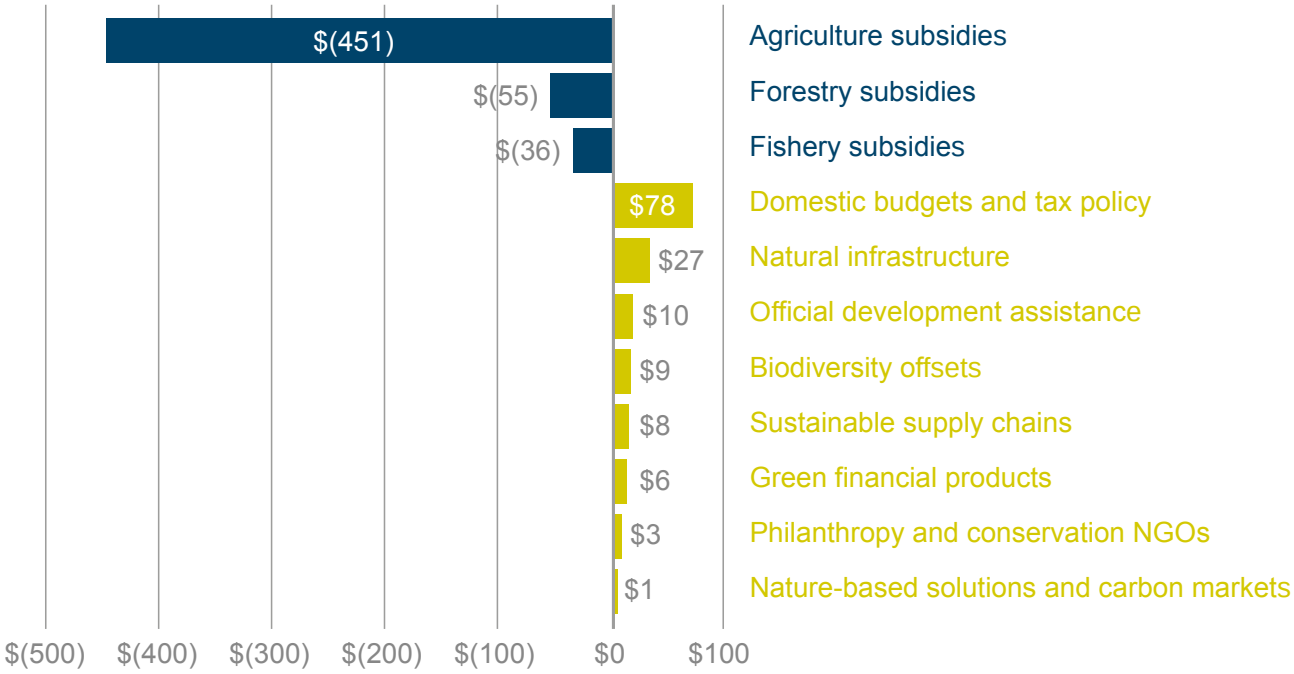
Funding gap

Numerous mechanisms and frameworks have been developed to create accountability by assigning value to nature. These frameworks are as varied as the vantage points of their creators. Because they start with different premises, their underpinning logic will differ and so will their value systems. For example, some aim at protecting nature for its intrinsic value while others, with utilitarian views, seek to draw monetary value or very concrete utility out of nature. Some transaction mechanisms put financial returns first, while others prioritise environmental outcomes. And some mechanisms aim to minimise biodiversity loss caused by human activities, while others want to achieve net biodiversity gain.

Very few of these frameworks have made their way into public policy; even fewer actually make the value of nature 'transactional'. As such, there

1. 'Biodiversity' and 'nature' are used interchangeably in the context of this paper.

Figure 1: Deutz et al. (2020) based on OECD (2020). Harmful subsidies and global financial flows towards biodiversity conservation (upper estimates, in 2019 US$ billion per year)



Note: The estimates of agricultural, forestry and fisheries harmful subsidies correspond to OECD's "potential biodiversity harmful" category of production subsidies. This graph excludes the estimated additional US$ 395–478 billion in fossil fuel production subsidies.

is insufficient creation of biodiversity or natural value through direct monetary investment. The numbers that follow provide insight into the dimensions of the funding gap.

Based on recent estimates from the Organisation for Economic Co-operation and Development (OECD, 2020), global biodiversity finance[2] is currently at US$ 78–91 billion per year. This funding comes from both domestic (US$ 67.8 billion) and international public (US$ 3.9–9.3 billon) expenditure as well from private expenditure (US$ 6.6–13.6 billion). As Figure 1 shows, these figures are dwarfed by current spending on activities *harmful* to biodiversity. While this can be cause for alarm, these public payments also serve as an encouraging illustration of the power of governmental intervention with respect to backing and upholding a set of (frequently intangible) values.

It is possible that this imbalance will decrease as humans begin to understand that making nature fit into our economy is not sufficient and that we need, instead, to make our economy fit into the natural laws and boundaries of our planet. For example, against the backdrop of the current COVID-19 pandemic, there is mounting pressure to acknowledge the range of linkages between environmental and human health. In this context, the One Health approach (World Health Organization, 2017) is gaining significant political and financial momentum. It advocates considering environmental, animal and human health in unison and opens new doors to transaction mechanisms that now increasingly include the component of human health.

Impediments

The next chapters set out many of the mechanisms and enabling frameworks that have been created to help address the challenge of attaching a value to nature. These mechanisms and frameworks, however, have had poor uptake by funders, implementers and beneficiaries. The

2. Defined as follows: 'expenditure that contributes – or intends to contribute – to the conservation, sustainable use and restoration of biodiversity'.

following key impediments[3] are frequently cited for this lack of uptake:

Economic impediments

- Incentivisation and subsidies are currently counterproductive (see above).
- There is misalignment of (short-term) individual self-interest and the collective interest when using shared-resource systems ('tragedy of the global commons').
- Time horizons of biodiversity and nature restoration projects frequently exceed the time horizons for investors.

Technical impediments

- Setting up the mechanisms is frequently highly complex and time-consuming, requiring multi-stakeholder coordination and agreement.
- In contrast with climate change, where we focus on decreasing CO_2 emissions and keeping the average global temperature rise below 1.5 °C, there is no single unit that measures biodiversity and no single goal, which makes comparison challenging.
- Solutions and approaches to biodiversity challenges often need to be highly localised, frequently requiring small-scale projects, which, in turn, are more difficult to finance.
- Ecosystems and biodiversity interactions are highly complex and difficult to model.
- There is no standardised methodology to set the baseline.
- It is difficult to assess the benefits, such as employment creation, GDP growth and agricultural productivity, generated by nature protection (such as through nature-based solutions, protected areas, etc.). On the other hand, the opportunity cost of nature protection – the foregone revenues from unrealised economic activities that are destructive to natural capital[4] – is much easier to quantify: for example, the revenue-generating potential of replacing a rainforest with a palm oil plantation.
- There is a lack of understanding of the financial and economic impact of biodiversity loss and the erosion of natural capital.

Other impediments

- Traditionally disadvantaged groups (including indigenous populations, women) and their perspectives, needs and priorities are often neglected in the development of mechanisms.

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3. Based in part on World Bank Group (2020) *Mobilizing Private Finance for Nature*.

4. Natural capital can be defined as the world's stocks of natural assets which include geology, soil, air, water and all living things. It is from this natural capital that humans derive a wide range of services, often called ecosystem services, which make human life possible. https://www.cbd.int/business/projects/natcap.shtml

2. TRANSACTION MECHANISMS

Overview

Due to their unique characteristics, investments in nature and biodiversity typically need to rely on very specific, and often innovative, financial instruments. Figure 2 provides a global overview of the biodiversity financing landscape.

The figure refers to transaction mechanisms and related enabling frameworks. The enabling frameworks are detailed in Chapter 3. We have categorised the different transaction mechanisms under five types of intervention as follows:

1. Fiscal interventions
2. Regulatory instruments
3. New government-enabled markets
4. Traditional market-based instruments (including financial markets)
5. Hybrid mechanisms

It is important to note that the tables below do not represent a comprehensive inventory. They rather serve to stimulate discussion and creative exploration. (For a comprehensive overview of financial transaction frameworks for biodiversity, please refer to the BIOFIN Catalogue of Financial Solutions[5].)

The categorisation of financial mechanisms is only an approximation, as there are many nuances to each that make it difficult to assign clear categories. Furthermore, the information describing the parties to the transactions and the 'exchange of values' is simplified. In reality, the transactions can be very complex with many more actors involved. The purpose of the simplification is to reveal patterns or characteristics that may potentially lie at the roots of some of the impediments listed in Chapter 1.

Non-monetary transactions

Non-monetary transactions around nature and biodiversity conservation are not explored in detail in this report. This is because there is a lack of data and research on this topic.

Such non-monetary transactions may occur in different contexts, for example:

- the renewed interest in regenerative agriculture and in conscious and eco-friendly lifestyle choices outside capitalist and consumerist Western models;
- spiritual or nature-connection experiences;
- volunteering; or
- indigenous traditions.

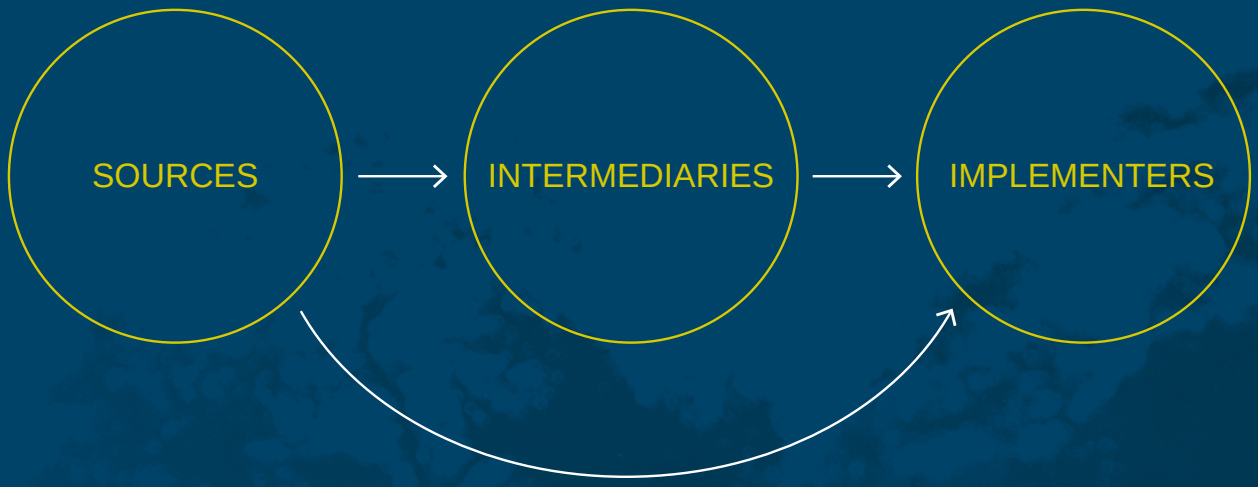
Each of these contexts will in turn be marked by different underlying motivations. For example, an environmental volunteer – undertaking habitat or species monitoring, removal of invasive species, or administrative or fundraising support for conservation causes – may be seeking to make a conscious contribution to society, or to foster and enjoy a sense of community. Others may be motivated by spiritual beliefs. There are, for example, environmental leaders who specifically appeal to people's spirituality and thereby achieve certain changes in behaviour and positive environmental outcomes[6].

The connection with and sense of stewardship for the land runs deep in traditions and beliefs, particularly in indigenous cultures. Since indigenous peoples manage or have tenure rights over 25% of the world's land surface, and their land corresponds to 40% of the Earth's protected areas and ecologically intact landscapes, they can play a powerful role in finding solutions to the current biodiversity crisis (Garnett et al., 2018).

5. BIOFIN Catalogue of Finance Solutions https://biodiversityfinance.net/finance-solutions

6. According to a display in Two Oceans Aquarium, Cape Town, South Africa.

Figure 2: The biodiversity financing landscape, adapted from OECD (2020), in turn adapted from Hainaut et al. (2018)



SOURCES

PUBLIC
- Government budgets (revenue from taxes, fees and charges)

PRIVATE
- Household revenues and savings
- Corporate revenues and savings

INTERMEDIARIES

PUBLIC
- Ministries
- Public agencies and funds
- Develepment finance institutions (national, bilateral, multilateral)
- Global Environment Facility (GEF) and multilateral funds

PRIVATE
- Institutional investors
- Asset managers
- Commercial banks
- Philanthropic foundations

IMPLEMENTERS

PUBLIC
- Local and central governments
- Protected area agencies
- Public utilities

PRIVATE
- Conservation NGOs
- Private companies
- Households and communities

EXISTING TRANSACTION MECHANISMS

- Fiscal interventions
- Regulatory instruments
- New government-enabled markets
- Traditional market-based instruments (incl. financial markets)
- Hybrid mechanisms

ENABLING FRAMEWORKS

- Ecosystem accounting frameworks
- Valuation methodologies
- Nature- and biodiversity-related data
- Standards
- Policy frameworks

Inventory of existing transaction mechanisms

Table 1: Financial transaction mechanisms

Category 1: Fiscal interventions

1a Blended public funds providing capital in the form of grants, equity and debt

Transaction parties	Exchange values
• Governments • NGOs/project developers	Funds against nature protection services

Funds from the budgets of several public entities are pooled and used to fund or de-risk investments in nature and biodiversity, for example as part of a blended finance scheme.

This mechanism provides a source of risk capital that can leverage other sources of financing, with the additional benefit that the funding comes from existing budgets. However, it may prove difficult to secure the long-term replenishment of the fund.

Examples

The Land Degradation Neutrality (LDN) Fund was established by the governments of France, Luxembourg and Norway, and the Rockefeller Foundation (UNCCD, n.d.). The fund is committed to providing evidence of its 'achieved impacts', which include increasing revenues from sustainable use of natural resources, increasing employment, improving food and water security, and carbon sequestration.

The Green Exercise Partnership in Scotland is a joint venture between the Forestry Commission Scotland, Scottish Natural Heritage and Health Scotland (part of the Scottish National Health Service (NHS)). It funds projects to show the health benefits that derive from investment in and management of the NHS estate. For example, it funded tree planting, active woodland management, pathway improvement and other actions so that hospital staff and patients, and local residents can benefit from exercise and time in nature (Baroni, Nicholls and Whiteoak, 2019).

1b Tax increment financing

Transaction parties	Exchange values
• Governments • Private parties/taxpayers	Funds against nature protection services and higher future tax revenues

Tax increment financing (TIF) is used to finance nature-based infrastructure projects and other redevelopment projects based on anticipated future tax revenue resulting from the new development (National Housing Conference, n.d.). When a TIF district is established, the "base" amount of property tax revenue is recorded using the status quo before improvements. For example, a new public green space prompts a rise in property values, leading to an increase in actual property tax receipts above the base. While the base amount of property tax revenue continues to fund the maintenance of the nature-based infrastructure, the additional tax revenue is used to pay bonds and reimburse investors.

While TIF provides a way to increase public budgets without the need to raise taxes, it can be difficult to forecast the expected tax revenue increase. Such schemes also require dedicated legislation and are challenging to implement in lower income economies.

Example

TIF was used to overcome funding shortfalls for a green corridor at the Gateway South Business Park in Baltimore, Maryland, USA (Northeast Midwest Institute, 2006).

1c Tax rebates

Transaction parties

- Governments
- Private parties/taxpayers

Exchange values

Tax rebate against nature protection services

Landowners receive reductions in income or property taxes if they incorporate long-term conservation measures and active biodiversity management on their lands.

Such schemes secure the buy-in of private landowners and improve biodiversity using private sources of financing.

Examples

In the USA, ‘conservation easements’ mean that landowners receive tax benefits in return for giving up their right to develop their land. When the land is sold, the easement remains in place (The Nature Conservancy, n.d.).

The Conservation Land Tax Incentive Program in Ontario, Canada offers landowners a 100% property-tax exemption if they agree to maintain eligible portions of their properties in a manner that contributes to the natural heritage and biodiversity objectives for conserving land (Ontario Ministry of Natural Resources, 2018).

In South Africa, section 37D of the Income Tax Act provides a dedicated tax incentive related to biodiversity: it allows landowners to deduct 4% of the value of land declared as a nature reserve from their taxable income (South African National Biodiversity Institute (SANBI), 2019).

1d Debt-for-nature swaps

Transaction parties

- Creditor governments
- Debtor governments
- NGOs/project developers

Exchange values

Debt relief against nature protection services

Debt-for-nature swaps can take different forms. For example, a creditor government or business might swap repayment against the debtor's commitment to fund local conservation projects. Alternatively, NGOs (and donors) might purchase a debt and then swap it against the debtor's commitment to fund conservation.

Swaps can typically lead to benefits beyond immediate investment in nature, such as the creation of nature-based revenue streams, policy changes, etc. However, they tend to involve very long set-up times and complex negotiations.

Example

The Nature Conservancy created the Seychelles Conservation and Climate Adaptation Trust to convert US$ 22 million in sovereign debt into investment in marine conservation, helping the country achieve its goal of 30% marine protection. Funding came from several private foundations and The Nature Conservancy itself (Convergence, 2017).

1e Carbon or pollution tax

Transaction parties

- Governments
- Individual users of fuel

Exchange values

Right to use fuels with high carbon content against tax income

A carbon tax is a tax levied on the carbon content of fuels, generally in the transport and energy sector. Globally, 25 countries have committed to charging a carbon tax or are already doing so. A pollution tax or 'green tax' is levied on activities that are harmful to nature.

Such taxes are an efficient means of generating funds for nature conservation, but they do not foster innovation.

Example

In Zimbabwe, a tax of US$ 0.03 per litre is payable on petroleum and diesel products, while Ukraine collects an 'environmental pollution fee' from all polluting entities.

Category 2: Regulatory instruments

2a Developer contribution charges

Transaction parties

- Governments
- Project developers

Exchange values

Right to reduce natural capital against funds

Infrastructure and property developers are required to make a one-off payment as part of a development approval application. The proceeds can be directed towards preserving natural ecosystems.

Such charges provide a way to increase limited public budgets, while incentivising property developers to improve the sustainability performance of infrastructure projects. However, they are only suitable to fund small-scale projects and otherwise must be complemented by other sources of financing.

Example

In Vancouver, Canada, property developers are required to pay a development cost levy before receiving a building permit. If the new development also involves rezoning, developers also pay a community amenity contribution. The revenues are used by the city to fund public facilities, including parks (Baroni, Nicholls and Whiteoak, 2019).

2b Business improvement districts

Transaction parties	Exchange values
• Governments • Businesses	Funds against nature protection services

Business improvement districts (BIDs) involve contracts between municipal governments and private capital holders, under which the latter contribute towards the rehabilitation of natural areas or ecosystems. Once a given level of regeneration has been achieved, the 'district', comprising public and private counterparties, is empowered to manage and maintain the natural asset.

BIDs can be effective for the regeneration of brownfield urban areas, but are less effective in areas that are spread out or have mixed land uses, as it is more difficult for the payer to capture the benefits of targeted improvements (Baroni, Nicholls and Whiteoak, 2019).

Example

The Lower Don Valley Flood Defence project in Sheffield, UK is funded partly through a BID levy on businesses in the area (expected to cover about 17% of the total project costs). The project improves flood defences at over 50 locations along an 8 km stretch of the River Don (Baroni, Nicholls and Whiteoak, 2019).

2c Betterment levies

Transaction parties	Exchange values
• Governments • Property owners	Funds against nature protection services

Stakeholders that benefit from nature-based solutions, either in the form of higher revenues or higher property valuations, pay a levy that is directed towards maintaining the natural asset that generates these revenues.

Betterment levies can be used to fund non-revenue-generating nature-based assets. However, consideration needs to be given to whether there are negative financial consequences for landowners who may not have the capacity to pay a levy or who are 'asset rich, but income poor'. The potential impacts on businesses also need to be considered (Baroni, Nicholls and Whiteoak, 2019).

Example

Wimbledon and Putney Commons, public parks in London, UK, are maintained through a levy (additional to council tax) on those who live within a short distance of these green spaces (Baroni, Nicholls and Whiteoak, 2019).

Category 3: New government-enabled markets

3a Biodiversity offsetting

Transaction parties	Exchange values
• Biodiversity reducers • Biodiversity enhancers • Sometimes with 'conservation or mitigation banks' as intermediaries	Funds enabling a specific offset project (e.g. rehabilitation/restoration) against right to reduce biodiversity

Offsetting requirements are put in place typically for large industrial and infrastructure projects, as the final step in the mitigation hierarchy that the project developer is required to follow. Biodiversity offsets are measurable conservation outcomes designed to compensate for adverse and unavoidable impacts of projects. The goal is to achieve, overall, no net loss of biodiversity. More than 25 countries have implemented mandatory biodiversity offset schemes. Also, the International Finance Corporation performance standards include mandatory offsetting.

Offsetting schemes make the adverse effects of infrastructure projects visible and create accountability. However, individual transactions can be costly to set up and implement, and finding matching nature restoration projects is not always possible.

Examples

The government of Mozambique has begun implementing a biodiversity offsetting scheme applicable to all infrastructure and large industrial projects, such as mines (Bechtel and Nazerali, 2016).

The value of the global ecosystem marketplace has reached more than US$ 36 billion. This includes payments for services such as carbon capture and water storage, as well as biodiversity conservation, for example through mitigation banks or other offsetting systems (Thiel, 2018).

3b Carbon markets

Transaction parties

- CO_2 producers
- CO_2 eliminators

Exchange values

Funds enabling a specific offset project (e.g. preservation of forests and introduction of efficient cookstoves) against right to emit CO_2

The annual carbon sequestration value of expanded conservation could be worth US$ 4–10 billion. Company pledges amounting to about US$ 3 billion a year by 2030 suggest that carbon offsets may become a material source of conservation funding (Claes et al., 2020).

Carbon offsets will play a vital role in achieving the carbon neutrality targets of companies and can therefore be a significant source of revenue for conservation projects. However, as current schemes often rely on avoided deforestation or avoided forest degradation, they are only suitable for areas with high rates of deforestation or degradation where these rates can be slowed, stopped or reversed (Roe et al., 2020).

Example

Carbon Tanzania works with a wide range of partners on land and forest restoration initiatives. These are funded by selling carbon credits, from avoiding forest loss and degradation, into voluntary carbon markets (Roe et al., 2020).

3c Trading of stormwater credits

Transaction parties

- Property developers
- Property owners

Exchange values

Funds exchanged against the right to not meet stormwater guidelines

These schemes involve the trading of credits to manage stormwater and the pollution of natural waterways from stormwater discharge. The generation of revenues through selling credits is used to establish a secondary market to attract private investment to finance more substantive stormwater management measures.

This mechanism creates a monetary value for stormwater management, which incentivises property developers to explore nature-based solutions. This requires strict regulation of stormwater management.

Example

In Washington, D.C., projects are required by the municipality to meet a 1.2 in run-off retention standard; developers are allowed to buy credits when their projects do not comply with the standard. Credits are sold and purchased among developers or redevelopers, based on their capacity to meet the programme's limits (Bassi et al., 2017).

Category 4: Traditional market-based instruments (incl. financial markets)

4a Green bonds

Transaction parties

- Investors
- Businesses

Exchange values

Investment against a financial return and a foreseen green outcome

The proceeds of the bond are directed at predefined green projects while the bond is backed by the issuer's entire balance sheet (Climate Bonds Initiative, 2020).

The issuance of a green bond has a signalling effect, demonstrating the issuer's commitment to sustainability. However, as actual impact measurement and reporting are not required according to the Green Bond Principles (only a disclosure of the expected environmental impact) (ICMA, 2018), the additionality – the actual increase in the amount of capital allocated to green projects – is frequently questioned (Michaelsen, 2018).

Examples

Green bonds have been issued by countries (e.g. Indonesia, France, Poland) and municipalities (e.g. Stockholm, Paris), as well as corporate entities such as Toyota, Apple, EDF and Citigroup.

4b Resilience bonds

Transaction parties	Exchange values
• Project developers • Insurance companies • Investors	Funds against nature protection services

Resilience bonds are issued to finance climate-resilient upgrades that are paid back through subsequent cost savings from lower insurance premiums. They aim to move pools of capital from post-disaster relief to pre-disaster preparedness and prevention. Resilience bonds provide opportunities for coastal communities to rebalance existing insurance portfolios and mobilise funding for municipal flood barriers and coastal protection measures.

Resilience bonds enable governments to transfer climate disaster risk to insurers, while raising financing for nature-based solutions that they could otherwise not afford to deploy. This instrument is, however, still in the pilot stage.

Examples

Norfolk, Virginia and other US coastal cities in the 100 Resilient Cities network are well positioned to benefit from rebalancing their insurance portfolios using resilience bonds. These cities all have significant exposure to surge-related flooding and have created specific plans and strategies to reduce these risks with comprehensive systems of engineered and natural flood barriers and coastal protection measures (re:focus partners, 2018).

There are ongoing discussions to do a pilot in Boulder, Colorado, USA. The city wants to use resilience bonds to finance climate resilience programmes such as strengthening disaster response through community-building exercises (Ruggeri, 2017).

4c Sustainability-linked bonds

Transaction parties	Exchange values
• Investors • Businesses	Investment against a return and a verified green outcome

These are non-earmarked bonds whose financing cost may be increased in the event of the issuer failing to achieve a sustainable performance objective.

Sustainability-linked bonds can be issued by any issuer, unlike green bonds. To avoid the risk of greenwashing, issuers must select key performance indicators that are ambitious enough.

Example

The energy group Enel issued a US$ 1.5 billion five-year bond with a 2.65% coupon. This rate is subject to the energy company's strategy of having at least 55% of its installed capacity in renewable energy sources by 2021. If the 55% goal is not reached by 31 December 2021, the coupon will be increased by 25 basis points (bps) until the bond matures.

4d Sustainability-linked loans

Transaction parties	Exchange values
• Banks • Businesses	Funds against a return and a foreseen green outcome

Sustainability-linked loans financially incentivise borrowers to reach predetermined sustainability performance objectives, for example by lowering interest rates or adjusting other terms of the loan agreement. Interest rate benefits must be 'meaningful', that is about 2.5–3 bps. The sustainability-linked loan market is estimated to have reached US$ 122 billion in 2019 (BloombergNEF, 2020).

These loans encourage borrowers to set sustainability performance targets that go beyond a business-as-usual scenario. One drawback, however, is that independent external verification of the achievement of the targets is not required.

Example

Cemex, a Mexican cement maker, obtained a US$ 3.2 billion sustainability-linked loan, where the interest margin was linked to five key performance indicators, including setting up quarry rehabilitation plans and biodiversity action plans, as well as the successful implementation of water management plans in sites located in water-scarce areas. The interest rate margin could step up or down 1 bp or remain unchanged (Environmental Finance, 2020).

4e Insurance-based solutions

Transaction parties	Exchange values
• Insurers • Property owners	Risk cover against a premium payment

Parametric, sometimes called index-based, insurance solutions are a type of insurance that covers the probability of a predefined event happening instead of paying for an actual loss that occurred (Swiss Re, 2018).

While solutions can be customised, and location specific, the schemes can be expensive to set up, requiring multi-stakeholder involvement.

Example

Swiss Re's innovative coral reef insurance is a parametric insurance product that pays for the restoration of a coral reef in case of a storm surge. The insurance premiums are paid by property owners who benefit from the flood protection provided by the reef.

4f Payment for ecosystem services

Transaction parties	Exchange values
• Users of the services provided by that ecosystem • Stewards of the ecosystem	Funds enabling enhancement or maintenance of an ecosystem against ongoing services provided by the ecosystem

Under payment for ecosystem services (PES) schemes, beneficiaries pay for the benefits delivered to them by restoration and conservation actions.

PES can be considered as revenue streams from nature-based assets that would otherwise not generate any income. This enables the structuring of a wider range of financial instruments. Nevertheless, beneficiaries might find it hard to accept that they have to pay for an ecosystem service that has until now been free.

Example

In Switzerland, farmers receive payments for the provision of public and ecological services, as part of the federal agricultural policy. The farmers must provide information about their ecological performance, with regard to the balanced use of nutrients and the allocation of ecological compensation areas (Bassi et al., 2020).

4g User fees

Transaction parties

- Implementing agencies
- Users of ecosystem services

Exchange values

Funds against the use of ecosystem services

These schemes require users of natural capital to pay fees for the ecosystem services provided. This could encompass, for example, entrance fees paid by those who visit national parks.

The introduction of mandatory fees for sites that were previously open access is likely to be unpopular with residents.

Examples

In Australia, the Botanic Gardens and Parks Authority (Perth) and the Royal Botanic Gardens and Domain Trust (Sydney) generated 7% and 12% respectively of their revenues from user charges related to events and functions in 2011–2012 (Searle, 2013).

4h Crowdfunding

Transaction parties

- Project developers
- Individuals

Exchange values

Funds against nature protection services

Crowdfunding involves raising funds for a project through the donation of small amounts from a large number of individuals.

This approach is especially suited to supporting small-scale projects that would not necessarily qualify for other financing instruments.

Example

MyParkScotland, a charity raising funds for Scotland's public parks, includes a crowdfunding platform where donors can support various park projects (Baroni, Nicholls and Whiteoak, 2019).

Category 5: Hybrid mechanisms

5a Concessional loans

Transaction parties

- Public or private institutions (including philanthropic)
- Implementing agencies

Exchange values

Financing against conservation outcomes and, potentially, returns

These are loans that are extended on terms substantially more generous than market loans. This 'concessionality' is achieved either through interest rates below those available on the market or by grace periods, or a combination of both (OECD, 2003).

Concessional loans are an important component of blended financing solutions and can be used to attract private sources of financing. They are not suitable, however, for nature-based projects that do not have the necessary cash flows to service the loan.

Examples

The Natural Capital Financing Facility offers concessional loans, among other funding instruments, to projects that promote the conservation, restoration, management and enhancement of natural capital for biodiversity and adaptation benefits. This includes ecosystem-based solutions to challenges related to land, soil, forestry, agriculture, water and waste inside the EU (European Investment Bank, n.d.).

5b Impact bonds

Transaction parties

- Governments
- Investors
- Implementing agencies

Exchange values

Funds against achievement of environmental objectives

These are structured on a 'pay for performance' model, enabling public entities to transfer performance risks to investors who provide the working capital to an implementing agency to deliver specific outcomes. Bond holders only realise their principal and return if the outcomes are delivered.

Impact bonds create accountability and efficiency in traditionally administration-heavy activities. They may, however, stifle innovation as the complete focus is on the efficient delivery of one or several very specific outcomes. They are also expensive to establish.

Examples

The Rhino Impact Investment Bond (ZSL, n.d.) has predefined conservation performance indicators linked to black rhino conservation activities. There are also many examples of environmental impact bonds, such as the DC Water EIB, which funds the construction of green infrastructure to manage stormwater run-off and improve water quality in the District of Columbia, USA.

5c Transfer arrangements

Transaction parties	Exchange values
• Governments • NGOs/community organisations	Natural assets against nature protection services

These schemes involve the transfer of natural assets to community organisations at less than market value with the requirement that the lands will be regenerated and conserved.

They can support the development of credible decision-making bodies that can represent the interests of local communities.

Example

Community-based natural resource management (CBNRM) schemes (USAID, 2013) use such an approach, for example targeting the management of timber extraction in Mexico.

5d Public-private partnerships

Transaction parties	Exchange values
• Governments • Conservation enterprises/implementing agencies • Users of natural assets	Concession against nature protection services

Public-private partnerships (PPPs) are arrangements under which private counterparties raise capital and maintain natural assets. They are remunerated by the users of the natural asset or by the public sector, or both.

The track record of PPPs in lower income countries indicates that these arrangements do not always bring value-for-money.

Example

African Parks is a Johannesburg-based NGO that works with governments to develop long-term PPPs to manage and operate conservation areas (Claes et al., 2020). For example, a safari lodge might invest in the maintenance of a natural area and its wildlife, financing these activities through revenue generated by its tourism business.

3. ENABLING FRAMEWORKS

The instruments and mechanisms set out in the previous chapter are built upon and enabled by a complex and interlinked set of frameworks, standards and methodologies. In the sections that follow we provide an overview of some of the most relevant:

- ecosystem accounting frameworks;
- valuation methodologies;
- nature- and biodiversity-related data sources;
- standards; and
- policy frameworks.

Ecosystem accounting frameworks

Robust accounting of ecosystems at a national level, to which the frameworks in Table 2 can contribute, will lead to credible and predictable valuations of ecosystem services and nature-based infrastructure services.

Table 2: Ecosystem accounting frameworks, examples

Name	Description
System of Environmental Economic Accounting (SEEA)[i]	The SEEA constitutes an integrated statistical framework for organising biophysical data, measuring ecosystem services, tracking changes in ecosystem assets, and linking this information to economic and other human activity.
The Economics of Ecosystems and Biodiversity (TEEB)[ii]	TEEB is a global initiative focused on "making nature's values visible". Its principal objective is to integrate the values of biodiversity and ecosystem services into decision-making at all levels.
Wealth Accounting and the Valuation of Ecosystem Services (WAVES)[iii]	WAVES is a World Bank-led global partnership that aims to promote sustainable development by ensuring that natural resources are widely integrated in development planning and national economic accounts.

Valuation methodologies

The models and methodologies in Table 3 help increase comparability – between different ecosystems and geographies – and predictability by assigning monetary values to services provided by natural assets as well as to the assets themselves.

Table 3: Valuation methodologies, examples

Name	Description
Autocase[IV]	Autocase is a company providing software of the same name that uses cost-benefit analysis to translate environmental, social and economic impacts of construction projects into triple bottom line metrics – profit, people and the planet.
Co$ting Nature[V]	Co$ting Nature is a web-based tool for natural-capital accounting and analysis of the ecosystem services provided by natural environments, identifying the beneficiaries of these services and assessing the impacts of human interventions.
Envision[VI]	Envision is a rating system that provides guidance for planning, designing and delivering sustainable and resilient infrastructure. The manual includes objectives and performance indicators to guide the user through a project assessment and, potentially, a sustainability award. The tool is a sustainability decision-making guide, not a set of prescriptive measures.
Exploring Natural Capital, Opportunities, Risks and Exposure (ENCORE)[VII]	ENCORE is a tool to help understand and visualise goods and services provided by nature, as well as the impact of environmental change on the economy.
Integrated Valuation of Ecosystem Services and Trade-offs (InVEST)[VIII]	InVEST is a suite of models used to map and value the goods and services from nature that sustain and fulfil human life. These models help explore how changes in ecosystems can lead to changes in the flows of many different benefits to people.
Land Utilisation Capability Indicator (LUCI)[IX]	LUCI is a tool that models ecosystem services and illustrates the impacts of land use on them. It compares the landscapes' current situation with estimates of their potential capability with respect to ecosystem services. LUCI thus indicates where a change in landscape usage might be beneficial and where maintaining the current situation is desirable.
Multi-scale Integrated Models of Ecosystem Services (MIMES)[X]	MIMES is an analytical framework to integrate different ecological and economic models to help understand and visualise ecosystem service values. It relies on Simile, which is modelling and simulation software for complex dynamic systems, and each MIMES application is customised to a specific socio-ecological system.
Social Values for Ecosystem Services (SolVES)[XI]	SolVES is designed to assess, map and quantify the perceived social values of ecosystem services. Social values and the perceived, non-market values the public assigns to ecosystem services, particularly cultural services such as aesthetics and recreation, can be evaluated for various stakeholder groups.
Sustainable Asset Valuation of IISD (SAVi)[XII]	SAVi is an assessment methodology that provides policymakers and investors with a comprehensive analysis of how much their infrastructure projects and portfolios will cost throughout their life cycles, taking into account risks that are overlooked in a traditional valuation.

Nature- and biodiversity-related data sources

Many of the transaction mechanisms and financial instruments discussed earlier rely on high-quality data on natural capital and biodiversity. Fortunately, the growth of sustainable investing in recent years was accompanied by the expansion of sustainability data providers with increasingly sophisticated data-analytics services.

Table 4: Nature- and biodiversity-related data sources, examples

Name	Description
GEO Biodiversity Observation Networks[XIII]	GEO, the Group on Earth Observations, is a partnership of more than 100 national governments and other participating organisations. Its Biodiversity Observation Networks gather data on biological diversity, encompassing all of the Earth's plants, animals and micro-organisms.
Global Biodiversity Information Facility (GBIF)[XIV]	GBIF provides open access to a large range of local, regional and global biodiversity data. Its international network and research infrastructure is publicly funded by the world's governments.
Global Forest Watch[XV]	Global Forest Watch is an online platform that provides data and tools for monitoring forests and land use. It includes data on deforestation.
Integrated Biodiversity Assessment Tool (IBAT)[XVI]	The IBAT database integrates key sources such as the IUCN Red List of Threatened Species, the World Database of Key Biodiversity Areas and the World Database on Protected Areas.
MSCI ESG DataMetrics[XVII]	MSCI ESG DataMetrics offers a comprehensive set of over 500 scores, indicators and raw datasets available for all constituent companies in the MSCI World Index, a broad global equity index. This facilitates cross-industry analysis and provides metrics that inform the MSCI ESG Research rating model, which is designed to measure a company's resilience to long-term environmental, social and governance (ESG) risks.
Open Foris[XVIII]	Open Foris is a set of free, open-source tools that facilitate flexible and efficient forest data collection, analysis and reporting.
Sustainalytics' ESG Data[XIX]	Sustainalytics' ESG Data is a comprehensive set of raw data points that covers a variety of environmental, social and governance (ESG) themes. The data set includes management, corporate governance and controversial event indicators along with historical indicator-level data.
UN Biodiversity Lab[XX]	The UN Biodiversity Lab is a provider of spatial data to support conservation and development decision-making.
Vigeo Eiris Datalab[XXI]	VE Datalab uses environmental, social and governance data to measure and assess the performance of investments. It can also be used for portfolio screening, best-in-class strategies, portfolio analysis, thematic investment, strategy development or academic research.

Standards

Standards, guidelines and taxonomies have an essential role to play in the structuring and functioning of many of the transactional mechanisms presented in Chapter 1. They provide the common definitions across stakeholders that are needed to make natural capital transactional.

Table 5: Standards, examples

Name	Description
Biodiversity Information Standards[XXII]	Biodiversity Information Standards (TDWG) – historically known as the Taxonomic Databases Working Group – is a not-for-profit association formed to establish international collaboration among the creators, managers and users of biodiversity information and to promote the wider and more effective dissemination and sharing of knowledge. TDWG develops standards and guidelines for the recording and exchange of data about biological organisms.
EU taxonomy for sustainable activities[XXIII]	The EU taxonomy is a classification system establishing a list of environmentally sustainable economic activities and setting related performance thresholds. The taxonomy helps companies, project promoters and issuers access green financing to improve their environmental performance.

GRI Standards[XXIV]	The GRI (Global Reporting Initiative) is an independent, international organisation that helps businesses and other organisations take responsibility for their sustainability impacts by providing them with a common language to report on those impacts.
IUCN Green List Standard[XXV]	The IUCN Green List Standard is at the heart of the organisation's Green List of Protected and Conserved Areas. The latter is a programme of certification for national parks, natural World Heritage sites, community conserved areas, nature reserves and so on, that are effectively managed and fairly governed. The standard provides an international benchmark for quality that motivates improved performance and achievement of conservation objectives.
IUCN Red List of Ecosystems Categories and Criteria[XXVI]	The IUCN Red List of Ecosystems Categories and Criteria is a global standard for how to assess the status of ecosystems, applicable at local, national, regional and global levels.
Key Biodiversity Areas Standard[XXVII]	The KBA Standard sets out globally agreed criteria, thresholds and delineation procedures for the identification of key biodiversity areas. These are sites contributing significantly to the global persistence of biodiversity in terrestrial, freshwater and marine ecosystems.
SASB Standards[XXVIII]	The SASB (Sustainability Accounting Standards Board) Standards enable businesses to identify, manage and communicate financially-material sustainability information to their investors.
Task Force on Climate-related Financial Disclosures (TCFD) [XXIX]	The TCFD has developed a framework to help businesses and other organisations more effectively disclose climate-related risks and opportunities through their existing reporting processes. Its recommendations aim to promote more informed investment, credit and insurance underwriting decisions and, in turn, enable stakeholders to better understand the financial system's exposures to climate-related risks.
Taskforce on Nature-related Financial Disclosures (TNFD)[XXX]	The initiative to launch the TNFD was modelled on the TCFD (see above). It is based on a partnership between four organisations – Global Canopy, WWF, UNEP Finance Initiative and UNDP – and its members include governments, regulatory bodies and think tanks along with more than 45 private companies, including AXA, BNP Paribas and Storebrand. The launch of the task force was planned for early 2021. The group will be tasked with delivering a framework to guide nature-related financial disclosure by the end of 2022.

Policy frameworks

Solid and forward-looking policy and regulatory frameworks need to be in place to facilitate the functioning of a nature economy. They are crucial in providing support for innovation and setting the priorities for economic growth.

Table 6: Policy frameworks, examples

Name	Description
Biodiversity offsetting frameworks[XXXI]	More than 100 countries have developed or are in the process of developing biodiversity offset policies/frameworks. For example, in the EU, the following define biodiversity offsetting: • the Birds and Habitats Directives; • the Environmental Liability Directive; and • the Environmental Impact Assessment frameworks. Each is translated into national law by all EU Member States.
Emissions-trading schemes[XXXII]	Emissions trading is a market-based approach to providing an economic incentive to decrease emissions. Globally, there are 35 national emissions-trading schemes and 22 sub-national schemes, with the world's largest carbon market being the EU Emissions Trading System.
European financial regulations on sustainability integration[XXIII]	Forthcoming amendments to EU financial regulations are designed to integrate sustainability considerations into the investment, advisory and disclosure processes. The amendments integrate sustainability into the suitability process, organisational requirements and product governance requirements of the Directive on Markets in Financial Instruments (MiFID II) and the Regulation on Markets in Financial Instruments (MiFIR). A further amendment relates to the sustainability risks and factors to be taken into account by companies covered by the Undertakings for the Collective Investment in Transferable Securities (UCITS) framework and the Alternative Investment Fund Managers Directive (AIFMD).
European Green Deal[XXXIV]	The European Green Deal is the European Union's plan to make its economy sustainable and to achieve its goal of becoming climate neutral by 2050. It provides an action plan to boost the efficient use of resources by moving to a clean, circular economy to restore biodiversity and cut pollution. It also outlines investments needed and financing tools available. It explains how to ensure a just and inclusive transition.

Rights of Nature movement[XXXV]	Rather than treating nature as property under the law, the Rights of Nature movement acknowledges that nature in all its life forms has the “right to exist, persist, maintain and regenerate its vital cycles” (Global Alliance for the Rights of Nature, n.d.). As of 2019, rights of nature laws existed at local to national levels in 12 countries. For example, in the USA the Lake Erie Bill of Rights allows citizens to sue on behalf of the lake. Elsewhere, rivers and forests have been granted legal rights in countries including Ecuador, Colombia, India and New Zealand. Philosophically, ‘Earth jurisprudence’ refers to the idea that human rights are based on the mere fact that humans exist, and therefore there is no reason to not also have nature rights, as nature also exists, and human survival is dependent on our ability to coexist with nature. The Rights of Nature movement invites a paradigm shift from viewing nature as property or a resource to being an “interconnected […] community partner” on our planet Earth (Stone, 2010).

4. KEY TAKEAWAYS

This report maps existing transaction mechanisms that aim to help reverse the alarming trends in biodiversity loss and ecosystem collapse. It also identifies the enabling frameworks that support those mechanisms. The transaction mechanisms covered here are monetary in nature. They focus on financial transactions where one party provides financing in exchange for products and services. We have identified four key takeaways when compiling this inventory:

1. Innovation is focused on identifying revenue streams

The inherent challenge of financing nature-based and other conservation projects is that the products and services they provide are often shared across various beneficiaries, are usually free of charge, and are hard to quantify and therefore to price. As a result, there is a lack of revenue streams, which are a basic requirement for accessing capital through traditional financial structures. All the financing mechanisms described here aim to address this fundamental challenge, most relying on some form of valuation of the ecosystem services provided by the underlying nature-based project or asset. The innovative component of most of these financial mechanisms is how they link these valuations to beneficiaries who can pay for them.

2. Requirement for private-value-capture potential

Many of the financing mechanisms listed in this report apply only to nature-based projects with high private-value-capture potential. Such projects provide benefits that can be easily monetised to a narrow set of beneficiaries. Financial viability is therefore easier to achieve and, as a result, these projects can tap into a wider range of capital providers and have less difficulty to raise financing. Unfortunately, most nature-based and conservation projects do not fall into this category.

3. Reliance on public sources of financing

Public and philanthropic financing still play a dominant role in the financing of nature-based projects. The proportion of public sources of financing depends on the level of the project's private-value-capture potential. This can be a significant bottleneck for scaling up nature-based projects, especially as the global impacts of the COVID-19 pandemic mean that public budgets are increasingly strained.

4. Lack of scaling

With some notable exceptions (e.g. green bonds), financing instruments for nature-based solutions have not been implemented at scale. Indeed, some of the most promising mechanisms, such as resilience bonds, are still in their pilot stage. The lack of widespread implementation could be the result of changing investor demand for these investment opportunities. Natural capital has received a lot of attention in recent years as financial market participants have increasingly embraced sustainability investing. This has resulted in financial innovation leading to opportunities to access new sources of financing for nature conservation projects. This wave of innovation resulted in the emergence of a plethora of financial mechanisms, which will take time to be scaled up. Another reason why these mechanisms have not been used at scale is the limited track record of nature-based solutions. Without more certainty on how these solutions perform, especially in light of climate change, it is impossible for the largest capital providers to participate in this emerging asset class.

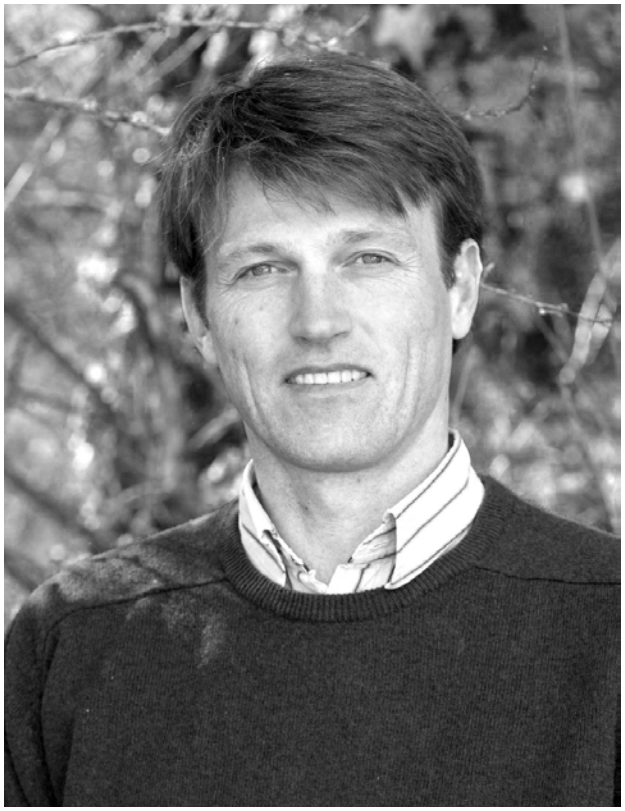
5. NEED FOR FURTHER RESEARCH AND EXPLORATION

While there is promising innovation in the development of transaction mechanisms, it is important to make effectiveness in nature protection the ultimate benchmark. This report does not attempt to test the robustness of the mechanisms in this respect and thus proposes the following questions for further exploration and scientific research:

- How successful or unsuccessful are the respective mechanisms in protecting biodiversity? How can their long-term effectiveness be evaluated?
- What other supporting regulatory framework(s) would transaction mechanisms require?
- What patterns or characteristics in the existing financial mechanisms may be hindering greater uptake?
- What are the policy and market conditions that prevent the scaling of biodiversity finance?
- What is needed for natural capital to become an asset class and for the securitisation of nature? And would that approach be desirable?
- Half of the world's terrestrial land is owned by communities, and indigenous peoples own a third to a half of this land[7]. What can be learned from community-centred approaches to environmental preservation or from those who closely link identity and wellbeing to the natural environment?
- What can be discovered about alternative, non-monetary ways of valuing nature? Is it conceivable that those ways are more effective than attaching a price tag to nature? What would it take to make them effective at a large scale?

7. WRI Blog (2017): https://www.wri.org/blog/2017/03/numbers-indigenous-and-community-land-rights

AFTERWORD



Holger Schmid
Director for Switzerland and Sustainable Economy, MAVA Foundation

Can we create economic value out of rebuilding nature? That's the big question to which this report provides part of the answer. These pages highlight 23 different financial transaction mechanisms and a further 35 different enabling frameworks. So, it doesn't seem to be a technical problem: the solutions are there.

It feels to me like it's a problem of political will and markets. We need concerted action with new actors that could change the way we value the positive externalities of nature and make it part of how the economy operates.

National governments realised some 10 to 20 years ago that it wasn't enough simply to fund research and development. It was necessary to also put in place mechanisms to bring those discoveries to the market. Most nations now have dedicated programmes to spot solutions and bring them to scale. We don't yet have such mechanisms in terms of a nature economy.

It is clear from this report that there is lots of experimentation going on, but the mechanisms have, almost without exception, not been implemented at scale. I think we haven't fully understood yet why this is the case. The authors point to some reasons: the mechanisms have grown out of a relatively recent wave of innovation that will take time to be scaled up, and there is, for now, a lack of certainty on how these nature-based solutions perform. Nevertheless, we are sitting on lots of research and ideas and there is a need for state or other actors to investigate how to replicate and scale them, not as something apart, but embedded in our economic thinking.

In a period where offset mechanisms are gaining a lot of attention, this report showcases a much more diverse palette of solutions that attempt to truly give nature value, based on real environmental services rather than being destruction replacement mechanisms.

Governments around the world are at this moment planning how to spend massive recovery funds in the aftermath of the global pandemic. The 'build back better' principle is regularly mentioned as a means of ensuring that we invest in more sustainable futures. The mechanisms set out in this report can be seen as a menu of green recovery solutions with nature at the centre.

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LINKS TO ENABLING FRAMEWORKS

I	https://seea.un.org/ecosystem-accounting
II	http://teebweb.org/
III	https://www.wavespartnership.org/
IV	https://autocase.com/
V	http://www.policysupport.org/costingnature
VI	https://sustainable-infrastructure-tools.org/tools/envision-rating-system/
VII	https://encore.naturalcapital.finance/en/about
VIII	https://naturalcapitalproject.stanford.edu/software/invest
IX	https://www.lucitools.org/
X	https://ipbes.net/policy-support/tools-instruments/multi-scale-integrated-models-ecosystem-services-mimes
XI	https://www.usgs.gov/centers/gecsc/science/social-values-ecosystem-services-solves?qt-science_center_objects=0#qt-science_center_objects
XII	https://www.iisd.org/savi/
XIII	https://earthobservations.org/
XIV	https://www.gbif.org
XV	https://www.globalforestwatch.org
XVI	https://www.ibat-alliance.org/the-data
XVII	https://www.msci.com/documents/10199/652ac2b1-5f70-4586-8db6-43ad0fa3f0d3
XVIII	http://www.openforis.org
XIX	https://www.sustainalytics.com/esg-data/
XX	https://www.unbiodiversitylab.org
XXI	http://vigeo-eiris.com/discover-ve-datalab-esg-data-analysis-your-way/
XXII	https://www.tdwg.org
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Luc Hoffmann Institute

Rue Mauverney 28
CH-1196 Gland
Switzerland

Tel: +41 22 364 9233

E-mail: luchoffmanninstitute@wwfint.org

www.luchoffmanninstitute.org

www.linkedin.com/company/luc-hoffmann-institute

@LucHoffmannInst

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