Report for External Consultation

Integrating Nature Into Sovereign Debt Markets

Towards a New Sovereign Debt Nature Assessment Model

November 2025

Table of Contents

Executive Summary

Context and Purpose

Nature loss represents one of the greatest systemic risks to the global economy, with over half of global GDP dependent on healthy ecosystems. From agricultural productivity and freshwater provision to coastal protection and pollination, ecosystem services underpin the very foundations of national economies. Yet sovereign debt markets, estimated at nearly USD 100 trillion, continue to overlook the importance of integrating nature-related risks. While climate considerations have started to influence sovereign ratings and investor decisions, biodiversity and ecosystem degradation — equally critical to economic stability — are rarely incorporated into debt assessments.

This omission creates a significant blind spot for investors, credit rating agencies, and policymakers. The erosion of biodiversity and ecosystem services undermines key macroeconomic fundamentals such as growth, exports, fiscal balances, and debt sustainability. For biodiversity-rich developing countries, which depend disproportionately on natural capital and ecosystem services, the implications are particularly acute. These countries face rising risks while also needing to attract private finance to deliver on the Kunming–Montreal Global Biodiversity Framework (GBF), which sets the global ambition to halt and reverse biodiversity loss by 2030.

In response to this gap and to start tackling this issue, in early 2025, the Finance for Biodiversity (FfB) Foundation convened a Sovereign Debt Working Group composed of various pioneering financial institutions and which was led by French asset management company, Amundi.

This effort produced a new Sovereign Debt Nature Assessment Model (contained herewith in this report) that provides systematic guidance for integrating nature-related risks and opportunities into sovereign debt analysis. This Model is the first step towards a broader Nature and Sovereign Debt Framework, which will feed into the Foundation's upcoming flagship Finance for Nature Positive (FfNP) programme.

Why Nature Matters for Sovereign Debt

The relationship between sovereign debt and nature is both material and systemic. Many economies and sectors, such as agriculture, forestry, fisheries, and tourism, depend directly on natural capital and ecosystem services to generate GDP, create employment, and secure exports. When ecosystems become degraded, governments are forced to spend more on disaster recovery, infrastructure protection, and ensuring food and water security, which reduces fiscal space. Emerging markets, often less economically diversified, are especially exposed, as they cannot easily absorb shocks linked to nature loss.

At the same time, investor perceptions are shifting. As nature-related risks become clearer, sovereigns that are perceived as vulnerable may face higher risk premiums, higher borrowing costs, and reduced market access. For example, overexploitation of fisheries or soil pollution that reduces agricultural productivity can directly threaten export revenues and foreign currency earnings, creating fiscal strain and raising default risk. Ignoring these drivers not only undermines debt sustainability but also weakens the ability of global finance to mobilise toward biodiversity goals.

Our Sovereign Debt Nature Assessment Model

Our new Sovereign Debt Nature Assessment Model puts forward an approach which captures both the financial materiality of nature loss — its impacts on macroeconomic stability and debt sustainability — and the impact materiality of countries' pressures on and contributions to biodiversity. It is not designed as a rating or index but as a practical tool for sovereign risk analysis, policy engagement, and capital allocation aligned to nature-related financial products and, potentially, more broadly aiming for nature-positive outcomes.

The Model incorporates 42 characteristics supported by publicly available indicators and datasets, enabling a robust yet practical approach. It is inspired by the OECD's State–Pressure–Response Framework and is structured around three pillars. The first pillar, State of Natural Capital, presents the extent, significance, and condition of ecosystems and species, and explores opportunities for protection and restoration. The second pillar, Socio-economic Activities, examines exposure to nature-related risks through the identification of economic sectors with high impacts and dependencies on nature, as well as the environmental pressures from human activities. The third pillar, on Governance, evaluates international commitments, regulations addressing drivers of nature loss, and committed resources for implementation capacity.

Application and Use

The Model is designed to serve multiple stakeholders. For financial institutions, it enhances risk screening by identifying sovereign exposure to nature loss, informing portfolio allocation, strengthening engagement strategies with issuers, and supporting the development of investment products such as nature-linked bonds. It will provide the basis for the development of a nature-positive criteria applicable to the sovereign debt asset class.

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For sovereign issuers and policymakers, the Model offers clarity on what investors value and why. It enables national biodiversity strategies to be translated into financially operable terms, integrated into debt management strategies, and used to mobilise additional private capital. For NGOs and multilateral institutions, the Model strengthens advocacy by linking biodiversity directly to sovereign debt sustainability and highlights the need for enabling policy and market frameworks. It also aligns with multilateral development banks' commitments, such as their 2021 statement "Nature, People, and Planet".

"The Sovereign Debt Nature Assessment Model offers clarity on what investors value and why."

Benefits and Impacts

Applying the Sovereign Debt Nature Assessment Model will deliver multiple benefits. It strengthens sovereign risk assessments by incorporating nature as a material driver of fiscal and macroeconomic stability. It helps channel resources towards countries that demonstrate effective stewardship of natural capital, while creating incentives for governments to adopt stronger biodiversity policies. It also catalyses funding towards nature-related investment opportunities and fosters richer dialogue between sovereign issuers, investors, and policymakers. Furthermore, the Model promotes a whole-of-government approach to the nature-positive transition by encouraging better coordination among finance ministries, debt management offices, and environmental agencies. This would then help to align debt management with broader economic and sustainability goals.

What to Expect Next

Over the coming two years, the FfB Foundation will take the Model from concept to practice. This will include developing technical guidance, updating indicators and datasets, and producing case studies that demonstrate its application. The Foundation will use this content to support its policy engagements to ensure sovereign debt markets align with GBF targets. It will also leverage the Model to develop nature-positive criteria as part of its upcoming Finance for Nature Positive Programme, which will notably support financial institutions to identify, assess, and prioritise nature-related opportunities that contribute towards nature-positive outcomes.

By bridging finance and biodiversity, the Sovereign Nature Assessment Model lays the groundwork for systemic change in sovereign debt markets. It provides investors, issuers, and policymakers with a structured approach to account for nature in sovereign analysis, thereby improving financial stability while steering capital flows toward countries advancing a nature-positive economy. In doing so, it supports the global mission of halting and reversing biodiversity loss by 2030, ensuring that sovereign debt markets contribute to safeguarding both economic resilience and the ecosystems on which all economies depend.

Investor Testimonials

"While existing nature assessment models and framework focus primarily on corporate assets, there remains a critical gap in assessing sovereign assets on nature. Sovereign issuers also lack clear guidance on integrating national nature strategies into debt instruments. This focus group will bridge that gap and drive progress at the intersection of nature and sovereign debt."

Gaëlle Blanchard, ESG Analyst – Sovereigns & Supra nationals at Amundi and Chair of the Sovereign Debt focus group

"As long-term investors, identifying and understanding nature-related investment risks and opportunities is critical. The output of this working group provides sovereign investors with essential tools to navigate this complex landscape."

Paul Ruijs, Country Sustainability Specialist at Robeco

"Sovereign debt is a key asset class in our portfolio, and this framework helps deepen our understanding of nature-related impacts, dependencies, and risks. We look forward to exploring its potential to improve oversight and seeing practical examples and test cases."

Kaboo Leung, Senior Responsible Investment Strategist at NN Group

"The connection between sovereign debt and nature remains underexplored. This Finance for Biodiversity initiative helps navigate the data jungle, offering reliable insights and a pathway to expand the share of portfolio assessed against biodiversity."

Linda Seghezzi, VBV-Vorsorgekasse AG

Overview

At a Glance

Sovereign debt represents a cornerstone of global financial markets, yet its exposure to nature-related risks remains largely under-recognised and potentially mispriced. Current market practices often fail to reflect the material impacts that nature degradation and biodiversity loss can have on sovereign creditworthiness and fiscal stability. As a result, many financial institutions face a critical blind spot in their sovereign debt portfolios. The integration of nature-related risks into sovereign debt analysis, therefore, is rapidly emerging as a key focus area across investment, risk management, and regulatory frameworks – presenting both challenges and strategic opportunities for all financial institutions.

To assist financial institutions with this blind spot, this report on **Integrating Nature Into Sovereign Debt Markets: Towards a New Sovereign Debt Nature Assessment Model** led by the Finance for Biodiversity Foundation (from now on referred to as "the FfB Foundation") offers policy-relevant, practical guidance and initial insights on how financial institutions, markets, and sovereign counterparts can integrate meaningful and operable nature considerations into sovereign debt assessments, thereby helping to mobilise private financial flows to key countries to halt and reverse biodiversity loss. Our report is specifically for financial institutions, sovereign debt investors – such as banks, private investors and official creditors – structurers, rating agencies, and policymakers. It aims to assist them in systematically qualifying countries' natural capital, recognising impacts and dependencies on nature driven by socio-economic activities, and understanding sovereigns' actions and ambitions to address the specific nature challenges they face.

A new Sovereign Debt Nature Assessment Model (also referred to as the 'Model') is proposed to evaluate and compare countries through the development of detailed country profiles. These profiles are based on 42 characteristics and supported by relevant indicators and data sources, enabling a comparative assessment of each country's natural capital, its socio-economic dependence and impact on nature, and the governance of nature-related issues. By embedding both financial materiality and impact materiality, this Assessment Model promotes a more comprehensive and forward-looking understanding of sovereign sustainability risks and opportunities stemming from nature loss. It is meant to inform risk management, investment strategies, and sovereign engagement. It highlights sovereign policy actions in terms of curbing pressures on nature, preserving natural capital and enabling such outcomes through efficient governance. The Assessment Model is providing a methodology, rather than an index or a rating of countries. It will support the development of sample country profiles and could lead to a country analysis tool offering a benchmarking capacity. It intends, through clarity and transparency, to build investor knowledge and confidence in governments' environmental approaches, support building more resilient approaches to the risk posed by nature loss and direct investment with an understanding of nature considerations.

This report marks the first step towards developing a new Nature and Sovereign Debt Framework, advancing research and best practices in country analysis, policy engagement, and investment strategies.

This work will feed into the FfB Foundation's forthcoming flagship Finance for Nature Positive (FfNP) programme, which aims to provide financial institutions with tools and relevant criteria to identify, assess, and prioritise opportunities that contribute towards nature-positive outcomes. As such, the proposed Assessment Model is meant to lay the foundation for criteria to align sovereign financing and investment – in both developed and emerging markets – with the Kunming-Montreal Global Biodiversity Framework (GBF) nature-positive goal. Sovereign debt forms one of four pillars of the forthcoming Finance for Nature Positive Framework that is to be developed under the FfNP programme, alongside three pillars dedicated to Transition Leaders, Solutions Providers & Enablers, and Real Assets, thus covering both countries and real economy players.

"The Sovereign Debt working group has been designed to be a catalyst for innovation."

Project Background and Process

To ensure sectoral relevance and maximum uptake within the financial sector, the FfB Foundation launched a Sovereign Debt working group in early 2025 made up of 15 of the Foundation's members, spanning banks, asset owners, asset managers and insurers. The group was led by Amundi and included representatives from Abeille Assurances, Aviva, BPCE Assurances, Caisse Des Dépôts Group, Fidelity International, HSBC, La Banque Postale, MACIF, Phoenix, NN Group, Robeco, SCOR, USS Pension, and VBV-Vorsorgekasse. The group has reflected on the reasons why financial institutions need to integrate nature into their assessments of sovereign debt. They have focused on exploring approaches to risk screening as well as discussing considerations for nature-positive outcomes, and also sovereign engagement. To support meaningful future action, they have also co-developed this new Assessment Model designed to enhance understanding of countries' natural capital, the relationship between key economic sectors and nature and national governance of nature-related issues. Their work has also covered a review of multiple sources of publicly available data to help point practitioners in the right direction. All of this thinking, including some of their drafting, has been captured in this guidance document herewith.

The Sovereign Debt focus group has been designed to be a catalyst for innovation, bringing together expertise to drive fresh thinking and global momentum on this critical issue. The FfB Foundation's goal is to reshape the way sovereign finance integrates nature considerations into the analysis of traditional macroeconomic indicators at the heart of financial decision-making. It builds knowledge and capacity for finance professionals, to anticipate the potential implications of nature-related factors on the monetary and fiscal performance of economies in both the medium and longer term, while also helping to identify opportunities for sovereign finance strategies that could contribute towards nature-positive outcomes.

The focus group will support the Foundation's upcoming FfNP programme. It will also inform the Foundation's policy work and engagement with policymakers. By fostering engagement among financial institutions, markets, multilateral development banks, and governments, our work on sovereign debt and nature seeks to increase financial flows towards a healthy relationship between economies and nature. See below for the timeline of our sovereign debt work.

Project Genesis Timeline

2024

Constructive dialogue continued between the FfB Foundation, BIOFIN (UNDP), and UNEP FI on the importance of integrating nature considerations into investment decisions – bridging the gap between financial markets and sovereign governments to help mobilise private capital towards priority countries for halting and reversing biodiversity loss. The topic was formally introduced at COP 16 in Cali, Colombia. The FfB Foundation, together with UNEP FI and BIOFIN, co-hosted an event convening financial institutions, governments and multilateral organisations to discuss incorporating nature considerations into sovereign debt portfolios. The session examined the challenges and opportunities of aligning sovereign debt with nature goals, emphasising how stronger integration of national biodiversity strategies can enable sustainable financing for the nature transition and support vital conservation and restoration initiatives.

2025

In order to provide guidance for financial institutions, the FfB Foundation recruited, among its members, a group of investors with a strong interest in advancing the sovereign topic. The focus group started in January under the FfB Foundation's Nature-Positive programme. The 15 investors, representing banks, insurance companies, asset owners, and asset managers, have been led by Amundi. They have met every three to four weeks from January to June 2025 to develop this guidance. Pre-consultation discussions have also been held with relevant stakeholders. The focus group members, along with the FfB Foundation, have developed the Assessment Model, its methodology, gathered relevant sources, and drafted this report.

How the Report has been Structured

The report is divided into four sections: Section 1 introduces the overlooked connection between sovereign debt and nature, highlighting how this risk is emerging as a significant blind spot for financial institutions. It emphasises the importance of integrating biodiversity and ecosystem services considerations into sustainability analysis and debt issuance – both as macroeconomic fundamentals and strategic priorities. The section also provides an overview of relevant existing frameworks that have informed the development of our Assessment Model, and concludes by outlining the role of financial institutions in addressing these issues.

Section 2 covers the new Sovereign Debt Nature Assessment Model itself, starting with the design process and principles behind the Assessment Model's development, followed by a deep dive into each of the components of the Model (pillars) and then a brief look at the limitations and potential adaptations of the Model itself. Section 3 then puts this Assessment Model into practice through providing more detail on nature-risk screening, ways to engage with sovereign issuers, the use of sovereign nature-linked financial instruments and introducing investment considerations for nature-positive outcomes. The final section, Section 4, then concludes the report and shares the next steps of the Foundation's work that are envisaged on sovereign debt and what's next for our Assessment Model.

1. Sovereign Debt and Nature: An Unseen Risk

1.1 Introduction

The stability of our global economy is deeply reliant on the healthy functioning of natural ecosystems and the goods (e.g. food, timber and medicine) and services (e.g. clean water, flood protection, and climate regulation) that they provide (IPBES, 2019a; WEF, 2020; Dasgupta, 2021; WWF, 2024). The environmental resources (stocks) and ecosystem services (flows) are commonly referred to as natural capital – a concept that frames nature as an economic asset (Natural Capital Coalition, 2016). In this report, natural capital will be used as an umbrella term, though stocks and flows will be distinguished when relevant, aligning with frameworks such as the UN System of Environmental-Economic Accounting (SEEA). The terms natural capital and nature will also be used interchangeably, where "nature" emphasises a broader, systemic role in sustaining economies and societies. Following the IPBES Values Assessment Report typology, nature's values span instrumental (means to an end), intrinsic (agency of non-human entities), and relational (reciprocal relationships) (IPBES, 2022). However, this report herewith does not claim to address "nature" in its entirety, recognising that its significance extends beyond sustaining human economies and societies – for instance, in shaping worldviews and knowledge systems.

According to the World Economic Forum's 2020 research, over half of global GDP – including approximately USD 44 trillion – is considered to be moderately or highly dependent on nature. This reliance spanned 163 economic sectors, with particularly significant exposure in industries such as construction, agriculture, and food and beverage (WEF, 2020).

More recently, in 2023, PwC found that 55% of global GDP – equivalent to about USD 58 trillion – was now exposed to material nature risk, indicating a rise of nearly USD 14 trillion in nature-dependent economic activity since 2020. The update confirmed that all 163 economic sectors analysed continue to exhibit portions of their value chains that are highly dependent on nature (PWC, 2023). This evolving insight underscores that global economic dependency on nature not only remains vast but has grown significantly, emphasising rising financial exposure to ecosystem decline and nature-related risks.

Sovereign debt – money borrowed by a national government, typically through the issuance of bonds or loans – which is the focus of this report, represents an important share of global financial flows and constitutes a key portion of the assets owned by financial markets across all sectors, including investors, insurers, and banks. Interestingly, the sovereign debt market is larger than the corporate debt market, where the global sovereign debt market is estimated to be nearly USD 100 trillion (IMF, 2024a). This figure is approximately equivalent to the size of the world's entire global GDP (IIF, 2025), highlighting the importance of sovereign debt markets within the global financial landscape.

According to the Institute of International Finance (IIF) (2025), two thirds of this global sovereign debt market is made up of mature or developed markets which include the U.S., Japan, the Eurozone, the UK, and Canada.

The remaining one third is made up of emerging markets, which comprises China, India, Brazil, South Africa, and Turkey (WEF, 2024a; UNCTAD, 2024). See Box 1 below. When it comes to integrating nature into sovereign debt portfolios, this breakdown demonstrates the importance of paying particular attention to mature markets, especially when looking at the global market as a whole.

Sovereign debt and nature are inextricably connected. This is because environmental health directly impacts upon sovereign macroeconomic fundamentals – economic indicators and structural factors that influence a country's economic performance, fiscal stability, creditworthiness as well as its ability to meet debt obligations (Nature Finance, 2023; European Central Bank, 2024; IMF, 2024b; Hadji-Lazaro et., 2025). These fundamentals are critical for assessing sovereign risk and are widely monitored by investors, credit rating agencies, and multilateral institutions when evaluating sovereign debt.

In order to assist sovereign debt practitioners – including investors, structurers, rating agencies, as well as policymakers - in assessing the nature impacts, dependencies, risks and opportunities that each country may present and how they are managed, this guidance document provides a practical model that can help integrate nature considerations into the sovereign debt assessment process. This will not only support better-informed allocation of sovereign assets, but it will also facilitate more targeted resource mobilisation towards countries that steward their natural capital effectively, helping to curb nature loss. This resource mobilisation would be enabled by a clearer understanding of nature-related risks and by highlighting opportunities within sovereign debt that deliver positive outcomes for nature, making capital more accessible to countries with stronger nature stewardship. Our guidance also seeks to enrich dialogue between sovereign issuers and debt holders while catalysing a whole-of-government approach to a nature-positive economy – an FfB Foundation priority for aligning financial flows with the GBF – by incentivising stronger coordination among ministries, debt offices, and environmental experts.

Sectoral Indebtedness (End Q4 2024 USD Trillion)	**Houshold debts**	**Non-financial corporates**	**Government**	**Financial sector**	**Total**
Mature markets	40.8	51.8	**64.6**	57.2	214.3
Emerging markets	19.3	39.5	**30.7**	14.2	103.7
Global (total)	60.1	91.3	**95.3**	71.4	318.4

Box 1: Sectoral Indebtedness - Adapted from: IIF (2025): Household debt incorporates outstanding bank loans. Financial sector debt and non-financial corporate debt incorporate cross-border and domestic bank loans as well as onshore/offshore outstanding bonds. Government debt is extrapolated from the IMF-WEO database.

1.2 Sovereign Nature Loss: A Current Blind Spot for Financial Institutions

The reliance of economies on nature creates sensitivity to nature loss and generates risk. The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) reports that one million species face extinction and over eight million known species, and vast portions of terrestrial and marine ecosystems have been altered. Key drivers of this crisis include land and ocean use changes, resource extraction, climate change, pollution, and invasive species (IPBES, 2019a). As ecosystems degrade, essential services – such as food, water, air quality and climate regulation – diminish, threatening economic stability. According to the World Economic Forum, both biodiversity loss and ecosystem collapse have been ranked as the second most significant long-term global risk over the next decade after extreme weather events (WEF, 2025).

Overexploiting natural resources and degrading ecosystems can undermine economic stability, weaken debt sustainability, raise default risks, and worsen debt ratings and financing conditions. Specifically, nature loss can affect a country's economic activity and erode sovereign macroeconomic fundamentals such as weakening GDP growth, exports, national account balances, exchange rates and tax revenues, all of which undermine debt sustainability (IMF, 2024b; AXA Climate & LSEG, 2024). Sovereign debt – especially in biodiversity-rich emerging and developing markets – is also particularly sensitive to natural capital degradation as these economies rely heavily on nature, lack diversification, and face heightened fiscal, climate, and investment risks. The risks are particularly acute in countries already facing structural fiscal deficits and limited debt-carrying capacity. This degradation of a country's economic activity and its subsequent impacts demonstrates the tight interconnection between nature loss and debt sustainability.

As these nature-related risks are either ignored or mispriced in sovereign debt markets (Pinzón et al., 2020), it creates a blind spot for financial institutions, whereby sovereign debt exposures in financial portfolios do not yet align with, or reflect, nature-related risks and impacts. To give an example – for soft commodity-exporting economies (e.g. economies that export fruit, fisheries, timber etc.), the continued depletion of natural resources risks driving output declines as ecosystems reach critical tipping points. This can lead to a weakening of exports, dwindling currency sources, increased reliance on costly imports, worsening balance of payments and undermining external debt sustainability. Similarly, nations dependent on tourism face revenue losses if natural attractions are degraded or if water becomes scarce, or critical infrastructure (e.g. roads, bridges, power grid) is damaged. The fiscal burden may be further amplified by rising adaptation and mitigation costs – especially as climate risks increase and the protective value of ecosystems declines (Nature Finance, 2022).

As global markets move toward the nature-positive goal of halting and reversing biodiversity loss by 2030, articulated in the Kunming-Montreal Global Biodiversity Framework (GBF), countries that fail to adapt risk trade restrictions and declining competitiveness due to stricter sustainability regulations in importing markets. Consequently, nature loss is increasingly viewed as a critical determinant of long-term growth potential and sovereign creditworthiness (NGFS, 2023). Figure 1 below shows the relationship and feedback loops between debt sustainability and nature. For example, when a country mismanages its natural capital, the country's production and productivity may decrease as would its expected exports, imports would rise, and trade and primary balances would weaken. This means the country's capacity to repay its debt may be hampered. Sovereign credit risk assessments must therefore account for the long-term impacts of ecosystem degradation and the scale of investment required to shift away from natural capital depletion.

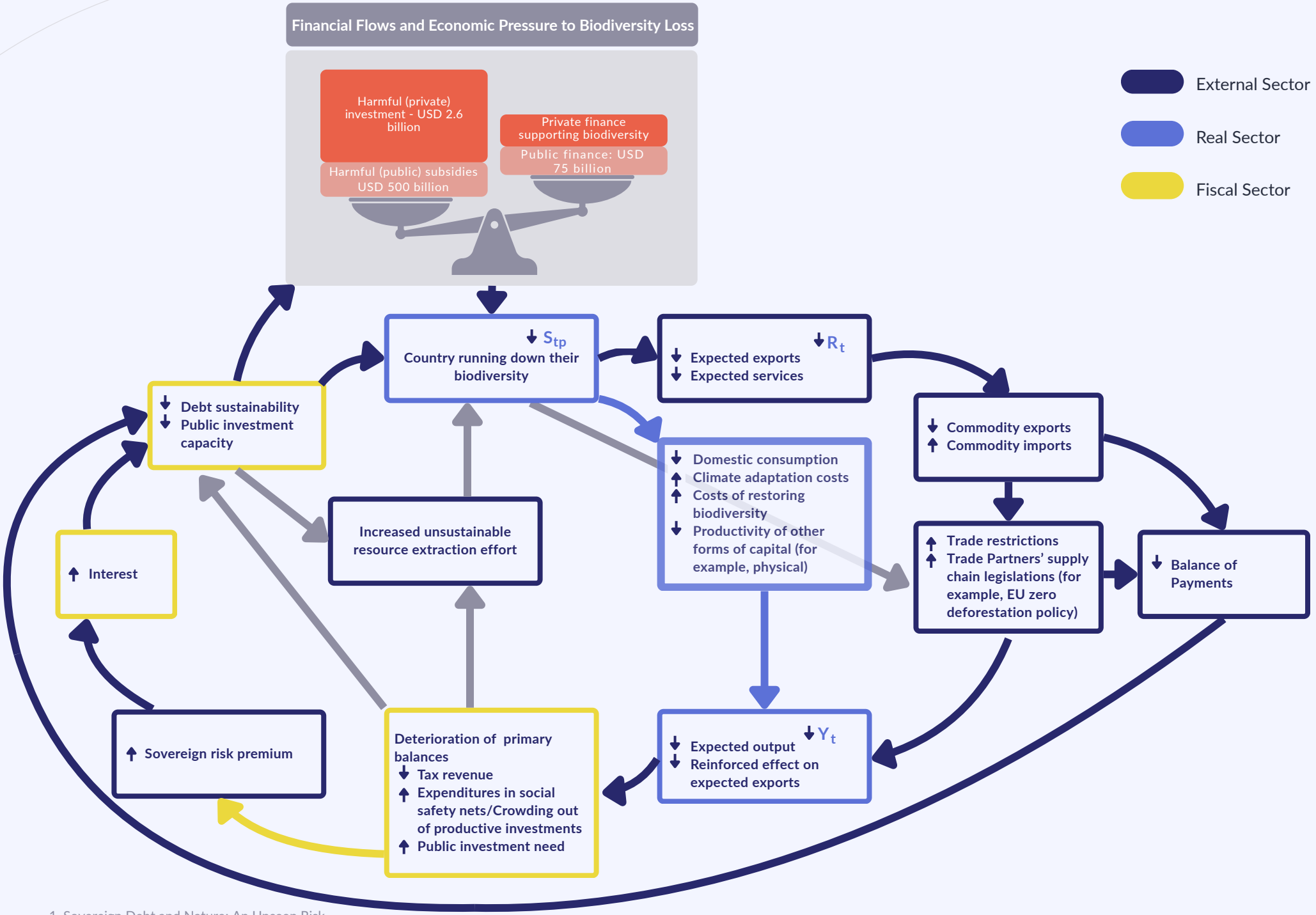
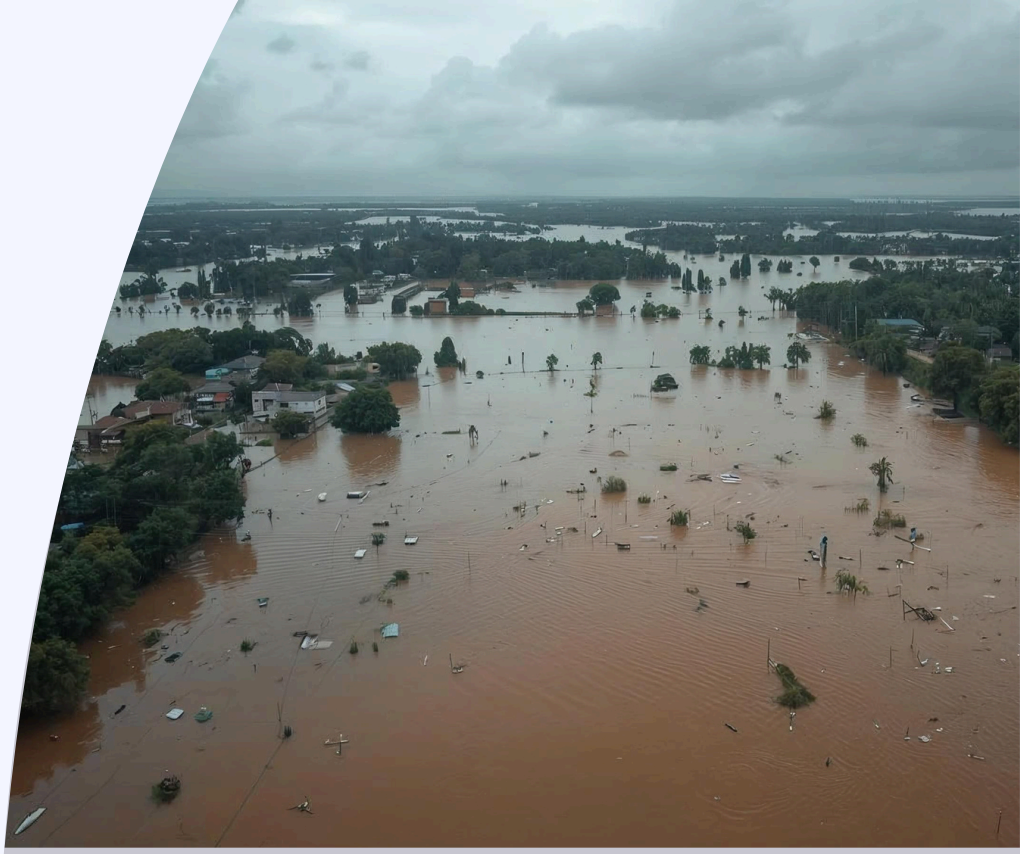


Figure 1: Feedback Loops for debt sustainability and nature - Source: Adapted from IMF (2024b).

1.3 Integrating Nature into Sovereign Debt Markets: A Macroeconomic Fundamental

It is increasingly recognised that nature-related risks can erode long-term value, and as such, incorporating natural capital and ecosystem services considerations into sustainability analysis and debt issuance is becoming a macroeconomic fundamental and a strategic priority. This is illustrated in the case studies depicted in Box 2 where nature-related factors affected the sovereign debt rating of countries. The Network for Greening the Financial System (NGFS) and INSPIRE Study Group on Biodiversity and Financial Stability (2022), underscores that failing to internalise these nature-related risks may lead to drops in credit ratings and, in times of crisis, sudden repricing in sovereign markets, which would affect global financial stability.

Countries that take proactive steps to protect and restore nature can complement their creditworthiness with this Assessment Model, especially as natural assets grow scarcer and more economically significant. These efforts can lead to improved access to financial markets, greater capital inflows, and more favourable borrowing terms, ultimately strengthening their capacity to service debt (Nature Finance, 2022). Box 3 below illustrates specific case studies of improved financing conditions for countries from debt-for-nature swaps, an emerging mechanism offering debt relief linked to nature commitments. This is a specific approach, which is just an example among a diverse range of nature-linked financial tools (see list in Appendix 2), and which is not equivalent to integrating nature considerations into broad sovereign debt analysis and country sustainability performance. However, they do highlight investors' appetite and can be a source of inspiration as they link sound nature management and ambitious targets with potential financial and economic benefits for countries.



Pakistan
Between June and October 2022, historic floods generated damages estimated over USD 30 billion. The Pakistani dollar bonds fell following the floods. At the end of September 2022, the yield on the bond maturing in December 2022 had climbed to 105%, and those for 2024 and 2025 to 61% and 39%, respectively (World Bank, 2022; Siddiqui, 2022).

Ecuador
In 1997-1998, the meteorological phenomenon called El Niño led to floods and power outages, which exacerbated an existing financial crisis. Facing the exploding cost of financing, the country defaulted shortly after (Mallucci, 2022).

Box 2: Examples of sovereign debt stability affected by nature-related factors

By analysing how governments manage nature and biodiversity, sovereign investors can identify and allocate capital to issuers that demonstrate strong environmental stewardship – helping to mitigate long-term risk and align portfolios with sustainability objectives. This is particularly relevant for emerging markets where nature can be abundant[1] but also where economies and/or sectors often rely heavily on natural capital, e.g. the agricultural sector or small island states. It is also relevant to advanced economies, as they face the same long-term effects of nature loss, even if the strength of their economy makes them less vulnerable, especially if their economic capacity is the result of a strong reliance on natural capital in other (supplying) countries.

Countries are following differentiated paths when it comes to curbing pressures on nature, resource mobilisation and ecosystem protection. As sovereign assets constitute a substantial portion of financial institutions' overall portfolios, their performance can significantly impact financial stability, which is a concern for central banks, as well as restrict investment returns, which is a concern for the financial institution holding the debt. Directing capital, therefore, towards the sovereigns that strategically manage nature-related risks, nurture nature-positive outcomes, and protect long-term economic benefits, needs to be key to investors (Nature Finance, 2022). Active engagement by financial institutions with sovereign issuers can also help to incentivise sovereigns to improve their environmental stewardship.

[1] Natural capital constitutes more than one quarter of wealth in lower- to middle-income countries and nearly half in low-income countries (AXA, 2024).

Gabon
The USD 500 million refinancing of Gabon's sovereign debt is expected to free up USD 163 million for ocean conservation projects, supporting Gabon's ambitious national effort to protect 30% of its lands, freshwater systems, and ocean by 2030 (TNC, 2023; White & Case LLP, 2023).

Ecuador
In 2023, Ecuador completed a record-setting USD 1.6 billion debt conversion tied to marine conservation in the Galápagos Islands. The deal reduces debt burden while directing USD 450 million of the savings toward a USD 450 million conservation trust fund over the next two decades (DFC, 2023; Galápagos Life Fund, 2023; Pew Charitable Trusts, 2023).

Box 3: Examples of improved financing conditions through debt-for-nature swaps

1.4 Understanding the Current State of Play for both Sovereigns and Financial Institutions

Presently, most existing models and frameworks, such as the Taskforce on Nature-related Financial Disclosures (TNFD) and the Science-Based Targets Network (SBTN), offer guidance primarily on corporate assets when assessing financial portfolios. The NGFS recognises that nature loss is a threat to global and national financial stability. Its conceptual framework adopts a high-level approach, identifying linkages from nature loss to corporations, countries, investors and financial stability. A large share of its work relates to corporate assets. A stronger focus on sovereign assets would be welcome, given their significant weight in financial institutions' portfolios and their critical role in overall financial stability.

As for most asset classes, financial institutions are more advanced on integrating climate considerations into their portfolios and strategies, compared to nature considerations. This is illustrated by the number of already existing initiatives for net-zero sovereign debt targets (IIGCC, 2024; PRI, 2024), available research (Pictet AM, 2024; Monnin et al., 2024; Axa IM, 2025) and the existence of an established assessment tool: "Assessing Sovereign Climate-Related Opportunities and Risks" (ASCOR). There is, however, no equivalent reference or recognised guidance at this stage on nature considerations into sovereign debt, even if the appetite of investors is increasingly growing.

Such interest can be witnessed in recent market developments, such as the launch of the Nature and Biodiversity risk-adjusted sovereign index in 2025 by FTSE Russell and AxA Climate as well as the Sovereign Biodiversity Index (SBI) by Ninety One in 2024, which relates to previous work on sovereign debt with WWF and which offers a clear assessment of environmental risk. It is also worth noting that other key initiatives have emerged to support investor action on nature and sovereign debt, notably on sustainability-linked debt (led by Nature Finance) and debt-for-nature swaps (led by six global environmental organisations). The current work of the FfB Foundation is building on this previous research and evolving market dynamics. It aims to answer the needs of its member financial institutions, and the broader market, for a practical, stakeholder-driven guidance that can support the transformation of their internal processes towards a better integration of nature considerations into their sovereign debt strategies.

Sovereigns currently lack clear guidance on integrating national biodiversity strategies into the narrative or technical clauses of their debt issuance. Efforts to align with GBF targets often fail to translate into financially operable terms or provide the concrete data financial markets need (UNEP FI, 2023). This challenge is especially acute for developing countries struggling to mobilise international funding. To maximise progress toward the nature-positive goal, targeted attention should be given to addressing this gap in the 17 megadiverse countries (WEF, 2024b), as well as the countries supported by the International Climate Initiative (IKI), which include Brazil, China, Colombia, Costa Rica, India, Indonesia, Mexico, Peru, the Philippines, South Africa, Thailand, Türkiye, Ukraine and Vietnam.

National Biodiversity Strategies and Action Plans (NBSAPs), are meant to shape the implementation of the Convention on Biological Diversity (CBD) at the national level. Currently, the number of published NBSAPS stands at 57 out of 144 Parties in September 2025 (see the CBD's online reporting tool), with most countries only publishing national targets instead. Sovereign issuers, in collaboration with their national treasury administrations, are only beginning to disclose nature considerations when issuing sovereign debt.

Financial institutions are keen to incorporate information on natural capital and enabling policies into their investment considerations, but currently lack the necessary understanding and guidance. This guidance document and accompanying Assessment Model intends to fill that void by facilitating the dialogue between sovereign issuers and financial institutions. The intention is to ensure that the efforts countries make to nurture their natural capital and curb the impacts of their economic activity can be effectively promoted and find a translation among the financial markets.

"By considering nature in their investment decisions and engagement strategies, financial institutions can help foster more resilient economies."

1.5 The Role of Financial Institutions

Financial institutions are increasingly interested in recognising the relevance of natural capital to sovereign debt markets. As investors in government bonds, they play a key role in shaping how capital is allocated to countries and in identifying long-term risks and opportunities. By considering nature in their investment decisions and engagement strategies, financial institutions can help foster more resilient economies.

Financial institutions' portfolios, notably institutional investors, will often include more sovereign assets than corporate assets, both for risk management and for compliance with liquidity and solvency regulations. The sovereign holdings will be primarily from developed countries, owing to their perceived stability and regulation on capital adequacy requirements that impose holdings of developed market sovereign debt. Contrary to corporate holdings, where the choice is endless, sovereign holdings options are only very few. Financial institutions active in sovereign markets typically hold debt from about 30 countries – mostly G7, G20, and select emerging markets. Those with in-house emerging market expertise can diversify further and invest in more countries, yet the sovereign debt universe remains far smaller than that of corporate assets.

Practically speaking, therefore, when it comes to risk screening or taking investment decisions, this means that more time can be invested in deep diving into countries to understand their dynamics better. It also means that decisions relating to portfolio management can also be highly constrained. Nevertheless, financial institutions can and should be informed. In particular, financial institutions may seek to understand where their investment can make a difference with a nature-positive focus. In addition, informed and active engagement with governments is a strategy that financial institutions can pursue, by building solid dialogue processes on this matter.

One should note that sustainable bonds or sustainable sovereign debt only make up approximately 1-2% of the overall sovereign debt market (OECD, 2023). For the purpose of this report, the focus is placed on the entire sovereign debt market, which includes the small share of sustainable bonds. Section 3 of our guidance elaborates on these very specific transactions, acknowledging that they are marginal in the overall sovereign debt market.

Financial institutions have multiple roles in the sovereign debt markets, from issuance and sales to risk management and investment. Our guidance is meant to inform all the teams engaged in the process. Large commercial banks (e.g. JPMorgan, Bank of America, Citi, HSBC, or BNP Paribas) act as structurers and underwriters. Debt Capital Markets teams advise sovereign issuers (e.g. governments and central banks) on how to issue debt to appeal to investors. They structure bond issuances, set terms, and manage the syndication process, coordinating investor presentations. Sales teams distribute the sovereign bond issues to institutional clients, such as asset managers, pension funds, and hedge funds. They communicate sovereign debt opportunities, pricing, and strategy. This process requires a thorough understanding and adequate communication of risk and investment considerations. From the standpoint of the FfB foundation, we argue that nature loss implications must be integrated throughout this process to ensure the sound management of sustainability risks and to enable the emergence of strategies contributing to nature-positive outcomes.

Development banks, such as the World Bank, Asian and African development banks etc., are also a key force in the financial markets and directly support emerging market governments with long-term financing for sustainable development and infrastructure projects. Development finance typically involves lending directly to national governments or providing guarantees for sovereign-backed initiatives.

They facilitate the mobilisation of co-financing from the private finance sector (ADB, 2025; AFDB, 2025; World Bank, 2025). A core mission of many development banks today is to align public financing with global climate and biodiversity goals, including the Paris Agreement and the GBF. Notably, multilateral development banks (MDBs) formalised their engagement on this topic in 2021 with the joint statement "Nature, People, and Planet" and have since continued to expand their efforts (see Section 3 on nature-positive considerations).

In practice, sovereign teams assess a country's macroeconomic situation, fiscal capacity, and debt sustainability to tailor financial solutions accordingly. They design, negotiate, and monitor financing agreements. These teams often work closely with ministries of finance, planning, and sectoral departments. Including thorough nature considerations into these processes is key to fulfil their mission in screening risks, in the choice of investment towards nature-positive outcomes, and in engaging on priority elements with governments (NGFS & INSPIRE, 2022; UNEP FI, 2023). Among the development banks, the French Development Bank (AFD Group), in particular, is demonstrating leadership on building understanding regarding sovereign exposure to nature-related risks, which has inspired the FfB Foundation in the development of this Model. Box 4 below details their methodology, published in June 2025, on how to assess economic exposure to nature-related physical and transition risks. To note, in 2024, the AFD Group committed to ensuring that 100% of its interventions are aligned with the expectations of the Global Biodiversity Framework, as it did in 2017 regarding the Paris Agreement (AFD, 2024).

Sovereign debt is held by pension funds, insurance companies, commercial banks, and asset managers. Central banks also hold substantial amounts of sovereign debt. Sovereign portfolio management teams – across all these categories of financial institutions – invest in sovereign debt in accordance with the institution's investment strategy and risk appetite.

Asset allocation is driven by credit quality, duration constraints to match term liabilities, and compliance with solvency regulations. Sovereign bonds from advanced economies are often considered low-risk assets, so they are key components of portfolios for these purposes (BIS, 2021). On the other hand, sovereign bonds from emerging markets and developing economies[1] are more often held for yield enhancement purposes. Macroeconomic analyses, sovereign risk assessments and investment outlooks, usually provided by ESG and Research and Strategy teams, support investment and allocation decisions (IMF, 2025).

The Assessment Model outlined in this guidance provides key information when evaluating credit quality and sovereign risk, which builds on traditional economic analysis. Factoring in nature-risk exposure and governance can lead to a differentiating view of advanced economies, e.g., Canada vs Australia, or Spain vs Italy. The Model also sheds a new light on investment considerations, providing grounds for investment with a nature-positive focus in addition to yield considerations. It will help new investment product development, including constructing funds with ESG minimums.

In all institutions, risk teams monitor sovereign credit and geopolitical risks and set credit limits, ensuring that exposures remain within established thresholds. Including the risks stemming from nature loss, as described in our section on risk above, will modify the long-term outlook of many countries. This can lead to renewed credit assessments, which may, in turn, lead to revising comparative credit thresholds for countries. The Model proposed enables the identification of the key nature risks faced by the country, together with indications of the country's preparedness to face these risks. It will serve, not only for the analysis of sovereign assets,

[1] Natural capital constitutes more than one quarter of wealth in lower- to middle-income countries and nearly half in low-income countries (AXA, 2024).

The French Development Agency (AFD) has recently published a research paper in June 2025 on how to assess economic exposure to nature-related risks. The paper presents a detailed methodology to assess socio-economic exposure to nature-related risks (NNRs) worldwide. The approach serves as a screening tool to identify the main potential physical and transition risks, drawing on publicly available data sources. It is intended to guide efforts towards gathering country-level data that is more accurate and engaging local stakeholders.

Methodology to identify physical risks exposure:

1. Identify globally a set of exposed sectors to nature-related physical risks based on their dependence on ecosystem services;
2. Computing the share of main socio-economic indicators generated by these exposed sectors to evaluate countries' exposure to physical shocks;
3. Adding qualitative information about the capacity of ecosystems to provide ecosystem services on a national scale.

Methodology to determine transition risks exposure:

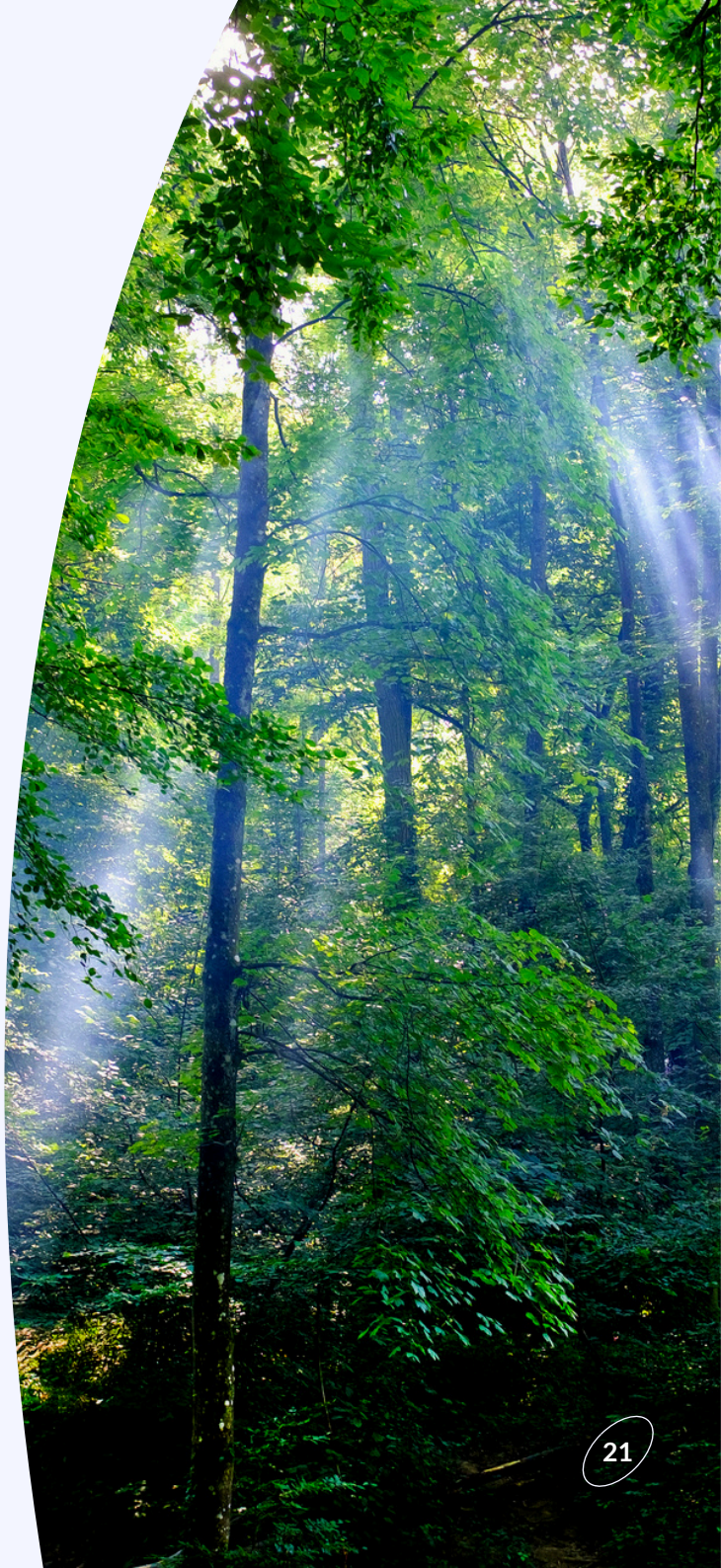
1. Identifying in the GLORIA – Global Resource Input-Output Assessment database – database, at the country level, a set of exposed sectors to a transition based on the pressures they exert on biodiversity and on their contribution to species' risk of extinction;
2. Computing the share of main socio-economic indicators generated by these sectors to evaluate countries' exposure to the transition.

Box 4: Example of how to assess sovereign economic exposure to nature-related risks

but also for the analysis of companies and projects located in these countries, where a thorough understanding of the national context is warranted.

Treasury and Asset-Liability Management (ALM) departments manage the institutions' own sovereign debt holdings, for duration matching, for liquidity management and regulatory compliance of capital adequacy requirements, such as those set out under BASEL III, the global regulatory framework developed by the Basel Committee on Banking Supervision to strengthen bank regulation, supervision, and risk management by increasing capital requirements, improving liquidity standards, and reducing leverage to enhance financial system stability. ALM departments allocate capital towards perceived lower-risk sovereign bonds for capital adequacy. Sovereign debt from advanced economies is widely regarded as a high-quality liquid asset and plays a critical role in asset-liability management. However, when nature-related risks are factored into assessments, the relative positioning of these economies may shift - particularly over the long term and thus possibly affecting pricing of long duration bonds. Countries with key economic sectors that rely heavily on degraded ecosystems and that lack strong policies to address nature loss may appear less resilient compared to others.

Beyond financial institutions, credit rating agencies play a crucial role in the sovereign debt market. They assess the creditworthiness of sovereigns and issue ratings that are often key decision elements when it comes to pricing bond issues, risk screening, and investment. The Assessment Model also outlines important elements to consider when assessing long-term credit quality.



2. Introducing a New Sovereign Debt Nature Assessment Model

2.1 Introduction

Our Model is primarily designed for investors to help develop the thinking required to integrate nature-related risks and opportunities into their sovereign debt portfolios. It can also serve sovereign issuers in their dialogue with investors, helping them understand what investors wish to learn and assess. Our Model can help open communication channels, focus on critical issues, and facilitate greater dialogue between investors and sovereign bond issuers, enabling issuers to demonstrate the grounding and ambition of their environmental approaches and, over time, help to attract additional investment as well as build trust. In the following subsections we provide an overview of the Model, cover the design process and principles behind the Model's development and deep dive into each of the components of the Model (pillars) before considering the limitations and potential adaptations of the Model itself.

2.2 Model Overview

Since sovereign assets represent a substantial share of portfolios, their performance has a significant effect on valuations and returns. Financial institutions can therefore benefit from integrating nature-related factors into their analysis to strengthen their understanding of both risks and opportunities. Our Model (see Box 5 below for a snapshot view) is designed to guide practical, informed decisions for investors, policymakers, and other stakeholders. It supports engagement with sovereigns through a financial materiality lens, using improved nature-related risk screening methods, while also laying the groundwork for criteria to guide contributions to nature-positive outcomes. By combining investment and risk perspectives, the Model enables stakeholders to assess both the economic risks and opportunities that arise from sovereigns' varying degrees of dependence on, and impact upon, nature. A detailed version of our Model is provided in Appendix 1, including explanatory notes and guidance on interpreting indicators to support financial institutions in analysing country profiles.

Our Assessment Model consists of three pillars which cover a country's existing state of natural capital (Pillar 1), how much it's socio-economic activities impact and depend on nature (Pillar 2), as well as the policies and governance that have been put in place that help to manage natural capital (Pillar 3). Specifically, Pillar 1 assesses a country's overall state of nature, health of ecosystems, and trends; Pillar 2 provides a view of a country's economic activity and exposure to risks from natural dependencies and impacts and also helps to translate this perspective into macroeconomic indicators that provide insight into a country's debt-servicing capacity over the medium to long term. It also gathers a series of pressure-based indicators evidencing the sources of impacts of human activities on natural capital; Pillar 3 then assesses whether a country has commitments and action plans to preserve and support its natural capital, and evaluates the strength of its current commitments.

There are 42 characteristics that support the three pillars. These characteristics have been selected to feature clear and relevant elements providing essential insights for decision-making, within a broader process, in terms of risk management, investment, and engagement with issuers.

The suggested indicators represent the characteristics and link to currently available public data sources. The 42 characteristics, with their relevant indicator(s), form a country profile. The data points presented are not to be taken as prescriptive, but rather as an example of what could be used to create a country profile.

"Our Model aims to provide financial institutions with a commonly recognised, comparable set of information that can guide their individual analysis."

To note, the Model should be understood as a starting point for financial institutions towards the integration of nature considerations into their sovereign debt analysis. It is meant to help with the identification of key information about an economy's relationship with nature, which can encourage the search for more data and precise information for each country and for each potential financial decision-making situation. It does not aim to provide a full picture per country, which could require hundreds of characteristics and more granular information, notably by using national datasets. Furthermore, our Model aims to provide financial institutions with a commonly recognised, comparable set of information that can guide their individual analysis and spur strategy development on nature within the sovereign debt asset class.

Pillar	Ref	Category	Ref	Characteristics	Indicators
Pillar 1 – State of Natural Capital	1A	Extent & Significance	1A1	Existence of Areas of Global Significance for Biodiversity	Critical Natural Assets
					Number and Extent of Key Biodiversity Areas (KBAs)
			1A2	Terrestrial Ecosystem Extent	National territory covered by native forest
					National territory under each land cover class
			1A3	Freshwater Ecosystem Extent	Renewable Internal Water Resources
			1A4	Marine Ecosystem Extent	Marine and Coastal Habitats
	1B	Integrity	1B1	Species Extinction Risk	Red List Index (RLI)
			1B2	Terrestrial Ecosystem Condition	Biodiversity Intactness Index (BII)
			1B3	Freshwater Ecosystem Condition	Freshwater Quality
			1B4	Marine Ecosystem Condition	Ocean Ecological Health
			1B5	Air Condition	Exposure to Toxic Air Compounds
	1C	Protection & Care	1C1	Restoration Opportunities on Land	Areas of Global Significance for Restoration
			1C2	Restoration Opportunities at Sea	Marine Priority Areas
			1C3	Protected Area Network Quality	Protected Area Connectivity (ProtConn)
					Terrestrial Key Biodiversity Areas (KBAs) Protection
			1C4	Cultural and Stewardship Significance in Ecosystems	Areas managed or co-managed by Indigenous Peoples and Local Communities
Pillar 2 – Socio-economic Activities	2A	Economic Exposure	2A1	Country Exposure to Impacts and Dependencies through National Production	% of value added from sectors with high dependencies on ecosystem services
					% of value added from sectors with high impact on nature
			2A2	Country Exposure through Importation	% of imports generated by high impact sectors
					% of imports generated by high dependency sectors
			2A3	Country Exposure through Exportation	% of exports generated by high impact sectors
					% of exports generated by high dependency sectors
			2A4	Employment generated by Exposed Sectors	% employment generated by high impact sectors
					% employment generated by high dependency sectors
	2B	Macro-Economic Indicators	2B1	Value added generated by Exposed Sectors	% value added generated by high dependency and high impact sectors
			2B2	Exports generated by Exposed Sectors	% of exports generated by high dependency sectors and high impact sectors
			2B3	Imports generated by Exposed Sectors	% of imports generated by high dependency sectors and high impact sectors
			2B4	Employment generated by Exposed Sectors	% of employment generated by high dependency sectors and high impact sectors
					% of women employed in high-dependency sectors
	2C	Environmental Pressures	2C1	Land Use Change	Habitat Loss Trends
					Land Cover Change (natural versus anthropogenic)
			2C2	Exploitation of Resources	Pressure on Water Resources (Water Stress)
					Projected Water Stress (2030/2050/2080)
					Overfished share
			2C3	Invasive Species	Terrestrial Invasive Alien Species (IAS) Threat
					Introduced Marine Species
			2C4	Climate Change	GHG Emissions
			2C5	Pollution	Nitrogen Surplus
					Plastic Emissions to Oceans
					Air Pollutant Emissions Intensity
Pillar 3 – Governance Response	3A	Commitments & Action	3A1	International Environmental Commitments	Participation in Global Biodiversity Treaties
			3A2	Translation into National Planning	Existence of a Current National Biodiversity Strategy and Action Plan (NBSAP)
					National Biodiversity Strategy and Action Plan (NBSAP) Ambition
			3A3	Translation into Economic Transformation	Biodiversity in Sectoral Transition Plans
					Biodiversity Finance Plan Status
			3A4	Habitat and Species Protection	Percentage of Terrestrial Areas covered by Protected Areas
					Percentage of Marine Areas covered by Protected Areas
			3A5	Social Inclusivity Efforts	Legal status and Recognition of IPLCs in Biodiversity and Land Policies
					Presence of Gender-specific Targets in NBSAP or related Biodiversity Plans
	3B	Drivers & Water	3B1	Land, Freshwater and Ocean Use Change	Land and Ocean Use Change Policy Instruments
			3B2	Exploitation of Resources	Overexploitation Control Policies
			3B4	Invasive Species	Budget for Invasive Alien Species Management
			3B5	Climate Change	Climate Change Commitment
			3B6	Pollution	Pollution Control Policy Instruments
			3B3	Water Governance	Integrated Water Resource Management (IWRM)
	3C	Resources & Implementation	3C1	National Natural Capital Accounts	Natural Capital Accounting Adoption
			3C2	Corporate Disclosures	Mandatory Corporate Biodiversity Disclosures
					TNFD adoption by Economic Sector
			3C3	Governance through Subsidies	Subsidy Reform for Biodiversity
			3C4	Government spending on Biodiversity Conservation	Budget Allocation to Biodiversity
			3C5	Nature finance Instruments Issued	Sovereign Nature Finance Instruments

2.3 Design of the Assessment Model

Several steps have been taken to develop the Model. First, we reviewed relevant literature (see our References section) to help inform and validate the development of the Model. Second, the focus group of 15 of the Foundation's members contributed to the elaboration of the Model, through individual and regular meetings. Contributions were synthesised and debated in these meetings to deliver a practical model which facilitates decision-making on risk screening, investment considerations, and country engagement. Third, early consultations with experts were conducted to enhance alignment, robustness, consistency, and relevance. Notably, the ongoing work of the Agence Française de Développement has inspired Pillar 2 of the Model. The FfB Foundation's policy paper and exchanges with the FfB Foundation Public Policy advocacy Group and the WWF NBSAP Tracker team have helped to guide Pillar 3.

As shown in Box 6, the Model organises information into three layers – **Characteristics, Indicators, and Data Points** – across three pillars: **State of Natural Capital, Socio-economic Activities, and Governance Response**.

The Model has been developed and iterated according to the following criteria:

Characteristics

Characteristics define what the Model aims is to understand. To ensure the Model is easy to use, efforts have focused on minimising the number of characteristics and highlighting the most relevant features to profile countries and meaningfully inform sovereign analysis. A balance was struck between the desire for less, driven by practicality, and the desire for more, allowing for more targeted decision-making. The characteristics were chosen to provide profiles that can stand alone and inform investors on the significance of nature on the country's territory (Pillar 1), economy (Pillar2) and its environmental approach (Pillar3). The characteristics also aim to facilitate a comparison among countries.

Relevance was assessed for the purpose of risk screening, investment consideration, and policy engagement guidance, in the context of the global biodiversity goals. The characteristics will continue to evolve through iterations and further consultation with stakeholders.

Pillars of FfB Sovereign Debt Nature Assessment Model	
Pillar 1 – State of Natural Capital	A country's existing natural capital, focusing on its extent, significance, integrity, also including protection and restoration opportunities.
Pillar 2 – Socio-economic Activities	How much the economy impacts and depends on nature, through a sectoral analysis approach, including a series of broader pressure-based indicators.
Pillar 3 – Governance Response	Policies and commitments to manage natural capital, to identify how well it is managed for.

Layers of FfB Sovereign Debt Nature Assessment Model	
Characteristics	Building blocks of the Model, capturing specific dimensions of a country's relationship with nature.
Indicators	Simplified proxies for characteristics. They translate complex systems into measurable values that enable screening and profiling.
Data points	Underlying values or spatial layers from which indicators are derived.

Box 6: Overview of the Assessment Model's structure – Pillars & Layers

Indicators

Indicators show how to measure the characteristics. To help facilitate decision-making, for each characteristic, a selection of potential indicators are proposed as a practical means of measurement for most of the characteristics. The number of indicators can evolve as more potential measures become available. The choice of indicator was led by the intention to capture the complexity of each characteristic in a robust manner, and provide a comparison base for a wide number of countries. For example, for the characteristic "extent of terrestrial ecosystem", one of the chosen indicators is "National territory under each land cover class", a simplified yet meaningful proxy. The indicators proposed in this Model are illustrative, not prescriptive. They represent the best available proxies at the time of writing, selected to balance simplicity and usability, support decision-making, and enable broad country comparability. However, it is acknowledged that their selection was not grounded in a formal scientific review. Therefore, the following guidance is intended to support future iterations and user adaptations.

Indicators are assessable using publicly available data, such as government documents and reliable, publicly available databases. While data availability remains a limitation for some indicators, we aim to evolve the Model as disclosure and data availability improve. Indicators are considered at the national level in order to be relevant for sovereign bond investment decisions and country analysis.

Data sources

Data points provide the information used for calculating the indicators. The Model points to several publicly available data sources which can be used by financial institutions to assess how a country is performing on any specific indicator. In this version of the Model, most indicators are covered by publicly available data sources (see Box 5 above). It also points to alternative sources of interest, primarily for deep diving.

Preference went to reliable public data sources from highly regarded scientific and supranational institutions, and sources that provide an extended world coverage, time series, and appropriate updates. It is important to outline that the current version of this work has identified the indicators based on the data landscape in 2025, and that a more systematic, data-agnostic approach, based on academic research, might be developed later on.

Some characteristics do not point to any data source. This outlines the need for new market data development. The technical appendix (Appendix 1) details all data sources featured. Sources provide data that can be expressed in different ways, depending on the indicator. Some will provide quantitative elements, sometimes in the form of aggregated indices, while others will offer qualitative assessments, and others will point to maps. It is also important to outline the disparities in coverage across countries, driven by socio-economic and historical factors, as well as across biomes and the types of pressures captured in the datasets. Although the data landscape is expected to improve in the coming years, particularly with the expansion of geospatial information, investors tailoring the Assessment Model should remain mindful of these limitations to avoid bias and ensure data quality. A non-exhaustive list of relevant considerations is provided in our data checklist, which can be found in Appendix 3.

Alignment

Characteristics of the Models were designed to align with the GBF as well as other existing models, frameworks and initiatives, such as relevant work of the IMF, the NGFS conceptual framework, the Align Project, the TNFD, the Nature Positive Initiative, the WWF NBSAP Tracker, and the forthcoming guidance "Financing Nature: A Practitioner's Guide to Results Metrics Selection" developed on behalf of the Nature Working Group of the Multilateral Development Banks. Our Model also builds on the work on economic exposure to nature–related risks exposure of the AFD (see Box 4 above).

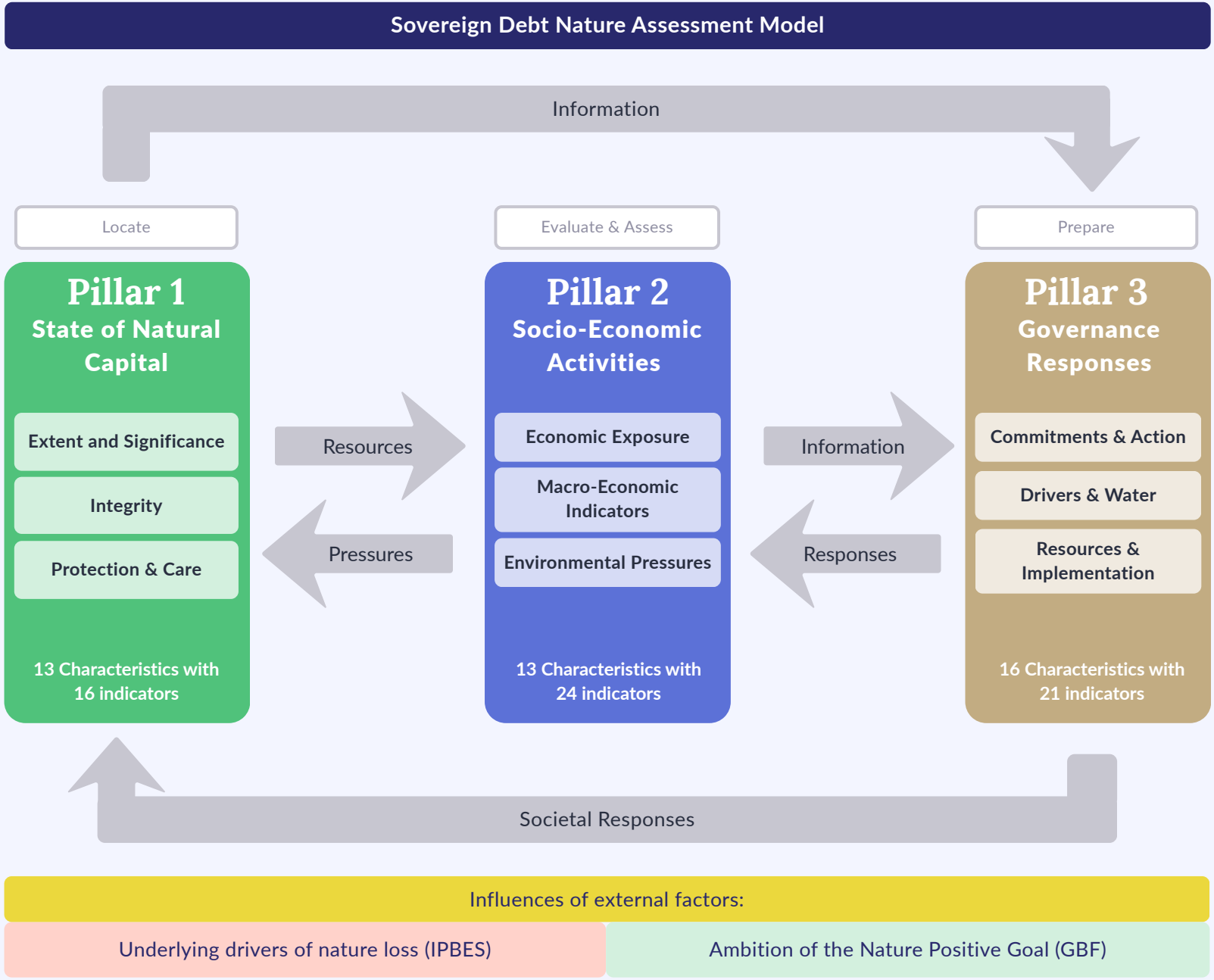
The structure of the Model's pillars has been inspired by the OECD's State-Pressure-Response (SPR) Framework, and its updated Drivers-Pressure-State-Impacts-Response (DSPIR) Model, as well as the TNFD LEAP approach (see Figure 2 below). The SPR Framework is based on OECD's concept of causality: when human activities put pressure on the environment by altering ecosystems and depleting resources, society responds through environmental, economic, and sectoral policies, which in turn influence those activities, creating a feedback loop. Together, these steps form the environmental policy cycle of problem recognition, policy design, monitoring, and evaluation (OECD, 1993). Through presenting information related to the "State" of Natural Capital and the Socio-economic "Activities" in a country – which are exerting pressures on natural capital, as well as its Governance "Responses" – the Model follows the steps of the same cycle. It aims, as such, to provide the picture of a country's relationship with nature that is meaningful enough to inform potential nature-related risks and opportunities in sovereign debt investing, even if it may only be a first step towards additional country-level research.

The Model does not follow the sequencing of the DSPIR Model. Drivers of nature change are considered as external factors which are aligned with the IPBES direct and indirect drivers of biodiversity loss (IPBES, 2019b) – changing land and sea use, direct exploitation of organisms, climate change, pollution, and invasive alien species. The Model does however include information on impacts, which are not a category in the SPR framework. This helps to identify economic sectors that potentially exert most pressure on nature, as described in the ENCORE methodology. To understand the impacts of such pressures, users are advised to consult the ENCORE tool directly and assess the specific companies operating in the relevant sector within the country. By using ENCORE to identify economic sectors dependent on nature, the Model diverges from both the SPR Framework and the DSPIR Framework. Dependencies are commonly treated in parallel with impacts and can also be interpreted as a change in the state of nature.

Considering that dependencies are a key source of exposure to nature-related risks for an economy, as they express how humans rely on ecosystem services, they have been included as a key characteristic within the analysis of economic activities. To note, in a world where natural resources are finite, dependencies can turn into pressures when unsustainable (Bryhn et al., 2020).

Our Model also aims to align with the TNFD, as it seeks to inform on a country's material nature-related dependencies, impacts, risks and opportunities. Although the TNFD applies to corporations, and not to states, the three pillars of the Model clearly mirror the TNFD LEAP process (Locate, Evaluate, Assess, and Prepare). Pillar 1 informs the Locate step, where financial institutions are expected to understand the nature-sensitive geographies of their portfolios. Pillar 2, with its focus on macroeconomic indicators, fleshes out the Evaluate and Assess steps, where financial institutions must evaluate countries' exposure to nature-related risks and assess the vulnerability of their own portfolios. Pillar 3, which investigates countries' preparedness, substantiates the Prepare step where portfolio risks need to be managed, on the basis of the responses from countries to the nature challenge.

More than 190 nations have signed the Kunming-Montreal agreement in 2022 (the GBF). For many, the implementation of the agreement is a long road. The Model helps monitor and compare the advancement of countries on their transformation path towards halting and reversing biodiversity loss by 2030 and towards nature recovery by 2050. Pillar 3 specifically examines how the GBF agreement is implemented through national legislation and policies. Characteristics covering Committed Resources and Implementation Capacity (see 3C in Box 5 and Appendix 1) give an indication of the means nations give themselves to achieve the GBF targets.



Legend

Alignment with TNFD LEAP Approach

Relations between the pillars' information, from the OECD State-Pressure-Response Framework

External factors

Figure 2: Illustration of the Sovereign Debt Nature Assessment Model - Source: FfB Foundation (2025)

2.4 Deep Dive into the Three Pillars

This following section now provides a closer look at each of the three pillars of our Sovereign Debt Nature Assessment Model. While the Model has already been outlined at a high level, this deep dive explores the underlying characteristics, indicators, and rationale that bring each pillar to life. It highlights how ecological, economic, and governance dimensions are translated into practical, financial, and policy-relevant insights for sovereign debt analysis, offering users a clearer view of the country-level information that can be retrieved from applying the Model.

Turning to Pillar 1

The first pillar of the Assessment Model is divided into three categories of characteristics that capture the state of a country's natural capital: (i) Extent & Significance, (ii) Integrity, and (iii) Protection & Care (see Box 7 below). The characteristics of Pillar 1 provide insight into the significance and state of nature within a country. The indicators were chosen to portray the extent of ecosystems and their global significance, as well as their integrity, meant as condition, intactness, or levels of degradation, alongside species-related indicators like the species extinction risk. This pillar also provides insights on restoration and protection opportunities, notably through an analysis of the "quality" of protected areas in terms of connectivity and representativeness. Social and governance-based dimensions, such as IPLC (Indigenous Peoples and Local Communities) stewardship of ecosystems are also reflected, in line with evolving global standards and equity-based targets under the GBF. The indicators cover the three realms, including terrestrial, freshwater, and marine, with custodianship currently focused only in terrestrial ecosystems, where spatial data is most available.

Pillar 1: State of Natural Capital		
Extent & Significance	**Integrity**	**Protection & Care**
Areas of Global significance (1A1)	Species Extinction risk (1B1)	Restoration Opportunities on Land (1C1)
Terrestrial Ecosystem Extent (1A2)	Terrestrial Ecosystem Condition (1B2)	Restoration Opportunities at Sea (1C2)
Freshwater Ecosystem Extent (1A3)	Freshwater Ecosystem Condition (1B3)	Protected Area Network Quality (1C3)
Marine Ecosystem Extent (1A4)	Marine Ecosystem Condition (1B4)	Cultural and Stewardship Significance (1C4)
	Air Condition (1B5)	

Box 7: The different categories of characteristics of Pillar 1

The idea of Pillar 1, for a sovereign practitioner in a financial institution, is to get a rapid picture in a few broad brushstrokes, of the natural capital available within the country's boundaries. What is being looked at relates to the:

Extent & Significance, which points to the quantity of natural capital within national borders, and provides a view of world criticality. Thanks to the indicators in this category, an institution typically knows if it is looking at a country that holds little or considerable natural capital, and whether it is also critical for the world, beyond national boundaries. This criticality is seen in 1A1, highlighting Critical Natural Assets and the number and extent of Key Biodiversity Areas (KBAs) within the country. The three main biomes are considered: land, freshwater and marine. For terrestrial ecosystems (1A2), the chosen indicators are native forest cover, primarily to address the concerns of financial institutions and countries regarding deforestation, and land cover by class to include non-forest ecosystems. Complementary indicators to facilitate deep-diving could cover other ecosystems, such as marshes or grassland. For freshwater (1A3), the focus was put on internal renewable water resources, given water is a major concern for financial institutions and a pressing global issue. For marine ecosystems (1A4), the extent of priority coastal habitats (mangroves, warm-water corals, cold-water corals, salt marshes and sea grasses) that drive biodiversity and coastal protection was considered.

Integrity, which looks at how healthy the natural capital is of a specific country. The Model focuses on both ecosystems and species as the primary components of biodiversity, whereas genetic diversity was excluded due to limited methodological clarity and data availability. The three main realms are considered, namely land, freshwater and marine, with the addition of the atmosphere. For species, the Red List Index (RLI) (1B1) is proposed as representative of the condition of species. For the terrestrial category (1B2), the Model points to the Biodiversity Intactness Index (BII) for ease of use.

For a deep dive based on country-specific data, one may also consider soil health in addition. Freshwater ecosystem condition is represented through an indicator for freshwater quality (1B3), which has been calculated at station, basin and country level. Users can also refer to the maps of the River Connectivity Status Index. For the marine category (1B4), the Model points to a poly indicator – Ocean Health Index (OHI) - providing a holistic view of marine ecosystem health, integrating multiple pressures and services. Users are invited to supplement this indicator with information on coral bleaching alerts and coastal eutrophication. Lastly, an indicator for air condition (1B5) is also provided, which points to exposure to toxic air compounds, a well-tracked and widely used indicator.

Protection & Care, including opportunities for protection and restoration, and insights on custodianship, which provide additional information to the financial institutions that wish to take impactful steps and be able to locate within a country where restoration would be most beneficial. In the form of maps, the Model points to opportunities on land (1C1) that carry global significance, and to marine priority areas at sea (1C2). Proxy information is also proposed for protection opportunities, to halt impacts. The characteristic focuses on protected area network quality (1C3) measured in terms of connectivity and representativeness. More precise than the percentage of area protected in a country – which is found in Pillar 3 as a policy commitment – these indicators provide insights on the potential for improvements, starting by observing the state of natural capital. Finally, custodianship recognises that natural capital is defined, not only by its ecological features, but also by who manages it. Indicator 1C4 measures the proportion of terrestrial ecosystems overseen or co-managed by Indigenous Peoples and Local Communities (IPLCs), highlighting both cultural importance and governance standards. These areas frequently coincide with regions of high biodiversity, lower rates of deforestation, and increased resilience (Garnett et al., 2018; IPBES, 2019b). Incorporating this perspective helps to develop a more comprehensive understanding of sovereign risks and opportunities related to nature.

Turning to Pillar 2

The second pillar of the Assessment Model covers four categories of characteristics that capture a country's socio-economic interactions with natural capital, both domestically and abroad: (i) exposure to high-impact and high-dependency sectors, (ii) translation into macroeconomic indicators, and (iii) environmental pressures (see Box 8 below). In Pillar 2, the outlook is on socio-economic activities, with a focus on the sectors that make a country's economic health. The characteristics of Pillar 2 highlight the country's exposure to nature-related risks, through a sectoral analysis of impacts and dependencies, across production, trade, and employment. By pointing out the most exposed sectors, this analysis reveals the ones that will necessitate transformation. It questions the long-term health of an economy that is highly dependent on nature. Pillar 2 sheds light on key macroeconomic indicators, which are essential to a sovereign analysis. The question that needs to be answered here is: how much the economy relies on sectors that could be affected by nature loss and the global sustainability transition, in terms of expected regulations, technologies, and market demands? This analysis can then be contrasted with an understanding of the pressures affecting the natural capital of the country, presented across drivers of biodiversity loss, in line with IPBES direct drivers. This exercise also helps clarify how human activities affect natural capital, much of which is closely tied to economic activity. The sectoral analysis of a country's economy, combined with an understanding of the sources of pressures on its environment, provides insights on the economic and political transformations that investors could expect within countries aiming to improve the state of their natural capital.

The first focus of Pillar 2 is on the share of the economy that is exposed to nature-related risks. This exposure may stem from high or very high dependency on nature, leading to potential physical acute or chronic risks, through sectors such as agrifood, textile, construction or microchips, for example.

Pillar 2: Socio-economic Activities		
Economic Exposure	**Macro-Economic Indicators**	**Environmental Pressures**
Exposure through National Production (2A1)	% of value added generated by high dependency and high impact sectors (2B1)	Land Use Change and Habitat Loss (2C1)
Exposure through Importations (2B1)	% of imports generated by high dependency and high impact sectors (2B2)	Exploitation of Resources (2C2)
Exposure through Exportations (2C1)	% of exports generated by high dependency and high impact sectors (2B3)	Invasive Species (2C3)
Exposure through Employment (2D1)	% of employment generated by high dependency and high impact sectors (2B4)	Climate Change (2C4)
	% of women employed in high-dependency and high impact sectors (2B4)	Pollution (2C5)

Box 8: The different categories of characteristics of Pillar 2

Based on a list of economic sectors in the economy, which can be found in the GLORIA database, it is possible to identify the sectors that require the most attention. On the one hand, the sectors with very high dependency on ecosystem services will need to adapt to the physical risks stemming from nature loss, whether they are acute risks, such as catastrophic landslides affecting road construction due to lack of vegetation, or chronic risks, such as increasingly severe droughts in the agrifood sector. On the other hand, the sectors that are putting a lot of pressure on the ecosystems potentially face transition risks. If these sectors represent a significant share of the national economy, their transition will be critical to its future health.

The indicators in 2A1 capture the share of the country's value added (i.e. the economic contribution of a sector to a country's GDP) generated by sectors with high impacts or dependencies. The country exposure to nature-related risks may also stem from transition risks related to sectors that are highly or very highly impactful on nature and where consumer preferences shifts and regulations are expected, such as agriculture, mining, or chemicals. The larger the share of an economy's value added that depends on or impacts nature, the more vulnerable the country is if these challenges remain unaddressed. Based on information available on the World Integrated Trade Solution (WITS) from the World Bank, a special point of attention has been added with a focus on a country's imports from highly or very highly impactful sectors with 2A2, as well as its exports with 2A3. They are meant to bring to light the reliance of many developed economies on imported nature degradation, such as deforestation, and the specific trade risks that could be faced in commodities-exporting economies. In parallel, indicator 2A4 captures the proportion of the population employed in high impact and high dependency sectors. An additional indicator highlights the proportion of women employed in high-dependency sectors, such as agriculture, forestry, and tourism. This helps reflect not just where economic exposure lies, but also how it may disproportionately affect segments of the population, informing inclusive resilience assessments.

The second focus of Pillar 2 is to translate the sectoral analysis into five key macroeconomic indicators that are constitutive of sovereign analysis. 2B1 points to the exposure of value added, whether through dependency or impact sectors. It is not exactly the sum of 2A1 and 2A2, simply because some sectors are both dependent and impactful on nature and cannot be duplicated. This is the case of the agrifood or the construction sectors. 2B2 looks at imports, 2B3 at exports. They are key to understanding a country's capacity to generate hard currency. 2B4 points to employment, a good indication of a country's economic dynamic. A complementary indicator under 2B4 is proposed to assess the percentage of women employed in high-dependency economic sectors. The inclusion of such socially disaggregated exposure strengthens the capacity of this pillar to inform transition plans that are both environmentally and socially just. These indicators help to highlight the country's sources and dimensions of its exposure to nature-related risks, allowing users to identify structural vulnerabilities that may influence a country's ability to adapt or absorb transition shocks.

The third focus of Pillar 2 is on assembling the main pressures exerted on the environment, aligned with IPBES direct drivers. These characteristics enable building connections between human activity and environmental state. 2C1 (Land Use Change) tracks habitat loss trends with the Species Habitat Index (SHI) and the natural versus anthropogenic land-cover change. A complementary dataset highlights forest degradation rates and drivers. 2C2 (Exploitation of resources) covers current and projected water stress. Information is also available on the biologically sustainable (meant as not over-exploited) marine stocks, even though with only limited global coverage.

2C3 (Invasive Species) looks at terrestrial threats and introduced marine species. 2C4 (Climate Change) reports GHG emissions. 2C5 (Pollution) includes nitrogen surplus and plastic emissions to oceans. Taken together, these indicators frame how human activities are affecting natural capital and, in turn, inform where sovereigns may need to recalibrate policy responses to manage nature-related risks and opportunities.

In Pillar 2, indicators point to exposure and pressure. What is evaluated is the share of the economy that is potentially vulnerable to nature-related risks and identifies the likely sources of potential risks. However, no risk valuation is proposed. The indicators are not scenario-based, as nature-related scenarios have yet to be developed by the market.

Turning to Pillar 3

The third pillar of the Assessment Model covers three categories of characteristics that capture a country's governance for natural capital management: (i) Commitments & Action; (ii) Drivers & Water; and (iii) Resources & Implementation (see Box 9 below).

Characteristics of Pillar 3 form an understanding of the country's policy actions towards ensuring the sustainable use, conservation and restoration of nature. They look into its international commitments and their actual translation into national legislation, strategy (existence and ambition of NBSAPs), planning (transition pathways), and actual protection. They focus on the mitigation of the five IPBES drivers of biodiversity loss and adaptation to one of nature's most common resource dependencies: ground and surface water. Furthermore, they also give a view of the country's knowledge, technical and economic resources committed to tangible implementation through measurement ability (natural capital accounting), monitoring capacity, subsidies direction, government targeted spending, and finance. The pillar also incorporates equity and inclusion dimensions, such as gender integration and recognition of Indigenous Peoples and Local Communities (IPLCs), which are essential for legitimacy, long-term effectiveness, and alignment with the global biodiversity goals.

In Pillar 3, the question that the Model attempts to answer is whether the nature-related issues of the country are managed and how they are managed, looking from the optics of the government's responsibility to take action. It is difficult to assess whether a government's ambition matches the level of concern on the state of natural capital, and whether the measures taken are and will be sufficient. Nevertheless, the Model paints a country profile that gives a first view on the country's international environmental engagements and their national translation (3A). This Pillar also looks at if and how the policies in place address the five IPBES direct drivers on nature stemming from the population and the economy, and how the governmental bodies deal with nature's biggest resource dependency, i.e., water (3B). The Model also investigates whether the government commits resources to meet its environmental ambition (3C).

From the view of International Environmental Engagements and their National Implementation (3A), the Model points to the participation in global biodiversity treaties (3A1) with a special focus on whether the country is or is not a party to GBF, as well as the Convention on International Trade in Endangered Species (CITES), and the Ramsar Convention on Wetlands. The GBF sets a decisive roadmap to reverse biodiversity loss by 2030. It requires all 196 participating countries to revise their NBSAPs to align with these ambitious goals. The Sovereign Debt Nature Assessment Model, in 3A2, looks into whether the country has developed and officially produced a renewed NBSAP. It refers to the WWF NBSAP Tracker to assess the level of ambition, actionability and GBF alignment of the NBSAP.

To note, there is no indicator directly pointing out the conflicts or synergies between climate and biodiversity plans, which would be essential to manage the trade-offs and synergies between the strategies to achieve sustainability goals. However, the NBSAP tracker makes it possible to see whether an NBSAP addresses the 23 GBF targets and applies a “drivers approach”, both of which directly incorporate climate change.

The Model, in 3A3, further explores the translation of the country’s environmental ambition into national sectoral transition plans. For climate change, the transformation of key sectors such as the energy, transportation and construction sectors has been paramount to tackle CO2 emissions. These transformations have often been led and facilitated by government sectoral plans. Governments are also expected to develop nature transition plans for key sectors such as agrifood, chemicals, mining, and construction. Specifically, in 3A3 notes whether a Biodiversity Finance Plan is in place (BIOFIN), and what is its status of development. As a key requirement of the GBF is the national protection of 30% of land and 30% of the ocean, the Model looks into the percentage of terrestrial and of marine areas covered by protected areas in 3A4. This is possible to assess thanks to the information from the World Database on Protected Areas (WDPA) managed by UN Environment Programme World Conservation Monitoring Centre (UNEP-WCMC). In addition, characteristic 3A5 covers social inclusivity efforts: it assesses whether Indigenous and community land rights are formally recognised within national legal frameworks or biodiversity policies, and it also tracks the presence of gender-specific targets or commitments in the country’s biodiversity strategies (e.g., NBSAPs). Together, these components provide insight, not only into a government’s ambition and implementation capacity, but also into how inclusive and representative its efforts are, particularly with respect to IPLCs and women.

Pillar 3: Governance Response		
Commitments & Action	**Drivers & Water**	**Resources & Implementation**
International Environmental Commitments (3A1)	Land, Freshwater and Ocean use Change (3B1)	National Natural Capital Accounts (3C1)
Translation into National Planning (3A2)	Exploitation of Resources (3B2)	Corporates Disclosures (3C2)
Translation into Economic Transformation (3A3)	Water Governance (3B3)	Governance through Subsidies (3C3)
Habitat and Species Protection (3A4)	Invasive Species (3B4)	Government spending on Biodiversity Conservation (3C4)
Social Inclusivity Efforts (3A5)	Climate Change (3B5)	Nature Finance Instruments Issued (3C5)
	Pollution (3B6)	

Box 9: The different categories of characteristics of Pillar 3

The Model aims to provide further information on how the country addresses institutionally its main impacts and dependencies on nature. Decreasing impacts is related to alleviating the pressures on nature. The Model proposes six characteristics, aligned to the IPBES direct drivers and also to water dependency. 3B1 points to land use and ocean use change, looking at the presence of legislation or planning frameworks aimed at limiting habitat conversion, such as land-use zoning, marine spatial planning, and deforestation moratoria. 3B2 tracks the presence of economic policy instruments addressing the overuse of natural resources, including controls on overfishing, overlogging, and mechanisms like circular economy strategies. 3B3 provides a view of the country's regulatory fight against Invasive Alien Species. 3B4 assesses the country Climate Change Commitment through rankings from climate policy indices (e.g. Climate Change Performance Index - CCPI) and also points to sovereign sustainability trackers such as the Assessing Sovereign Climate-related Opportunities and Risks (ASCOR) platform. 3B5 focuses on the national Economic Policy Instruments for Pollution Control to address major sources of pollution, including restrictions on harmful substances such as pesticides or plastics, emissions limits, and wastewater regulations. With 3B1 to 3B5, all five IPBES pressures are covered and paint the profile of a country's engagement to decrease impacts on nature. Beyond the view on institutional governance of impacts, the Model also aims to provide information on a country's management of the main dependency on nature, i.e. water. For this purpose, 3B6 points to the Integrated Water Resource Management (IWRM) as defined in the UN Sustainable Development Goal SDG 6.5.1, which scores a composite of policy integration, institutional frameworks, and stakeholder engagement in water management.

To complete the country profile, the last section, 3C, aims to understand whether the government commits actual resources and gives itself the tools to achieve its environmental ambitions. The adoption of natural capital accounting is a key step that a nation can take. It is checked in 3C1.

The GBF requires, through its Target 15, that businesses assess, disclose and reduce nature-related risks and negative impacts. Accordingly, 3C2 looks at corporate disclosure architecture: whether biodiversity disclosure is mandatory, which could be complemented by whether nature (or climate-and-nature) transition plans are mandated, and the uptake of TNFD-aligned reporting (e.g., adopters by sector). Target 18 of the GBF, aims at reducing harmful incentives globally and scaling up positive incentives for nature. 3C3 tracks countries that have implemented policies to reduce or eliminate subsidies harmful to nature, e.g. phasing out fossil fuels, pesticides and fertilisers, or harmful fisheries subsidies.

Government spending on nature conservation completes the picture with a look at budget allocation to nature in 3C4. Finally, the Model also tracks whether the country has issued specific nature finance instruments, such as debt-for-nature swaps or nature-linked bonds, in 3C5. This last characteristic can be seen as a sign of fruitful integration of finance and nature considerations within the government itself, aligning the goals of both finance and environment ministries.

2.5 Limitations and Potential Adaptations of the Model

In developing this assessment model, the aim was to capture the key elements shaping the interconnection between a country and nature. Yet it is difficult to present a complete picture of this relationship without significantly expanding the scope of characteristics, incorporating links between nature and social or geopolitical factors, highlighting the interconnectedness of nature and climate-related risks, and recognising the value that nature provides to people beyond purely financial aspects.

We acknowledge the crucial importance of considering those elements on an equal footing and while the approach undertaken here is solely focused on nature, we strongly encourage investors to embed this Assessment Model in a broader context and analysis of a country's specificities.

The Model has also been conceived as a tool allowing investors to take action now in assessing the sovereign assets that they have in their portfolios. As stated in the previous sections, it led to an approach that has been initiated mainly by considering the current data availability. Therefore, the Model is not exhaustive, neither in the indicators that would allow an investor to assess a characteristic, nor in the datasets or data points that would allow investors to compute such information. We can assume that a model aiming for a more precise view of the connection between a country and nature will generate many indicators and data points, thereby increasing analytical complexity. Refining the Model will therefore require balancing representativeness with resource optimisation. To guide the selection of additional data sources, a data checklist has been added to this document offering some guidance to mitigate bias, and address data quality concerns (see Appendix 3). The data currently available on the market has limitations. For example, ENCORE, one of the most widely used tools by financial institutions, provides valuable insights into the impacts and dependencies of activities and sectors. Yet its assessments would benefit from greater granularity at the level of industrial activities, and sector-level data does not capture the specificities of the location or context in which these activities occur — factors that may drastically influence the extent of the materiality of impacts and dependencies. Moreover, the partial coverage of value chain links makes it difficult to capture impacts that occur far upstream or downstream. Other data sources used in the model provide only partial geographic coverage, both across and within countries, and it is clear that the data landscape is unevenly developed across pressures, biomes, and topics. It also remains challenging to find country-level datasets that capture ecosystem services or natural capital flows. See the limitations of the ENCORE model for more. The limitations in data quality apply not only to ENCORE but to the market as a whole. A key improvement needed in currently available data is regular updates, to avoid inconsistencies and the use of outdated information.

Finally, innovative methodologies may be incorporated in the Assessment Model in future updates, such as ecosystem services valuation, scenarios, or country-level footprinting. It is important to note that model-based or qualitative data sources inevitably rely on assumptions that introduce uncertainty. Biodiversity footprinting tools, which aggregate indicators across pressures and biomes but often use low-granularity models, risk diluting information and increasing uncertainty. Similarly, country scorings can create a "black box effect"2, obscuring the nuance needed to fully understand a country's relationship with nature. To support investors in assessing country–biodiversity interactions, advances in scientifically robust, ideally non-reported data are urgently needed.

3. Putting the Assessment Model into Practice

3.1 Introduction

Each of the three pillars offers a distinct perspective on a country, thereby contributing to a more comprehensive and nuanced understanding when viewed together. For example, in nature-risk screening, attention may focus on countries where nature holds high ecological value but is currently degraded and under threat (Pillar 1); where key industries and human activities exert significant pressure on nature (Pillar 2); and where weak nature governance suggests poor prospects for future environmental outcomes (Pillar 3).

Investment may prioritise countries where mobilising resources can deliver greater impact – where nature governance (Pillar 3) addresses material challenges (Pillar 2) and where restoration opportunities exist (Pillar 1). Conversely, investment may deliberately avoid countries with high natural capital significance (Pillar 1), or those actively expanding sectors such as mining or drilling that drive environmental degradation (Pillar 2), without adequate governance frameworks to mitigate principal adverse risks to natural capital (Pillar 3). Financial institutions may engage with countries where nature governance (Pillar 3) does not fully address material economic pressures or dependencies (Pillar 2), and where ecosystems are on a severe degradation trend (Pillar 1). Through such engagement, they can promote sustainable investments for the conservation and restoration of natural capital, particularly in countries of high biodiversity significance.

The Model is designed to enhance informed decision-making and promote meaningful dialogue between investors and sovereign debt issuers. As users engage with the country profiles, navigation should be purpose-driven, enabling investors and stakeholders to determine how best to apply the Model according to their specific objectives and contexts. Our Model is a first step, an assessment tool meant to support a better integration of nature considerations into sovereign debt sustainability analysis. It aims to provide a basis for various uses by financial institutions, starting from risk screening, towards sovereign engagement and sovereign nature-linked investments. It will also be a building block for criteria on integrating considerations for nature-positive outcomes into sovereign debt portfolios, as part of the FfB Foundation's upcoming Finance for Nature Positive Framework.

As part of these developments, the FfB Foundation could explore the opportunity to develop an aggregated scoring system built from the country profiles resulting from the Assessment Model. There is an identified market interest in such product, which can be demonstrated by its existence for climate change (i.e. Climate Change Performance Index) and the first nature and biodiversity risk-adjusted sovereign index launched in September 2025 LSEG / FTSE Russell & AXA Climate, 2025). As of now, the FfB Foundation aims to align with the model of ASCOR on climate, to provide financial institutions with a stakeholder-driven, recognised model that can provide data-driven insights on economies' relationships with natural capital. The development of initial sample country profiles could lead to the development of a country analysis tool offering a benchmarking capacity. To start, the next steps of this work will thus focus on developing methodologies for analysis and actions into a practical framework, to increase capacity within financial institutions and support the emergence of sovereign strategies integrating nature.

This section outlines a vision for the potential application of the Model. Each step is expected to be further developed by the FfB Foundation, both through a dedicated peer working group to share knowledge and good practices, and through additional research and publications.

3.2 Nature-Risk Screening

Nature-risk screening forms an important part of integrating nature into sovereign debt portfolios. This is because risk considerations are paramount when it comes to assessing sovereign debt. This section explains how nature-related risks contribute to country vulnerability, potentially weaken macroeconomic indicators, and create financial risk exposure for sovereign debt holders – alongside reputational risks linked to environmental damage and misalignment with institutional targets.

Nature-related risks are often categorised as physical or transition risks. Physical risks stem from ecosystem service declines (e.g. soil health affecting agriculture), leading to a country's vulnerability to changes in impact pressures and hazards. Transition risks stem from changes in policy, regulations, or market conditions that can impact entire sectors, potentially causing economic slowdowns due to restricted sales or processes, mandated costly investments, or declining consumer demand. At the macroeconomic level, physical and transition risks can affect indicators such as prices, productivity, investment, socio-economic dynamics, fiscal balances, and trade and capital flows – ultimately influencing inflation and GDP (NGFS, 2024). See Box 10 below for more information on how nature loss can impact these essential macro-indicators relevant to sovereign debt markets, with the potential for becoming material financial risks.

Recognising these risks supports risk management and provides a well-informed macroeconomic view of the country. It feeds into scenario and sensitivity analysis, identifying geographies, sectoral activities, and governance that may lead to risk exposure. It also points to where transition finance is needed to alleviate risk. Furthermore, it will be key for financial institutions to relate this information to their own sovereign debt assessment methodologies, not only with further ESG criteria, but also with their assessment of a country capacity to reimburse debt. Also, recognising these risks serves not only to assess sovereign debt holdings but also critically informs other asset classes, particularly the corporate debt of companies located or operating in these countries. It may also lead to changes in country risk allocations.

The Model helps us understand the main topics that need to be closely followed for risk screening. Pillar 1 gives an overview of the country's natural capital. How much natural capital is there (1A)? Is it in good health (1B)? What are the indicator trends (1C)? Where is this change happening: on land, in a freshwater system, or at sea? Economies that are heavily reliant on natural capital will feel the brunt of nature loss. Agricultural countries where soil health (1B2) is degrading, for example, may face shortages of soft commodities and increased imports to compensate for the lack of domestic production, leading to inflationary pressures and impaired trade balances. Countries where water stress is on the rise (1C2) and that rely heavily on hydropower for their energy sources may face production decreases, leading to increased imports of energy and decline of GDP. Countries facing significant air pollution issues (1B5) are likely to see rising health problems among their populations, driving higher healthcare costs. They will also need to divert resources to capital expenditures for pollution-control processes, placing additional pressure on fiscal balances.

Prices: Fluctuations in the prices of commodities, energy, and water can drive inflationary pressures. These effects are often intensified by nature loss and climate change, as extreme events, such as droughts and floods, disrupt food production and supply chains, leading to volatility in global food prices. For instance, in Kenya, periods of drought have caused significant increases in cereal prices, contributing to higher overall inflation (IMF, 2024b; Waweru and Owino, 2022).

Productivity: Nature loss may reduce labour productivity (e.g. as a result of heat or pollution), the provisioning or regulating service productivity (e.g. soil health affecting agriculture yields) and it can also damage and disrupt key infrastructure assets (e.g. electricity from hydropower under stressed water levels) (NGFS, 2023).

Capital: Addressing nature degradation often requires increased investment in mitigation and adaptation measures, which can also lead to faster depreciation of existing capital. For example, India is making significant efforts to improve air quality, a necessary but costly undertaking. Economic losses from reduced productivity, premature deaths, and illness due to air pollution have been estimated at over 1% of the country's GDP. Notably, 21 of the 30 cities with the worst air pollution globally are located in India (World Bank, 2024).

Socio-economic changes: Nature loss can drive significant socio-economic shifts, including structural changes to economic systems, evolving societal preferences, rising inequalities, increased migration, and even conflict. A recent United Nations World Water Development Report (2024) underscores how water-related tensions are intensifying conflicts around the world. When water becomes scarce, polluted, or inaccessible, it can undermine food security, destroy livelihoods, and contribute to instability. According to the report, as of 2022, around half of the global population experienced severe water scarcity during part of the year, while one-quarter faced extremely high water stress, using more than 80% of their annual renewable freshwater supply. Climate change is expected to worsen the frequency and intensity of these pressures, posing escalating risks to social cohesion and stability.

Trade and capital flows: Disruptions to ecosystem services can trigger shocks to trade and capital flows, with ripple effects across global value chains that may influence exchange rates and sovereign credit ratings (Nature Finance, 2022; WEF, 2023). For example, the European Union's deforestation regulation – which restricts the import of goods linked to deforestation – directly affects countries that depend on exports such as beef, soy, or cocoa, potentially reducing export revenues and increasing trade-related vulnerabilities (S&P Global, 2023).

Fiscal balances: Nature loss can significantly affect fiscal balances by reducing government revenues and increasing public expenditures. Declines in ecosystem services – such as those supporting agriculture, tourism, and fisheries – diminish tax revenues, particularly in nature-dependent economies (IMF, 2024b). At the same time, governments face rising costs from climate-related disasters, infrastructure repair, and public health burdens linked to pollution and biodiversity loss (OECD & World Bank, 2019). In some cases, countries may be forced to import more natural resources – such as food or water – further straining their budgets and widening trade deficits (IADB, 2021). These fiscal pressures can worsen debt sustainability and elevate sovereign risk.

Box 10: The impacts of nature loss on commonly used sovereign macro-indicators
Adapted from: NGFS (2023) and CISL (2021)

Pillar 2 also highlights the country's most at-risk sectors. To what extent is the economy vulnerable to nature loss compared with its neighbours or peers (2A)? If this vulnerability is concerning, which key sectors should be prioritised (2B)? And how does sectoral vulnerability translate into the four key macroeconomic indicators (2C)?

Characteristic 2A1 is focusing on identifying high impact and high dependency economic sectors within a country's added value. Countries that have a high impact on nature, such as those with a large share of chemicals, unsustainable agriculture, construction and mining can be expected to undergo profound transformation of these sectors under the pressure of regulation, and consumer preference changes. Failing to do so warrants attention. Conversely, countries investing in sectoral transitions may enhance their long-term outlook, which can be a positive signal for long-term debt assessments. Countries where nature dependency is high, whereby an economy is concentrated on agricultural production, for example, or textiles or tourism in water stress conditions, will face a need for investment to adapt and limit water intakes in the sectors concerned. In the medium term, production may be constrained, capital expenditures may increase, primary and fiscal balances weakened, before investment yields returns in the long term. Countries that rely heavily on nature-intensive imports (2A2) – for example, developed economies importing agrifood products – also need to be a point of attention. Regulations, such as EU policies on imported deforestation, will require these sectors to invest heavily in more sustainable supply chains, affecting economic performance, inflation, and fiscal positions.

Once the economy's impacts and dependencies are understood, it then becomes possible to identify potential risk factors. The four macroeconomic indicators in 2B – value added, exports, imports, and employment – provide a quick, high-level view of a country's economic strength and debt repayment capacity in the context of nature loss. These indicators open the way for deeper questioning, to be adapted to each economy. For example, to what extent do the sectors with high impacts or dependencies create tax income or jobs in the country? To what extent do they represent competitive industries for a country, that may be engrained throughout the economy (such as soy production in Brazil or palm oil in Indonesia), contrary to an industry that could easily be replaced? It will also be worth analysing whether such industries are dependent on ecosystem services that are becoming degraded in a country. The potential level of risk can be reduced if these are effectively managed. All countries will be affected by nature loss, though the degree of impact will vary.

"Nature-related risks contribute to country vulnerability, potentially weaken macroeconomic indicators, and create financial risk exposure for sovereign debt holders."

Pillar 3 completes the analysis by determining whether the risks identified in Pillar 1 and 2 are being addressed by the country. What is the country's ambition (3A)? Are its laws and regulations addressing the main nature issues it faces with pertinence (3B)? Is the country allocating resources to meet its ambition (3C)? All these factors can be seen as either reassuring because institutional steps are taken to lessen the country's vulnerability, or topics of concern. Countries that have the GBF agreement (3A1) can be viewed as better prepared if they are acting on, and have developed a National Biodiversity Strategy Action Plan (NBSAP) (3A2), sectoral transition plans or a National Biodiversity Finance Plan (3A3 and if their key biodiversity areas are widely protected (3A4). Most countries have environmental laws in place, but do they adequately address the main topics of concern as to nature loss? For example, countries in the Amazon Basin can be compared by examining the strength and social acceptance of their policies on deforestation and overlogging (3B1 and 3B2), which would help preserve their long-term resources and export bases. Countries will show a higher degree of preparedness when resources have already been allocated to this goal, such as subsidy reforms (3C3), or conservation budgets (3C4). Countries that issue nature finance instruments (3C5) show a certain level of maturity in their financial and environmental strategies, where future economic flows are preserved through natural capital enhancement.

These initial ideas for country's nature-related risks based on the Assessment Model leads to two key recommendations to users. Firstly, that their analysis must build upon the interactions between pillars. This will enable understanding about where the pressures on nature are coming from, and if the policy responses are adequate, considering both the structure of the economy and the state-of-nature in a specific country.

Secondly, the sectoral approach proposed in Pillar 2 to build a picture of an economy, is also relevant for overall country analysis. For example, in the case of an economy with an important fishing sector, the dependency on healthy marine (or freshwater) ecosystem will be very high. What is the state of the marine ecosystems? What are the levels of pressures exerted? Are there any signs of overexploitation which could lead to an ecosystem collapse? If so, could it generate an economic shock and a difficulty to reimburse debt? Are there relevant policies in place to avoid such a risk, such as quotas on fisheries? As well as the cross-pillar analysis and sectoral approach, users of the Assessment Model must remember to leverage its signals as a first source of information that should be completed with deeper research, notably using country-specific insights and data.

The Model has been designed in such a way that it facilitates and enhances the analysis of sovereign debt for the purpose of risk screening, engagement and investment. Box 11 illustrates how sovereign debt practitioners expect the Assessment Model's nature-related risk analysis to support their goals, detailed in the rest of Section 3. These include engaging with issuers and building portfolios, currently through nature-linked financial products and, as methodologies advance, by integrating nature-positive outcome considerations.

Context

The sovereign debt asset class is currently concentrated in developed markets, primarily for liquidity and diversification purposes. These investments are mostly in national sovereign issuances with limited scope to influence issuer behaviour. Despite this, integrating nature-related risks into sovereign debt analysis is increasingly important to address long-term financial stability and systemic environmental risks.

Applications of the Model

1. **Internal Stakeholder Engagement**: The Model enables structured analysis of physical and transition nature risks, building internal capacity and informing governance and risk frameworks. It supports board and committee education, helping align internal risk thresholds with nature-related risk exposure.
2. **Sovereign Engagement**: Using the Model k to assess sovereign issuers allows for a more targeted and evidence-based engagement strategy. It enhances dialogue on material environmental risks, supports peer benchmarking (e.g. G7, G20), and fosters investor action around shared risk concerns and expectations.
3. **Portfolio Construction**: The Model supports adjusting sovereign weightings over time based on nature-risk performance and identifying jurisdictions with stronger nature-related risk profiles. This informs both medium-to-long-term asset allocation and new issuer inclusion.
4. **Strategy & Reporting**: Insights derived help shape future investment strategy by embedding material environmental factors. It also supports compliance with emerging nature-related disclosure standards (e.g. TNFD), enhancing transparency and accountability.
5. **Systemic Risk Mitigation**: By identifying cross-border environmental impact pressures (e.g. through supply chains), the Model can drive investor efforts to mitigate systemic risks. It can also support sovereign efforts to develop biodiversity strategies and meet global commitments, such as the Kunming-Montreal Agreement (GBF).
6. **Investment Opportunities**: Model outputs can inform green/blue bond strategies, macroeconomic assessments, and cross-asset investment (e.g. real estate, infrastructure). It supports development of customer-aligned products incorporating nature-related factors.
7. **New Business & Ratings**: Supports innovation in nature-integrated investment strategies, contributing to competitive, risk-adjusted returns in workplace pensions and bulk-purchase annuity (BPA) mandates. It builds an evidence base to strengthen third-party ratings and market positioning.

Constraints

Challenges include limited flexibility to reweight country exposures, difficulties in linking nature risks to sovereign-credit outcomes, restricted government access (especially outside the UK), and potential conflicts between environmental goals and socio-economic priorities. Additionally, the longer-term nature of environmental risk contrasts with short political cycles, complicating sustained engagement efforts.

Box 11: Application of the Assessment Model: potential actions enabled by nature-related risk analysis in Sovereign Debt

3.3 Engaging with Sovereign Issuers

Sovereign issuers are responsive to the needs of investors. Engaging issuers on key concerns around nature loss and highlighting necessary policy improvements can help focus efforts on strengthening the long-term prospects of a country's economy. By incorporating nature considerations into their investment decisions, investors can promote more responsible fiscal and environmental planning, and resource mobilisation.

The Model helps to evaluate the quality of nature governance, its pertinence, the effectiveness of nature-related regulations, and the ambition of its commitments to the global biodiversity goals. This detailed understanding can inform sovereign engagement efforts. It can guide investors in defining the engagement topics that are most meaningful when it comes to addressing the material issues faced by sovereigns. As a publicly available and independent tool which draws on a variety of public data sources, the Model can also serve as a shared reference point during engagement dialogues, especially in collaborative initiatives, and can be used directly with government representatives, which is often less sensitive than referencing internal sustainability scores. Based on the development of country profiles and nature-related risks analysis, the Model can serve as a common reference for sovereigns and investors towards improving nature stewardship. Financial institutions can engage with sovereigns to encourage the development of new legislation to curb pressures on nature, and support institutional capacity building where needed, helping ensure that public finances and ecosystems are managed in a mutually reinforcing way. This transition towards proactive engagement is essential for driving the nature-positive agenda and ensuring that investments yield tangible benefits for both nature and local populations.

When driving engagement, stewardship and collaborative action are key. Through joint engagements and collaborative efforts, financial institutions can create meaningful incentives for governments to act. For example, the Model can help prioritise whether to engage importing countries on nature-related import requirements, or on export-driven environmental risks for resource-producing countries. It can also help identify which specific driver of biodiversity loss to focus on (e.g. deforestation), or which material dependencies (e.g. water use) are most critical in a given sovereign context. Given its systemic nature, effectively addressing biodiversity loss also requires adequate policy frameworks to be in place that protect ecosystems from further degradation and foster regeneration.

A key reference to support collective engagement on nature policies is the report "Aligning Financial Flows with the Global Biodiversity Framework: Translating Ambition into Implementation", crafted in April 2024 by leading financial institution members of the FfB Foundation. The document outlines key actions governments can take to align financial flows with the GBF, as detailed in Box 12. It can also be used by financial institutions to advocate for comprehensive whole-of-government strategies that are able to bridge the current biodiversity finance gap.

The four key policy recommendations that are put forward in the paper are:

1. Require companies and financial institutions to assess, monitor, and disclose their nature-related risks, impacts, dependencies, and opportunities;
2. Mandate Nature Transition Plans based on sectoral transformation pathways, and foster collaborative commitments;
3. Actions from central banks and supervisors;
4. Create economic incentives for businesses and financial institutions to maximise the mobilisation of private finance.

Box 12: The FfB Foundation Policy Recommendations for Governments

These actions are especially relevant in light of international sustainability goals such as those articulated in the GBF, which underscores a sovereign's agreement on advancing global nature-positive outcomes. By engaging with government representatives and advocating for decisive policy actions, investors can encourage policymakers to implement measures to mitigate systemic risks such as biodiversity loss. However, sovereign engagement is a time and resource intensive effort. Investors therefore need to carefully consider how to allocate these resources effectively and craft robust and comprehensive engagement strategies to optimise outcomes. This can be done in three subsequent steps, which can, at least in part, be informed by the respective pillars of the Assessment Model.

Step one: Who – The first step is to identify countries that have the largest potential in addressing nature loss. Here, financial institutions need to gauge the overall impact of a country on nature, and its potential role in mitigating this systemic risk. To answer this question, investors can draw insights from the first pillar, including identifying countries with, for instance, the largest globally significant biodiversity sites (1A1), most species at risk of extinction (1B1), or a high economic exposure to nature risks (2A). Next to this, several other factors are important for investors to consider.

Firstly, in order to ensure legitimacy of targeting a specific country, there needs to be sufficient potential for more robust policy design (see the 'what' step below). Secondly, sovereign engagement requires a long-term commitment, meaning the country needs to have sufficient investment relevance (portfolio exposure). Finally, investors need to assess whether the country will be receptive to feedback from the (foreign) investment community and have a political landscape that is conducive for a constructive and sustained dialogue.

Step two: What – Tangible, actionable, and realistic engagement requests are a prerequisite for a fruitful dialogue. In order to determine the scope of the engagement and formulate clear objectives, a comprehensive assessment of the country's policy landscape is required. Specifically, three elements should be considered:

- Ambition: has the country set targets for halting biodiversity loss, and how ambitious are these (3A)?
- Policy design: has the country formulated adequate policies, and how likely are these to deliver on these targets (3B)?
- Policy implementation: are sufficient resources in place to implement and enforce these policies (3C)?

Many of these insights can be drawn from the policy Pillar 3. For instance, indicators in 3A are about the goals and intentions countries have formulated, while indicators in 3C are indicative of the quality of policy design. Once investors have determined their specific engagement requests regarding government policies, they need to identify which governmental departments and bodies to approach, and who within them to speak to (see the 'How' step below).

Step Three: How – Effective policy change, particularly on complex issues like biodiversity loss, requires alignment and cooperation across multiple governmental departments, agencies, and regulatory bodies. As such, investors need to conduct a mapping of relevant stakeholders, including their interests and role in addressing the issue. In addition, investors can also consider working with other investors to pool resources and enhance legitimacy. Finally, the timing and framing of the engagement is also of relevance to optimise outcomes.

3.4 Sovereign Nature-Linked Financial Instruments

More financial flows need to be directed towards the protection of nature, as the biodiversity finance gap is estimated at USD 700 billion per year (UNEP, 2022). This is especially critical for emerging market countries, which often have strained budgets, high public debt, and house a significant part of global natural capital. Nature-related financial instruments are one of the responses to Target 19 of the GBF, which states that private resources must be mobilised by "leveraging private finance, promoting blended finance, implementing strategies for raising new and additional resources, and encouraging the private sector to invest in nature, including through impact funds and other instruments".

Nature-related financial instruments are playing a growing role in sustainable investing, not only by channelling capital into conservation and restoration, but also incentivising improved natural capital performance by sovereigns. Appendix 2 outlines some of the most relevant nature-related instruments that have been utilised in the sovereign debt context, such as green and blue bonds, sustainability-linked bonds, debt-for-nature swaps, and biodiversity credit markets.

These instruments link financial terms – such as capital costs or debt obligations – to environmental outcomes, aligning national interests with ecological goals. For investors, such instruments are an opportunity to widen the scope of thematic investment available, to contribute to addressing the nature finance gaps, and to have an impact.

To attract investors to hold such nature-finance instruments, it is key that those particular sovereign issues show pertinent KPIs and include a full narrative on the country's nature profile. In relation to our Sovereign Debt Nature Assessment Model, this can help:

- Select the most relevant investments, i.e. investments with the highest potential impact, based on the assessment of the country's state of nature and policy responses;
- Check that the projects, KPIs and ambitions are aligned with the specificities of the country. Also, alignment with ICMA's Sustainable Bonds for Nature Practitioner's Guide would also be useful;
- Verify that the country's nature-related policies are coherent with the proposed financing.

In the context of sovereign nature-related assessments, these instruments are more than just financing tools – they comprise policy signals, performance incentives, and accountability mechanisms.

Currently, sovereign nature-linked financial instruments represent only a small fraction of the sovereign debt market. Sustainable bonds account for less than 2% of sovereign debt, while nature instruments remain a niche within this category, with only a few issuances occurring each year since 2010 (OECD, 2025). Nature instruments make up less than one in 1,000 of sovereign debt. While one can hope for growth in this area, it should not be expected to fully provide the capital influx needed for emerging markets to achieve their transformation efforts. The scaling of financial flows towards countries aligning their development with the GBF targets will only happen when nature considerations are integrated into mainstream sovereign finance. The Sovereign Debt Nature Assessment Model is specifically designed to achieve this goal.

3.5 Investment Considerations for Nature-Positive Outcomes

The Sovereign Debt Nature Assessment Model will feed into the overall Finance for Nature Positive (FfNP) Programme developed by the FfB Foundation (launching soon). The FfNP Programme aims to help financial institutions identify and assess opportunities to build portfolios that contribute to the Nature Positive global goal, in line with the mission of the GBF, focusing both on countries (sovereign debt) and real economy players (transition companies, solution providers and enablers, and real assets).

The Model will feed into the FfNP Programme by serving as the basis for the development of criteria to understand how financial institutions can build sovereign debt strategies contributing to the nature-positive goal. These criteria will be based on the FfNP working model developed by the FfB Foundation and UNEP FI in September 2024. Building a nature-positive economy is a journey, and so these criteria can serve to both qualify a country at the time of analysis and to also highlight potential levers for progress through policy engagement by financial institutions. This subsection specifically discusses the links between our Assessment Model and the FfNP working model, offers initial insights into interpreting country profiles through this lens, and outlines the further analysis needed to define what it means for sovereign debt strategies to contribute to the Nature Positive goal.

Inspired by the OECD's State-Pressure-Response Framework, the three pillars of the Model align closely with the strategies defined in the FfNP working model, which financial institutions can view as categories of investment opportunities.

These strategies also correspond to activities outlined by the Multilateral Development Banks (MDBs) Nature Group in their Common Principles for Tracking Nature-Positive Finance and by the World Bank Group (WBG) in its Nature Finance Tracking Methodology (see Box 13 below for a comparison). For sovereigns, the "enabling" nature-positive strategy – focused on transforming systems and value chains – maps directly to country nature governance.

The Assessment Model's pillars – natural capital, socio-economic activities, and governance – are therefore well-aligned with existing nature-positive frameworks, providing a strong foundation for developing criteria to integrate nature-positive considerations into sovereign debt portfolio construction.

With its 42 characteristics and relevant indicators, a country profile, which is based on the proposed Assessment Model, provides a comprehensive and efficient picture of an economy's relationship with nature. By presenting the state of its natural capital, the pressures generated by its economy, and its governance structures surrounding natural capital, the profile enables our understanding of whether and how a country may be contributing to nature-positive outcomes. Some initial insights on the interpretation of such country profiles can be proposed, based on the strategies described above. This helps to inform financial institutions looking for potential opportunities to build a sovereign debt strategy that could contribute to nature-positive outcomes.

In order to search for potential nature-related opportunities, financial institutions could examine the results of country profiles as follows:

Protection and Restoration of Nature: The Model enables investors to identify opportunities related to ecosystem protection and restoration. Pillar 1 will indicate a need for protection, conservation, and restoration, while Pillar 3 will point to governmental efforts to make it happen. An investor may seek to invest in a country that harbours key global biodiversity areas and is actively protecting these areas. This would facilitate mobilising resources towards meeting the GBF targets 2, 3 (30% land and 30% marine protection) and 4 (Limited extinction risk of species).

Sustainable use of Natural Capital: The Model highlights the economic sectors that need transformation (Pillar 2) in order to mitigate pressures on ecosystems. Countries that have identified their highly exposed sectors and are implementing meaningful policies and transition pathways (Pillar 3), present significant opportunities for impactful investment. One can assess a country's institutional support for the transformation of its agrifood, mining and construction, chemical sectors, which are highly exposed sectors. Countries that legislate for sustainable practices under GBF Target 10 – such as sustainable agriculture or aquaculture, forest conservation, or sustainable mining – can be recognised for contributing to nature-positive outcomes by helping reduce the drivers of biodiversity loss. An investor may also choose to invest in countries with robust environmental laws curbing pollution or pesticide/nutrient use, which would fit under Target 7 of the GBF.

Enabling Conditions for System Changes: The Model assesses a country's governance of nature (Pillar 3) by examining its international commitments, national legislation, strategic approach, and the resources dedicated to implementation. It lays out the enabling conditions for nature preservation and the shift to a sustainable economy.

Model 1: FfB Foundation and UNEP FI	Model 2: Multilateral Development Banks (MDBs)	Model 3: World Bank Group (WBG)
Sustainable use of biodiversity, avoiding biodiversity losses through managed phase-out of harmful activities and the reduction of drivers of loss (see Pillar 2). The **conservation and restoration** of nature to generate biodiversity gains (see Pillar 1). **Solutions providers and enablers** supporting system changes to transform value chains (see Pillar 3).	**Protection**: activities that maintain the current status and condition of biodiversity and ecosystems (see Pillar 1). **Restoration**: the process of assisting the recovery of an ecosystem that has been degraded, damaged or destroyed relative to a reference state (see Pillar 1). **Sustainable use and management of nature**: shift of economic activity away from processes driving nature loss (see Pillar 2). **Enabling conditions**: policies, models and sectoral instruments, incentives, data and other tools enabling the above activities (see Pillar 3).	**Restoration and conservation** of biodiversity or ecosystem services (see Pillar 1). **Reduction** of the direct drivers of biodiversity or ecosystem services loss (see Pillar 2). **Integration** of nature-based solutions across economic sectors. **Design and implementation** of policy, tools, or other sectoral instruments enabling (a) to (c) (see Pillar 3).

Box 13: Comparison of strategies and relevant activities in nature-positive models

An investor may look to invest in countries where natural capital is well protected, as characterised in Pillar 3 indicator on Marine and Terrestrial protection, especially if biodiversity is significant (Pillar 1) for that country. Investment could also be directed to countries in urgent need of protection, where new protection policies are enacted. Countries with corporate disclosure requirements and transition pathways specifically for the sectors identified as highly exposed (Pillar 2) will show interesting enabling conditions, as per Targets 14 and 15 of the GBF. Similarly, countries redirecting subsidies (GBF Target 18) from highly impactful activities to sectors with sustainable use of resources, or taxing impactful activities, may contribute to nature-positive goals.

Building on the Model's three Pillars, further work by financial institutions and the FfB Foundation's community will be required to develop recommendations that guide decision-making toward nature-positive outcomes in the sovereign debt asset class. Indeed, going further than the above-mentioned strategies and relevant activities, finance for nature-positive needs to fit a certain level of ambition compared to broader nature finance. First, opportunities contributing to the nature-positive goal must support the improvement of the state of nature compared to the 2020 baseline, under the definition of nature-positive by the Nature Positive Initiative, and support the implementation of the GBF, according to the WBG definition of Nature-Positive Finance. This would also need to be justified by a theory of change and observable trends. Furthermore, the WBG (Model 3) has defined two criteria to distinguish Nature Positive Finance from broader Nature Finance. Opportunities can be considered fitting for the "Nature Positive" criteria if they i) do not significantly harm nature and ii) deliver measurable positive outcomes for nature. This requires implementing both a "do not significantly harm approach" and measurement practices.

Among the many principles and safeguards to be built into the forthcoming criteria for sovereign debt to contribute to nature-positive outcomes, a key attention point is the potential misalignment of priorities between financial and impact materiality. There is no mechanism ensuring that actions meant to address financially material topics can help deliver better outcomes for nature. The criteria must lead to a prioritisation of actions by financial institutions – and sovereigns – that is aligned with the degree and speed of action required to halt and reverse biodiversity loss by 2030.

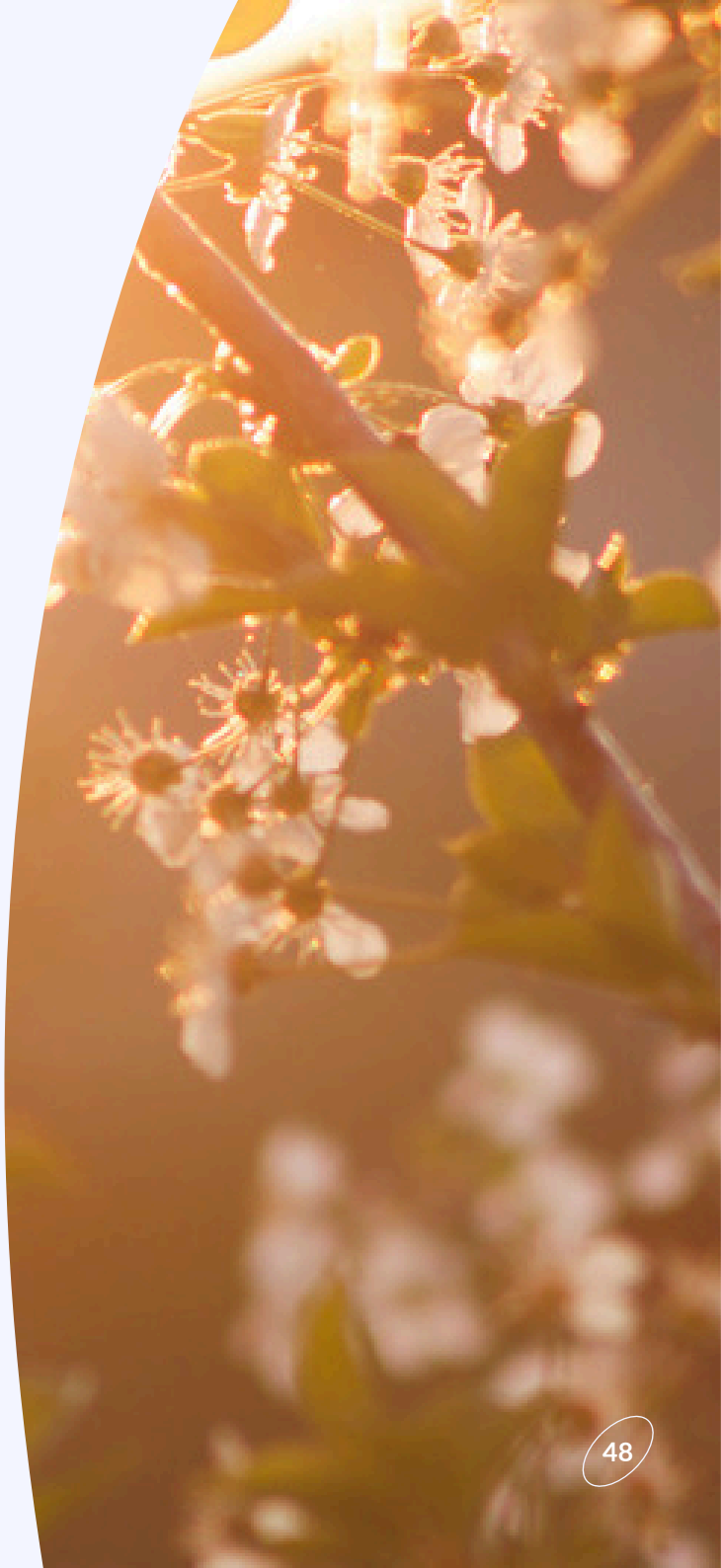
The definition of Nature Positive Finance provided by the WBG and endorsed by the FfB Foundation and UNEP FI provides a direction for further work for the Nature and Sovereign Debt Framework. The aim will be to understand how sovereign debt strategies can contribute to the nature-positive goal, in order to develop investments and engagement considerations. The key questions that will guide these next steps are the following:

- **Observing trends**: Is the country participating in implementing the GBF and improving the state of nature compared to the 2020 baseline? Can improvements to the state-of-nature be identified? What actions are put in place by the country, and how are these creating changes in the state of nature?
- **Avoiding harm to nature**: Is the country managing its environmental controversies and limiting any principal adverse impacts to nature? Would an investment in this country generate any potential future misalignment with the goals and targets of the GBF?
- **Measurable positive outcomes**: Improved trends and reduced impacts need to be measurable and justified by a theory of change; is there data made available by the country? Is there a theory of change explaining the results achieved, both at the level of the policy responses and the financial institutions' sovereign finance strategy? Are independent sources confirming claimed results in the improvement of the state of nature?

To answer these questions, and as part of our FfNP Programme, the next steps of the work on the Sovereign Debt Nature Assessment Model will lead to the development of a nature-positive criteria to understand how the sovereign debt asset class could contribute to the nature-positive goal, in line with global biodiversity goals.

"The criteria must lead to a prioritisation of actions by financial institutions – and sovereigns – that is aligned with the degree and speed of action required to halt and reverse biodiversity loss by 2030."

This upcoming work will rely on the development of country profiles gathering the key indicators that can support financial decision-making, by providing a rounded view on countries' ecological health, exposure to nature-related risks, and the governance in place to support the improvement of the state of nature. Enhancing the application of the Assessment Model through nature-positive considerations will further elevate the ambitions of sovereign debt investors' actions on nature, from risk screening and management, towards policy engagement and investment practices.



4. Conclusions and Looking Ahead

This report has laid the foundations for a new approach to integrating nature into sovereign debt markets. By developing a Sovereign Debt Nature Assessment Model built on three robust pillars – natural capital, socio-economic activities, and governance – we have taken an essential first step toward future-proofing sovereign finance with the realities of nature-related risks and opportunities. The Model provides a practical framework to guide financial institutions, sovereign debt investors, issuers, structurers, rating agencies, and policymakers in systematically considering nature within sovereign analysis, for risk screening, policy engagement practices, and identifying financial opportunities. In doing so, it underscores the potential for sovereign finance to contribute meaningfully to the global goal of halting and reversing biodiversity loss.

This Model builds on earlier research and market dynamics, while standing out as one of the first to adopt a bottom-up, stakeholder-driven approach. Co-developed with the FfB Foundation members and partners, it reflects both financial and impact materiality, offering structured characteristics and indicators that can be applied consistently across countries. The current work of the FfB Foundation aims to meet the needs of its member institutions and the wider market for practical guidance that supports the integration of nature into sovereign debt strategies.

This report also marks the first step toward a broader **Nature and Sovereign Debt Framework**, which will further advance research, nature-related risk screening, country analysis, policy engagement, and investment practices. For risk screening, the Model is designed to adjust to the specific needs of each user, enabling them to adapt, refine, or replace indicators over time without undermining its core structure. For this exercise, users can find recommendations on indicator selection, not to achieve perfection but to choose the best proxies to inform decision-making. Box 14 below outlines the next steps envisaged for this work.

For policy engagement, the FfB Foundation will work on connecting the Assessment Model and its resulting country profiles with its policy asks and collective engagement activities, which encourage a whole-of-government approach to GBF implementation towards aligning financial flows with global biodiversity goal. Finally, and as part of the Finance for Nature Positive Programme, criteria will be developed to raise ambition in the sovereign debt market towards effectively catalysing financial flows towards nature-positive outcomes. The Model should be understood as a living tool – one that will evolve as nature-related data improves, disclosure deepens, and sovereign engagement advances. Its value will depend on continuous refinement, informed by stakeholder feedback, stronger data, and real-world application.

1. Regular updates to the Assessment Model

- Collect stakeholders' feedback on the initial public version of the document to plan for future updates and adjustments;
- Ensure the list of characteristics, indicators, and data sources stays up to date with science, market, and tools developments;
- Develop a systematic, step-by-step approach to support financial institutions in implementing a model evolving with data availability;
- Increase the usability and accessibility of the Model for financial institutions, notably on including additional information on the information itself (e.g. is the data quantitative or qualitative? Is it a dataset for Excel, or a Map that can included in a PDF?) or on the data and tools (e.g. does a tool require setting-up an account?);
- Reinforce the capacity to mainstream understanding of the Model, by providing additional information on each indicator, such as whether it concerns impact materiality or financial materiality or both, notably whether it informs countries' capacity to reimburse their debts, and to which GBF target each may link.

2. Country profiles

- Develop sample country profiles by researching indicators results and formatting found information;
- Find and partner with knowledge partners including Academic Institutions to develop the sample profiles (6-12 months);
- Guide users' interpretation of the Model and support its use for nature-related risk screening for the sovereign debt asset class, by developing country analysis methodologies presenting different archetypes (e.g. "high exposure + weak governance") to help investors and sovereigns understand different outcome patterns – for now, initial insights on each indicator's interpretation can be found in Appendix 1;
- Country analysis could include varied possibilities for interpretations between countries to reflect the principle of differentiated responsibilities and development pathways, but also to match the different degrees of ambitions of investors based on their nature strategies;
- Support good practices for financial institutions' policy engagement with governments, notably by connecting the Model, the resulting country profiles, and associated nature-related risk analysis, with the policy asks of the FfB Foundation, which encourage a whole-of-government approach to GBF implementation towards aligning financial flows with global biodiversity goal;
- Assess market interest for a country analysis tool, including a broad range of country profiles;
- Leverage the Assessment Model to further adapt the FfB Nature Target Setting Framework for Investors to the Sovereign Debt asset class.

3. Pilots (6-12 months)

- Pilot with FI members to determine how the Model is helpful, where further clarification is needed, how useful the supporting guidance is, and how both the sources and tool format can be improved. The pilot should also capture how institutions are using the Model internally, what it enables them to do, and how it can be shared within their organisations;
- Understand and learn from members how they would use the Assessment Model results for decision-making;
- Assess market interest in country scores or indexes;
- Ensure representation across member types (larger and smaller players; more mature and less mature users) to differentiate use cases, indicator usage, and due-diligence approaches.

4. Investment into nature-positive considerations (1-2 years)

- Establish nature-positive criteria to understand how a country can contribute to nature-positive outcomes, based on common thinking as to what constitutes nature positive in sovereign debt in terms of general rhetoric and practical terms for FIs;
- Develop guidance on investment and engagement to support transformative actions for financial institutions aiming to generate nature-positive outcomes, focusing on increasing ambition, observing trends, avoiding adverse risks, and building measurement practices;
- Build or reinforce partnerships with key partners, such as NPI, UNEP FI, WWF, PRI and TNC, and the Development Banks to align vision and practices.

Box 14: Next steps for our work on Sovereign Debt and Nature

Delivering on the next steps will require effort from across the financial sector, sovereign issuers, policymakers, and knowledge partners. The Sovereign Debt Nature Assessment Model provides a foundation, but its true impact depends on broad uptake and shared ownership. We encourage financial institutions to apply and refine the Model, sovereign issuers to engage with it in their debt strategies, and policymakers to align national action with the GBF. As a living, bottom-up tool, the Model will only grow stronger through stakeholder contributions, practical pilots, and continuous learning. By working together, we can translate biodiversity commitments into financially operable terms, bridge the gap between sovereigns and markets, and mobilise private capital at scale. Sovereign debt markets – worth nearly USD 100 trillion – hold immense potential to drive resilience, stability, and nature-positive development. The time to act is now: shaping this Model is an opportunity to make sovereign finance a lever for transformative change to halt and reverse biodiversity loss this decade.

If you would like to learn more about how to get involved (e.g. if your institution is keen to join the piloting phase), then please reach out to the FfB Foundation: info@financeforbiodiversity.org – we look forward to hearing from you!

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Acronyms

ADB: Asian Development Bank - *Regional development bank promoting social and economic development in Asia.*

AFDB: African Development Bank - *Development finance institution supporting African countries.*

ASCOR: Assessing Sovereign Climate-related Opportunities and Risks - *Platform for evaluating sovereign ESG risks.*

BII: Biodiversity Intactness Index - *Indicator measuring ecosystem health based on species abundance.*

BIOFIN: Biodiversity Finance Initiative - *UNDP-led effort to improve biodiversity finance planning.*

CBD: Convention on Biological Diversity - *International treaty for the conservation and sustainable use of biodiversity.*

CCPI: Climate Change Performance Index - *Tracks national climate mitigation efforts.*

DFI: Development Finance Institution - *Financial institutions providing capital for development projects, often in emerging economies.*

DPSIR: The Driver-Pressure-State-Impact-Response model - *This model is a comprehensive framework used to describe and analyse the causal relationships between human activities and environmental conditions, providing a structured way to assess environmental quality and guide policy decisions.*

ENCORE: Exploring Natural Capital Opportunities, Risks, and Exposure - *Tool to assess sector-level environmental dependencies and impacts.*

FfB: The Finance for Biodiversity Foundation - *Platform connecting financial institutions committed to biodiversity action.*

FfB Members: *Signatories of the FfB Pledge actively participating in knowledge sharing and biodiversity initiatives.*

FfB Pledge: *Commitment by financial institutions to assess, engage, set targets, and disclose biodiversity impacts before 2025.*

FfNP: *Finance for Nature Positive Programme - Initiative promoting nature-positive finance approaches.*

GBF: Kunming-Montreal Global Biodiversity Framework - *Global agreement to halt and reverse biodiversity loss by 2030.*

GEF: Global Environment Facility - Multilateral fund supporting environmental projects.

IMF: International Monetary Fund - Global organisation providing financial support, policy advice, and economic monitoring.

IPBES: Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services - Scientific body providing assessments on biodiversity and ecosystem services.

KBA: Key Biodiversity Areas - Sites critical for global biodiversity persistence.

MDB: Multilateral Development Bank - International institutions providing development finance, including ADB, AFDB, World Bank.

MSA: Mean Species Abundance - Alternative biodiversity metric similar to BII.

NBSAP: National Biodiversity Strategies and Action Plans - National-level tools for implementing the CBD and GBF.

NGFS: Network for Greening the Financial System - Coalition of central banks and supervisors promoting sustainable finance.

OECD: Organisation for Economic Co-operation and Development - International forum for economic policy coordination.

SBTN: Science-Based Targets Network - Guidance for setting science-based environmental targets (nature-focused).

SDGs: Sustainable Development Goals - UN global framework for sustainable development.

SEEA: System of Environmental-Economic Accounting - UN standard integrating environmental data into national accounts.

SLB: Sustainability-Linked Bond - Debt instrument with financial terms linked to sustainability performance.

SPR Framework: OECD's State-Pressure-Response Framework - This is a conceptual model for organising and analysing environmental indicators and policies. It posits that human activities exert "pressures" on the environment, which affect its "state" (quality and quantity of resources), leading society to implement "responses" (policies, economic programs) to mitigate these impacts.

TNFD: Taskforce on Nature-related Financial Disclosures - Framework for organisations to disclose nature-related risks.

UNDP: United Nations Development Programme - UN agency supporting global sustainable development.

UNEP-FI: UN Environment Programme – Finance Initiative - Collaborates with financial institutions on sustainable finance.

UNEP-WCMC: UN Environment Programme World Conservation Monitoring Centre - Scientific centre monitoring biodiversity globally.

UN PRI: UN Principles of Responsible Investing - Initiative promoting ESG integration in investment decisions.

WBCSD: World Business Council for Sustainable Development - CEO-led organisation promoting sustainable business practices.

WEF: World Economic Forum - International organisation for public-private cooperation on global issues.

Glossary

Biodiversity: *The variability among living organisms from all sources, including terrestrial, marine, and other aquatic ecosystems. It includes diversity within species, between species, and of ecosystems (CBD, 1992, Article 2).*

Biodiversity finance gap: *The estimated global shortfall (≈USD 700 billion/year) between current financing and the resources needed to achieve biodiversity and conservation goals (Deutz et al., 2020).*

Biodiversity loss: *The decline in species, habitats, and ecosystems that underpin planetary stability, human well-being, and ecosystem services (IPBES, 2019).*

Debt-for-nature swaps: *Mechanisms where sovereign debt is reorganised, reduced, or restructured in return for commitments to fund biodiversity, climate, or other sustainable development outcomes (UNDP, 2023).*

Dependencies: *Aspects of nature's contributions to people that a person or organisation relies on to function, including water flow and quality regulation; regulation of hazards like fires and floods; pollination; carbon sequestration (SBTN, 2022).*

Drivers of biodiversity loss / Drivers of nature change: *Human activities directly or indirectly altering ecosystems, including land/sea use change, climate change, pollution, direct exploitation of resources, and invasive species (IPBES, 2019, TNFD, 2023).*

Ecosystem restoration: *Actions that recover degraded ecosystems, enhance biodiversity, and improve ecological resilience (CBD, 2019).*

Ecosystem services: *Benefits humans obtain from ecosystems, categorised as provisioning (e.g. food, water), regulating-supporting (e.g. climate regulation, pollination), and cultural services (e.g. recreation, spiritual value) (SEEA, 2018).*

Financial flows: *Movement of capital through investments, lending, and sovereign debt markets, aligned or misaligned with biodiversity-positive outcomes (UNEP-FI, 2022).*

Financial institutions: *Entities allocating capital and managing risks, including banks, insurers, asset managers, and institutional investors (OECD, 2020).*

Framework: *A basic structure underlying a system, concept, or text.*

Green and sustainability bonds: *Debt instruments issued to finance projects with environmental, climate, or biodiversity benefits (ICMA, 2021).*

Impacts: *Can be positive or negative contributions of a company or other actor toward the state of nature, including pollution of air, water, or soil; fragmentation or disruption of ecosystems and habitats for nonhuman species; and alteration of ecosystem processes (SBTN, 2022).*

Indicator: *A parameter, or a value derived from parameters, which points to/provides information about/describes the state of a phenomenon/environment/area with a significance extending beyond that directly associated with a parameter value (OECD, 1993).*

Indicators of environmental conditions: *Correspond to "state" box of the State-Pressure-Response framework. They comprise environmental quality and aspects of quantity and quality of natural resources (OECD, 1993).*

Indicators of environmental pressures: *Correspond to the "pressure" box of the SPR framework. They describe pressures on the environment caused by human activities (OECD, 1993).*

Kunming-Montreal Global Biodiversity Framework (GBF): *Global agreement adopted in 2022 to halt and reverse biodiversity loss by 2030, including 5 goals and 23 targets across conservation, sustainable use, and finance (CBD, 2022).*

Monitoring and disclosure: *Processes and systems for tracking, reporting, and communicating the biodiversity impacts and dependencies of financial activities (TNFD, 2023).*

Natural capital: *The stock of renewable and non-renewable natural resources (for example, plants, animals, air, water, soils, minerals) that combine to yield a flow of benefits to people (Natural Capital Coalition, 2016).*

Nature: *The natural world, with an emphasis on the diversity of living organisms (including people) and their interactions among themselves and with their environment (adapted from Díaz et al., 2015: The IPBES Conceptual Framework – Connecting Nature and People).*

Nature-positive: *Global societal goal defined as 'Halt and Reverse Nature Loss by 2030 on a 2020 baseline, and achieve full recovery by 2050'. It means ensuring more nature in the world in 2030 than in 2020 and continued recovery after that (Nature Positive Initiative, 2023).*

Nature-positive finance: *Nature Positive Finance is finance that is expected to deliver measurable positive outcomes for biodiversity or ecosystem services, relative to business-as-usual. As part of the broader category of Nature Finance, it is defined as contributing to the nature positive goal of halting and reversing nature loss and supporting the implementation of the Global Biodiversity Framework (Nature Positive Initiative, 2022; World Bank Group, 2024)*

Nature-related risks: *Potential threats to organisations from dependencies or impacts on nature, categorised as: Systemic risks – Risks from breakdowns in ecological systems; Transition risks – Risks from misaligned policies, technologies, or markets; Physical risks – Risks from biodiversity and ecosystem degradation (TNFD, 2023).*

Nature Risk Assessment: *Tools and methodologies to evaluate impacts, dependencies, risks, and opportunities related to nature (TNFD, 2023).*

Response indicators: *Correspond to the "Response" box in SPR framework. In the present context, the word "response" is used only for societal (not ecosystem) response (OECD, 1993).*

Sovereign debt: *The debt obligations of a sovereign nation, also referred to as government debt, national debt, public debt, or country debt. It encompasses all liabilities owed by the government to both domestic and foreign creditors (CFI, 2025).*

Target Setting Framework on Nature for Asset Managers & Asset Owners: *The conceptual structure supports asset managers and owners in setting targets for nature (The FfB Foundation, 2024).*

Transition pathways: *Sector-specific roadmaps guiding organisations toward biodiversity-friendly practices aligned with GBF targets (TNFD, 2023).*

Appendices

Appendix 1 – Our Sovereign Debt Nature Assessment Model (Full Technical Version)

Indicator and Data Overview

Pillar	Ref	Category	Ref	Characteristics	Indicators
Pillar 1 – State of Natural Capital	1A	Extent & Significance	1A1	Existence of Areas of Global Significance for Biodiversity	Critical Natural Assets
					Number and Extent of Key Biodiversity Areas (KBAs)
			1A2	Terrestrial Ecosystem Extent	National territory covered by native forest
					National territory under each land cover class
			1A3	Freshwater Ecosystem Extent	Renewable Internal Water Resources
			1A4	Marine Ecosystem Extent	Marine and Coastal Habitats
	1B	Integrity	1B1	Species Extinction Risk	Red List Index (RLI)
			1B2	Terrestrial Ecosystem Condition	Biodiversity Intactness Index (BII)
			1B3	Freshwater Ecosystem Condition	Freshwater Quality
			1B4	Marine Ecosystem Condition	Ocean Ecological Health
			1B5	Air Condition	Exposure to Toxic Air Compounds
	1C	Protection & Care	1C1	Restoration Opportunities on Land	Areas of Global Significance for Restoration
			1C2	Restoration Opportunities at Sea	Marine Priority Areas
			1C3	Protected Area Network Quality	Protected Area Connectivity (ProtConn)
					Terrestrial Key Biodiversity Areas (KBAs) Protection
			1C4	Cultural and Stewardship Significance in Ecosystems	Areas managed or co-managed by Indigenous Peoples and Local Communities

Table 1. Organisation of the Assessment Model's Pillar 1, with "Ref." for ID references

Pillar	Ref	Category	Ref	Characteristics	Indicators
Pillar 2 – Socio-economic Activities	2A	Economic Exposure	2A1	Country Exposure to Impacts and Dependencies through National Production	% of value added from sectors with high dependencies on ecosystem services
					% of value added from sectors with high impact on nature
			2A2	Country Exposure through Importation	% of imports generated by high impact sectors
					% of imports generated by high dependency sectors
			2A3	Country Exposure through Exportation	% of exports generated by high impact sectors
					% of exports generated by high dependency sectors
			2A4	Employment generated by Exposed Sectors	% employment generated by high impact sectors
					% employment generated by high dependency sectors
	2B	Macro-Economic Indicators	2B1	Value added generated by Exposed Sectors	% value added generated by high dependency and high impact sectors
			2B2	Exports generated by Exposed Sectors	% of exports generated by high dependency sectors and high impact sectors
			2B3	Imports generated by Exposed Sectors	% of imports generated by high dependency sectors and high impact sectors
			2B4	Employment generated by Exposed Sectors	% of employment generated by high dependency sectors and high impact sectors
					% of women employed in high-dependency sectors
	2C	Environmental Pressures	2C1	Land Use Change	Habitat Loss Trends
					Land Cover Change (natural versus anthropogenic)
			2C2	Exploitation of Resources	Pressure on Water Resources (Water Stress)
					Projected Water Stress (2030/2050/2080)
					Overfished share
			2C3	Invasive Species	Terrestrial Invasive Alien Species (IAS) Threat
					Introduced Marine Species
			2C4	Climate Change	GHG Emissions
			2C5	Pollution	Nitrogen Surplus
					Plastic Emissions to Oceans
					Air Pollutant Emissions Intensity

Table 2. Organisation of the Framework's Pillar 2, with "Ref." for ID references

Pillar	Ref	Category	Ref	Characteristics	Indicators
Pillar 3 – Governance	3A	Commitments & Action	3A1	International Environmental Commitments	Participation in Global Biodiversity Treaties
			3A2	Translation into National Planning	Existence of a Current National Biodiversity Strategy and Action Plan (NBSAP)
					National Biodiversity Strategy and Action Plan (NBSAP) Ambition
			3A3	Translation into Economic Transformation	Biodiversity in Sectoral Transition Plans
					Biodiversity Finance Plan Status
			3A4	Habitat and Species Protection	Percentage of Terrestrial Areas covered by Protected Areas
					Percentage of Marine Areas covered by Protected Areas
			3A5	Social Inclusivity Efforts	Legal status and Recognition of IPLCs in Biodiversity and Land Policies
					Presence of Gender-specific Targets in NBSAP or related Biodiversity Plans
	3B	Drivers & Water	3B1	Land, Freshwater and Ocean Use Change	Land and Ocean Use Change Policy Instruments
			3B2	Exploitation of Resources	Overexploitation Control Policies
			3B4	Invasive Species	Budget for Invasive Alien Species Management
			3B5	Climate Change	Climate Change Commitment
			3B6	Pollution	Pollution Control Policy Instruments
			3B3	Water Governance	Integrated Water Resource Management (IWRM)
	3C	Resources & Implementation	3C1	National Natural Capital Accounts	Natural Capital Accounting Adoption
			3C2	Corporate Disclosures	Mandatory Corporate Biodiversity Disclosures
					TNFD adoption by Economic Sector
			3C3	Governance through Subsidies	Subsidy Reform for Biodiversity
			3C4	Government spending on Biodiversity Conservation	Budget Allocation to Biodiversity
			3C5	Nature finance Instruments Issued	Sovereign Nature Finance Instruments

Table 3. Organisation of the Framework's Pillar 3, with "Ref." for ID references

Pillar 1 – State of Natural Capital

1A Extent & Significance

1A1	Existence of Areas of Global Significance for Biodiversity
Indicator	Critical Natural Assets
Definition	Natural and semi-natural ecosystems identified as "Critical Natural Assets" deliver at least 90% of the current provision of key nature's contributions to people (e.g. water regulation, flood mitigation, pollination) and support globally significant carbon storage and moisture recycling.
Biome(s)	Terrestrial, Freshwater
Primary Data Source(s)	UNBiodiversity Lab
Link	https://map.unbiodiversitylab.org/earth
Resolution & Coverage	Site polygons, ~2 km grid; Global
Update Frequency	One-time (Critical Assets)
Format & Access	Shapefiles (Map); open dataset
Interpretation	Highlights ecosystems most essential to human well-being through modelled benefits (NCP), not biodiversity metrics like species richness or legal status. Not suitable for national comparisons or monitoring.
Accessibility/Usage	Access via the UN Biodiversity Lab map. Go to the datasets tab, search for "Critical Natural Assets," and apply the filter. Dataset is for illustrative purposes only - values are modelled, not observed.

1A1	Existence of Areas of Global Significance for Biodiversity
Indicator	Number and Extent of Key Biodiversity Areas (KBAs)
Definition	Sites that contribute significantly to the global persistence of biodiversity, identified under the KBA Standard; the indicator reports (i) the number of KBAs and (ii) their mapped area within a country's land territory and, where relevant, marine EEZ. Sites that contribute significantly to the global persistence of biodiversity, identified under the KBA Standard; the indicator reports (i) the number of KBAs and (ii) their mapped area within a country's land territory and, where relevant, marine EEZ.
Biome(s)	Terrestrial, Freshwater, Marine
Primary Data Source(s)	Integrated Biodiversity Assessment Tool (IBAT); World Database of Key Biodiversity Areas (WDKBA) / KBA Partnership.
Link	IBAT: https://www.ibat-alliance.org/ WDKBA: https://www.keybiodiversityareas.org/kba-data
Resolution & Coverage	Global; site-level polygons (points where polygons not yet available).
Update Frequency	Rolling; use the latest annual snapshot and record the "as-of" date.
Format & Access	GIS vectors (SHP/GeoJSON) and CSV site lists; web viewers; downloads via WDKBA or IBAT (requires free subscription).
Interpretation	Reports the count of KBAs and the total KBA area (km^2) within national land territory and, where relevant, within the EEZ, optionally as a share of land/EEZ. Treats overlapping polygons by dissolving areas to prevent double counting, and allocates only the national share of cross-border sites. Indicates biodiversity importance, not legal protection status, condition, or management effectiveness.
Accessibility/Usage	Access via WDKBA: go to "KBA Data," view sites on the map, and request polygon downloads or export site lists after agreeing to data-use terms; cite the KBA Partnership and record the data version/date. For IBAT: sign in to the web app, go to "Country Profile", select the country under assessment, and search in the KBA tab.

1A2	Terrestrial Ecosystem Extent
Indicator	National territory covered by native forest
Definition	Area or percentage of land under natural or native forest, excluding plantation forests.
Biome(s)	Terrestrial
Primary Data Source(s)	Global Forest Watch
Link	https://www.globalforestwatch.org/dashboards/global/
Resolution & Coverage	National
Update Frequency	GFW (annual)
Format & Access	Raster, vector, CSV
Interpretation	Tracks natural forest extent and loss - useful for detecting degradation, deforestation, or recovery over time. Excludes plantations, enhancing accuracy for native ecosystem extent.
Accessibility/Usage	Use the GFW dashboard to generate maps or interactive graphs. Data can be filtered by country, year, and forest type. Downloadable in CSV and GIS-ready formats.
Complementary Indicator/Source	For tropical areas, both SCI (Forest Structural Condition) and FSII (Forest Structural Integrity) indexes are available on UN Biodiversity Lab.

1A2	Terrestrial Ecosystem Extent
Indicator	National territory under each land cover class
Definition	Ecosystem extent measured as the area (km^2) and percentage (%) of national land territory mapped under each land-cover class in a consistent global product (e.g. ESA WorldCover/ESA CCI), representing terrestrial ecosystems such as tree cover, shrubland, grassland, cropland, built-up, bare/sparse vegetation, and wetlands.
Biome(s)	Terrestrial
Primary Data Source(s)	ESA WorldCover (ESA CCI Land Cover alternative); UN Biodiversity Lab (hosts/layers).
Link	https://esa-worldcover.org/en https://map.unbiodiversitylab.org/earth
Resolution & Coverage	Global; raster at 10 m (WorldCover) or ~300 m (CCI); wall-to-wall coverage.
Update Frequency	Annual
Format & Access	Raster GeoTIFF with class codes; web map viewers; downloads via ESA portals or view/export via UNBL.
Interpretation	Reports the area and share of each land-cover class within the country's land territory. Uses the dataset's native legend; classes may be regrouped into broader ecosystem categories (e.g. natural vs human-modified) if needed. Indicates extent only - not ecosystem condition, species value, or legal/management status.
Accessibility/Usage	Access via WorldCover or UNBL: go to the portal/map, choose the dataset year, retrieve country-level statistics (download tiles and clip to the national boundary or run "summary by area").

1A3	Freshwater Ecosystem Extent
Indicator	Renewable Internal Water Resources
Definition	Renewable internal freshwater resources flows refer to internal renewable resources (internal river flows and groundwater from rainfall) in the country. Renewable internal freshwater resources per capita are calculated using the World Bank's population estimates.
Biome(s)	Freshwater
Primary Data Source(s)	Food and Agriculture Organization, AQUASTAT data
Link	https://data.worldbank.org/indicator/ER.H2O.INTR.PC
Resolution & Coverage	National
Update Frequency	Annual
Format & Access	CSV, Excel, XML
Interpretation	Indicates the extent of internal freshwater resources in a country based on estimates of run-off into rivers and recharge of groundwater.
Accessibility/Usage	Data can be accessed via the World Bank data portal. Data by country are available since 1960 and can be downloaded via Excel, CSV, XML.
Complementary Indicator/Source	WRI Water risk index for countries

1A4	Marine Ecosystem Extent
Indicator	Marine and Coastal habitat
Definition	Area (km^2) of habitats and percentage (%) of national coastline known to occur by country, covering mangroves, warm-water corals, cold-water corals, salt marshes and sea grasses.
Biome(s)	Marine (coastal/intertidal)
Primary Data Source(s)	Ocean Plus Habitats
Link	https://habitats.oceanplus.org/
Resolution & Coverage	Global
Update Frequency	Periodic releases; with last update in 2021
Format & Access	Web map viewer and downloads
Interpretation	Reports national marine and coastal area, as well as share of area under protection and presence of endangered species.
Accessibility/Usage	Access via Ocean Plus Habitats: open the map, select the country, select a specific habitat if desired.
Complementary Indicator/Source	Global Mangrove Watch (GMW). Source: https://www.globalmangrovewatch.org/ Coral Reef Extent. Source: https://allencoralatlas.org/atlas/#6.34/9.0998/101.4481 Seagrass Extent. Source: https://map.unbiodiversitylab.org/

1B Integrity

1B1	Species Extinction Risk
Indicator	Red List Index (RLI)
Definition	Tracks the extinction risk of species within a country, weighted by the proportion of each species' range that occurs within the country. A score of 100 means no species are threatened; 0 indicates very high extinction risk.
Biome(s)	All
Primary Data Source(s)	Red List Index
Link	https://epi.yale.edu/measure/2024/RLI
Resolution & Coverage	National Index
Update Frequency	Annual
Format & Access	Online database, CSV
Interpretation	Reflects changes in aggregate extinction risk over time. A declining RLI implies growing threats to native species or reduced conservation success.
Accessibility/Usage	Data can be accessed via the EPI or IUCN portals. Ten-year trends are visualised. CSV files with national scores are available for download. Suitable for policy dashboards.

1B2	Terrestrial Ecosystem Condition
Indicator	Biodiversity Intactness Index (BII)
Definition	Measures the percentage of original (pre-human impact) species abundance remaining in a given area. It reflects how much biodiversity is intact compared to an undisturbed baseline.
Biome(s)	Terrestrial, Freshwater
Primary Data Source(s)	Natural History Museum BII
Link	https://data.nhm.ac.uk/dataset/bii-bte
Resolution & Coverage	0.25° grid; Global
Update Frequency	Baseline (2020), projections to 2050
Format & Access	CSV (country & global values)
Interpretation	Indicates degree of ecosystem degradation from original species abundance. Based on modelled extrapolation from land-use impact datasets. Values <90% may breach safe ecological limits.
Accessibility/Usage	Download country-level and global data via the NHM data portal. Use filters to explore spatial resolution. Based on the PREDICTS database. Future scenario projections are included.
Alternative Indicator/Source	"Mean Species Abundance" (MSA) [Open GBS Platform] https://cdc-biodiversite.notion.site/GBS-open-Wiki-2a380e7be7c74648b2f6f581c26cc852"
Complementary Indicator/Source	Soil Health Possible source: Global Soil Health | FAO SOILS PORTAL | Food and Agriculture Organization of the United Nations

1B3	Freshwater Ecosystem Condition
Indicator	Freshwater Quality
Definition	Share (%) and count of monitored river and lake sites achieving “good” ambient water quality under SDG 6.3.2, using core parameters from UNEP GEMS/Water (GEMStat).
Biome(s)	Freshwater
Primary Data Source(s)	UNEP GEMS/Water (GEMStat).
Link	https://gemstat.org/data-gemstat/global-water-quality/
Resolution & Coverage	Global, station-level time series; coverage varies by country and water body type.
Update Frequency	Annual
Format & Access	CSV station records with metadata; national summaries where available.
Interpretation	Reports the proportion and number of monitored river/lake locations achieving “good” ambient water quality across the core parameters over the selected reference period; optionally disaggregates by parameter and water body type.
Accessibility/Usage	Access via GEMStat: go to “Global Water Quality”, filter by country and water body type, select the reference years, download station data or national summaries.
Complementary Indicator/Source	River Connectivity: Distribution of national river length (%, km) across connectivity classes—from free-flowing to severed—based on the Connectivity Status Index (CSI) of Grill et al. (2019). Source: Global free-flowing rivers/CSI (HydroLAB/WWF), Assessing global river connectivity 3 to map the world’s remaining free-flowing rivers

1B4	Marine Ecosystem Condition
Indicator	Ocean Ecological health
Definition	A composite indicator evaluating the condition of ecosystems using metrics such as species abundance, habitat quality, and ecological processes. Specific methodologies may vary by source.
Biome(s)	Marine
Primary Data Source(s)	Ocean Health Index (OHI)
Link	https://oceanhealthindex.org/global-scores/
Resolution & Coverage	National (EEZ-based scores for coastal countries); covers 220 countries/territories worldwide
Update Frequency	Annual (index calculated each year since 2012)
Format & Access	Results are published as open data; global and country-level scores downloadable (CSV format) and an interactive data portal
Interpretation	OHI provides an overall “ocean health” score (0–100) for each country’s marine area, based on ten goal components (e.g. biodiversity, clean water, fisheries, habitat, etc.). Provides a holistic view of marine ecosystem health, integrating multiple pressures and services. Useful for tracking marine resilience and national comparisons.
Accessibility/Usage	View scores per country on OHI site. Download global and EEZ-level CSVs. Each component (e.g. biodiversity, fisheries) is documented. Free use with attribution.
Complementary Indicator/Source	Coral Bleaching Events (% of mapped reef area that reached Bleaching Alert Levels 1–2. Source: https://allencoralatlas.org/atlas/ Coastal Eutrophication (Chlorophyll-a deviation from the global average). Source: Our World in Data (OWID) - https://ourworldindata.org/grapher/chlorophyll-a-deviation-from-the-global-average

1B5	Air Condition
Indicator	Exposure to Toxic Air Compounds
Definition	Measures population exposure to harmful air pollutants (e.g. PM2.5, NO_2, O_3, VOCs), indicating the health risks associated with ambient air quality.
Biome(s)	Terrestrial
Primary Data Source(s)	State of Global Air (Health Effects Institute/IHME GBD)
Link	https://www.stateofglobalair.org/data/#/air/plot
Resolution & Coverage	National (population-weighted annual pollutant concentrations); ~200 countries globally.
Update Frequency	Annual
Format & Access	Interactive data portal (maps, country profiles). Bulk datasets can be downloaded via IHME's GBD Results tools or API. All data are open access (freely available for use).
Interpretation	The State of Global Air platform compiles national average exposure levels to key air pollutants. Users can explore country data for $PM_{2.5}$ ($\mu g/m^3$ annual avg) and ozone (seasonal ozone exposure). Tied to SDG 11.6 and 3.9.
Accessibility/Usage	Explore interactive maps and country profiles on the State of Global Air site. Full datasets can be downloaded via IHME GBD Results Tool or API. Data are open access.

1C Protection & Care

1C1	Restoration Opportunities on Land
Indicator	Areas of global significance for restoration
Definition	Identifies anthropogenically modified areas with the highest global priority for ecological restoration based on their potential to restore terrestrial species habitats and sequester carbon. The indicator is derived from a spatial optimization using species distribution data for ~180k terrestrial vertebrates and plants, with carbon sequestration estimates from biomass and vulnerable soil carbon pools.
Biome(s)	Terrestrial
Primary Data Source(s)	UNBiodiversity Lab
Link	https://map.unbiodiversitylab.org/earth
Resolution & Coverage	National
Update Frequency	One time
Format & Access	GIS shapefiles, dashboard
Interpretation	Visualises land areas where restoration would yield dual biodiversity and carbon benefits. Prioritization reflects habitat value and carbon potential. Not intended for quantitative measurement or country-level reporting.
Accessibility/Usage	Accessible via the UN Biodiversity Lab platform. In the Datasets tab, filter by “Areas of Global Significance for Restoration”. Data is a visual planning layer and not downloadable. Supports spatial awareness and exploration.

1C2	Restoration Opportunities at Sea
Indicator	Marine Priority Areas
Definition	Identifies marine areas of high global priority for establishing or strengthening marine protected areas (MPAs), based on their potential to deliver triple benefits: protecting biodiversity, increasing fisheries yield, and securing marine carbon stocks. The prioritization is derived from a flexible, global conservation planning framework that accounts for present and future threats and integrates ecological and socioeconomic benefits.
Biome(s)	Marine
Primary Data Source(s)	UNBiodiversity Lab
Link	https://map.unbiodiversitylab.org/earth
Resolution & Coverage	Global marine coverage; spatial resolution varies by input datasets (typically coarse to medium resolution appropriate for EEZ-level or regional planning).
Update Frequency	One-time global analysis (2021)
Format & Access	Map overlay accessible via the UN Biodiversity Lab interactive viewer; open access, viewable online with layer details; non-downloadable raw data
Interpretation	Reflects marine spatial priorities for ecological restoration and protection. Emphasises triple benefits (biodiversity, food security, climate). Visual only; not statistically extractable or suitable for national MPA metrics.
Accessibility/Usage	Viewable via the UN Biodiversity Lab. Use the Datasets tab and select “Marine Priority Areas”. Layer is optimized for marine spatial planning, not precise area calculation. Interactive only; raw data is not downloadable.

1C3	Protected Area Network Quality
Indicator	Protected Area Connectivity (ProtConn)
Definition	Percentage of a country's land area that is both protected and structurally connected to other protected/natural areas, as estimated by the ProtConn index.
Biome(s)	Terrestrial
Primary Data Source(s)	UN Biodiversity Lab — ProtConn; Resource Watch — ProtConn.
Link	UNBL: https://map.unbiodiversitylab.org/earth (search "ProtConn") Resource Watch: https://resourcewatch.org/data/explore/bio040-Protected-Area-Connectivity
Resolution & Coverage	Global
Update Frequency	Periodic releases
Format & Access	Web map layer with country statistics
Interpretation	Reports the share of national land that is protected and connected (ProtConn%), complementing simple protected-area coverage by reflecting network connectivity; indicates structural connectivity only and not management effectiveness or species movement.
Accessibility/Usage	Access via UNBL or Resource Watch: open the ProtConn layer, zoom to the country, retrieve the national ProtConn% from the map/table or export stats.

1C3	Protected Area Network Quality
Indicator	Terrestrial Key Biodiversity Areas (KBAs) Protection
Definition	Percentage of mapped terrestrial Key Biodiversity Area (KBA) extent that overlaps protected areas within national boundaries, as reported by Yale EPI (TKP).
Biome(s)	Terrestrial
Primary Data Source(s)	Yale Environmental Performance Index (EPI) — Terrestrial KBA Protection (TKP).
Link	https://epi.yale.edu/measure/2024/TKP
Resolution & Coverage	Global
Update Frequency	EPI release cycle (e.g. 2024)
Format & Access	Indicator page and downloadable CSV tables
Interpretation	Reports the percentage of a country's terrestrial KBA area that is under formal protection; reflects coverage only and not management effectiveness or KBA condition.
Accessibility/Usage	Access via the EPI TKP page: click "Download data," filter for the country.

1C4	Cultural and Stewardship Significance in Ecosystems
Indicator	Percentage (%) of terrestrial ecosystems managed or co-managed by Indigenous Peoples and Local Communities.
Definition	Reflects the proportion of a country's terrestrial ecosystems that fall under the governance, ownership, or co-management of Indigenous Peoples and local communities (IPLCs). These areas play a critical role in biodiversity protection, climate resilience, and social equity.
Biome(s)	Terrestrial
Primary Data Source(s)	LandMark, WDPA (Protected Planet), Rights and Resources Initiative (RRI)
Link	https://www.landmarkmap.org/ https://www.protectedplanet.net/ https://rightsandresources.org/rri-tenure-tool/forest-tenure-data/
Resolution & Coverage	Subnational to National – Spatial (polygon-level) data with national summaries depending on country and platform.
Update Frequency	Irregular (varies by source)
Format & Access	Online map viewer, shape files, dashboards, downloadable datasets (depending on source).
Interpretation	A higher percentage suggests stronger recognition of Indigenous and community-based stewardship. Such areas are associated with lower deforestation, richer biodiversity, and more equitable governance. This indicator supports interpretation of sovereign nature-related risks and resilience.
Accessibility/Usage	Most datasets are publicly available and accessible through interactive platforms (e.g., LandMark, WDPA). Some allow direct shapefile downloads; others provide summary statistics. Coverage varies by country.
Complementary Indicator/Source	ICCA Registry, WRI Forest Governance Indicators (Indigenous Forest conflict), UN DESA reports, Environmental Justice Atlas (EJAtlas)

Pillar 2 – Socio-economic Activities

2A Economic Exposure

2A1	Country Exposure to Dependencies through National Production
Indicator	% of value added from sectors with high dependencies on ecosystem services.
Definition	Percentage of national gross value added (GDP) coming from sectors that have High or Very High dependence on ecosystem services (per ENCORE's materiality ratings). Calculated as the share of total value added contributed by industries classified as highly nature-dependent (e.g. agriculture, fisheries, etc.).
Relates to	Nature dependency (economic value at risk from ecosystem service loss; physical risk exposure)
Primary Data Source(s)	GLORIA MRIO (sectoral GVA by country)
Secondary Source	ENCORE (sector dependency ratings)
Primary Link	https://scp-hat.org/data-download/
Secondary Link	https://encorenature.org/en/explore
Coverage	Global (country-level data for ~160 countries)
Data Format & Access	% of GDP (value added). Available via SCP-HAT as CSV/Excel; open access. ENCORE data on dependencies via web tool/docs (qualitative ratings).
Interpretation Notes	Indicates how much of the economy relies on nature's services. A higher percentage means a greater portion of the country's value generation would be vulnerable if ecosystem services degrade. Method: Identify sectors labelled High/Very High dependency in ENCORE (meaning a loss of those services could cause production failure and severe financial loss), then sum their share of national value-added using GLORIA or national accounts. Interpretation: A large value implies significant exposure to ecosystem degradation (physical risk). Countries with high values should prioritize protecting the natural capital that underpins these sectors.

2A1	Country Exposure to Impacts through National Production
Indicator	% of value added from sectors with high impact on nature
Definition	Percentage of national value-added originating from sectors that exert High or Very High impact on ecosystems (per ENCORE's impact categories). It measures the share of the economy in industries that significantly drive biodiversity loss or environmental degradation (e.g. deforestation, pollution).
Relates to	Nature impact (economic share in nature-intensive sectors; transition/regulatory risk).
Primary Data Source(s)	GLORIA MRIO (sectoral GVA by country)
Secondary Source	ENCORE (sector impact ratings)
Primary Link	https://scp-hat.org/data-download/
Secondary Link	https://encorenature.org/en/explore
Coverage	Global (country-level)
Data Format & Access	% of GDP. GLORIA data via SCP-HAT (CSV/Excel). ENCORE impact info via tool/docs (qualitative ratings).
Interpretation Notes	Shows how much of the economy is based on activities that put pressure on nature. A higher percentage means the country's GDP heavily involves sectors that cause biodiversity loss (e.g. intensive agriculture, mining). Method: Use ENCORE to flag sectors with Very High environmental impact, then sum their GDP share from GLORIA. Interpretation: A large value signals potential transition risks – these industries may face stricter regulations or market shifts as the world pushes for nature-positive practices. For example, sectors like agriculture, forestry, fishing, and mining are among those with the greatest impacts on ecosystems. High values highlight an economy's dependence on activities that may need to transform to reduce ecological harm.

2A2	Country Exposure to Impacts through Importation
Indicator	% of imports generated by high impact sectors
Definition	Share of total import value that is produced by High/Very High impact sectors. This indicates the portion of a country's imports (by value) coming from industries that cause significant environmental pressure (in the exporting countries). Essentially, it measures imported nature-related risk via supply chains.
Relates to	Supply-chain impact (imported exposure to nature-intensive sectors)
Primary Data Source(s)	WITS / UN Comtrade (imports by sector)
Secondary Source	ENCORE (sector impact ratings)
Primary Link	https://wits.worldbank.org/
Secondary Link	https://encorenature.org/en/explore
Coverage	Global (country-level)
Data Format & Access	% of total import value. GLORIA data via SCP-HAT (CSV/Excel)
Interpretation Notes	Reflects how much the country relies on foreign products from high-impact sectors. Method: Identify imported goods from sectors with High/Very High nature impact (e.g. mining, oil & gas, industrial agriculture commodities) using GLORIA's import data and ENCORE's classifications. Sum those imports as a percent of total imports. Interpretation: A high value means the country's consumption is linked to significant environmental pressures abroad. The country could be indirectly contributing to habitat loss or pollution in supplier nations (e.g. importing beef linked to deforestation). It also suggests exposure to risks if those supply chains are disrupted by biodiversity loss or new environmental regulations. This aligns with a "footprint" perspective: environmental impacts can be imported via trade. Policymakers may use this to identify and manage import-related nature risks (e.g. diversifying suppliers or promoting sustainable sourcing).

2A2	Country Exposure to Dependencies through National Production
Indicator	% of imports generated by high dependency sectors
Definition	Percentage of total merchandise import value that comes from industries assessed by ENCORE as having High or Very High dependency on ecosystem services. Computation: map imported products (HS) to ISIC Rev.4 industries, tag industries with ENCORE dependency ratings, sum the value for tagged industries, divide by total merchandise imports, and multiply by 100.
Relates to	Supply-chain vulnerability to degradation of ecosystem services abroad (e.g. water, pollination, soil stability, etc.).
Primary Data Source(s)	WITS / UN Comtrade (imports by sector)
Secondary Source	ENCORE (sector dependency ratings)
Primary Link	https://wits.worldbank.org/
Secondary Link	https://encorenature.org/en/explore
Coverage	Global (country-level)
Data Format & Access	CSV/Excel downloads; ENCORE ratings via tool/docs
Interpretation Notes	Shows how reliant a country's imports are on nature-dependent sectors. It is based on gross trade values, not value-added; results depend on the concordance used and the ENCORE version/date. Re-exports and commodity price swings can distort shares.

2A3	Country Exposure to Impacts through Exportation
Indicator	% of exports generated by high impact sectors
Definition	Percentage of total merchandise export value generated by industries assessed by ENCORE as having High or Very High impact on nature. Computation: map export products (HS) to ISIC Rev.4 industries, tag industries with ENCORE impact ratings, sum the value for tagged industries, divide by total merchandise exports, and multiply by 100.
Relates to	Transition/regulatory risk embedded in the export basket; exposure to nature-related trade measures.
Primary Data Source(s)	WITS / UN Comtrade (exports by sector)
Secondary Source	ENCORE (sector impact ratings)
Primary Link	https://wits.worldbank.org/
Secondary Link	https://encorenature.org/en/explore
Coverage	Global (country-level)
Data Format & Access	CSV/Excel downloads; ENCORE ratings via tool/docs
Interpretation Notes	Indicates the share of exports coming from sectors that drive biodiversity loss (per ENCORE). Not a production-structure or value-added metric (use 2B1 for domestic value-added).

2A3	Country Exposure to Dependencies through Exportation
Indicator	% of exports generated by high dependency sectors
Definition	Percentage of total merchandise export value generated by industries assessed by ENCORE as having High or Very High dependency on ecosystem services. Computation mirrors the above: HS products → ISIC industries → tag with ENCORE dependency ratings → sum tagged export value / total exports × 100.
Relates to	Export-earnings vulnerability to ecosystem-service degradation (e.g., droughts, soil loss, declining pollinators) affecting production
Primary Data Source(s)	WITS / UN Comtrade (exports by sector)
Secondary Source	ENCORE (sector dependency ratings)
Primary Link	https://wits.worldbank.org/
Secondary Link	https://encorenature.org/en/explore
Coverage	Global (country-level)
Data Format & Access	CSV/Excel downloads; ENCORE ratings via tool/docs
Interpretation Notes	Shows how much of export value relies on ecosystem services through the producing sectors. Values are sensitive to concordance/mapping choices and ENCORE versioning.

2A4	Employment generated by High Impact Sectors
Indicator	% employment generated by high impact sectors
Definition	Percentage of total national employment working in economic sectors assessed by ENCORE as having High or Very High impact on nature. Calculated as the sum of employees in mapped ISIC Rev.4 industries flagged High/Very High by ENCORE, divided by total employment, multiplied by 100.
Relates to	Workforce exposure to nature-negative transition risk; distributional and regional labour risk.
Primary Data Source(s)	ILOSTAT (employment by economic activity, ISIC Rev.4)
Secondary Source	ENCORE (industry environmental impact ratings)
Primary Link	https://ilostat.ilo.org/data/
Secondary Link	https://encorenature.org/en/explore
Coverage	Global
Data Format & Access	CSV/Excel downloads (ILOSTAT); qualitative sector ratings on ENCORE website.
Interpretation Notes	Shows the share of jobs in industries that drive biodiversity loss (per ENCORE). Values depend on the ISIC - ENCORE mapping used and may under-count informal work. Within-sector variation and firm-level practices are not captured; the metric signals potential labour exposure to nature policy and market shifts rather than actual job losses.

2A4	Employment generated by High Dependency Sectors
Indicator	% employment generated by high dependency sectors
Definition	Percentage of total national employment working in economic sectors assessed by ENCORE as having High or Very High dependency on ecosystem services (e.g., water supply, pollination, soil stability). Computed as the sum of employees in mapped ISIC Rev.4 industries flagged High/Very High dependency divided by total employment, multiplied by 100.
Relates to	Workforce reliance on ecosystem services; vulnerability to nature degradation and climate-nature shocks.
Primary Data Source(s)	ILOSTAT (employment by economic activity, ISIC Rev.4)
Secondary Source	ENCORE (industry dependency ratings on ecosystem services)
Primary Link	https://ilostat.ilo.org/data/
Secondary Link	https://encorenature.org/en/explore
Coverage	Global
Data Format & Access	CSV/Excel downloads (ILOSTAT); qualitative sector ratings on ENCORE website
Interpretation Notes	Shows the share of jobs in industries reliant on nature's services, indicating potential labour vulnerability to droughts, water stress, soil loss, declining pollinators, etc. Estimates hinge on the chosen ISIC - ENCORE concordance; informal and seasonal employment may be under-reported. The metric reflects exposure, not resilience measures or adaptation capacity.

2B Macro-Economic Indicators

2B1	Value added generated by Exposed Sectors
Indicator	% value added generated by high dependency and high impact sectors
Definition	Percentage of national value added coming from “exposed” sectors, i.e. those that are either highly dependent on ecosystem services or have high impact on nature (the union of the two categories above). This aggregates the share of the economy linked to nature, either through dependence or impact.
Relates to	Overall nature exposure (combined dependency and impact)
Primary Data Source(s)	GLORIA MRIO (sectoral GVA) via SCP-HAT
Secondary Source	ENCORE (dependency & impact ratings)
Primary Link	https://scp-hat.org/data-download/
Secondary Link	https://encorenature.org/en/explore
Coverage	Global (country-level)
Data Format & Access	% of GDP. GLORIA data via SCP-HAT.
Interpretation Notes	Provides an overarching view of the economy’s connection to nature. Method: Compile the list of sectors that are either High/Very High dependency or High/Very High impact (from ENCORE), then use GLORIA to calculate their total share of GDP (avoiding double-counting any sector that meets both criteria). Interpretation: A higher percentage means a larger portion of economic activity is nature-related in some critical way (either vulnerable to ecosystem decline or contributing to it). Many primary sectors often fall into both high-dependency and high-impact groups (e.g. agriculture, forestry, fishing, mining overlap both dimensions). Therefore, this indicator gives a broad measure of nature-related economic exposure. Countries with a very high exposed share might face significant risks from biodiversity loss (affecting dependent sectors) as well as global pressure to reform environmentally harmful sectors. This metric can help prioritize diversification or sustainability efforts in the economy.

2B2	Imports generated by Exposed Sectors
Indicator	% of imports generated by high dependency sectors and high impact sectors
Definition	Share of total import value consisting of goods produced by exposed sectors (sectors highly dependent on or impacting nature). It measures how much of what the country imports is tied to nature-sensitive industries globally.
Relates to	Trade (imports) exposure (nature-linked sectors in imports)
Primary Data Source(s)	WITS / UN Comtrade (import data by sector)
Secondary Source	ENCORE (dependency & impact ratings)
Primary Link	https://wits.worldbank.org/
Secondary Link	https://encorenature.org/en/explore
Coverage	Global (country-level)
Data Format & Access	% of total imports value. GLORIA data via SCP-HAT.
Interpretation Notes	Measures the dependency of domestic consumption on nature-intensive sectors abroad. Method: Using the “exposed” sector list (#4), sum their contribution to imports (from GLORIA trade data) and divide by total imports. Interpretation: A higher value means a large portion of imports (e.g. food, timber, oil, minerals) comes from sectors that either rely on healthy ecosystems or cause biodiversity pressure. This indicates indirect exposure – the country’s economy could be affected by nature loss in supplier countries (through supply disruptions or price volatility). It also hints at the country’s external environmental footprint, as high values imply that domestic demand is met by nature-impacting activities elsewhere. This information can guide policies on sustainable procurement and trade (e.g. requiring certified commodities) to reduce imported biodiversity risk.

2B3	Exports generated by Exposed Sectors
Indicator	% of exports generated by high dependency sectors and high impact sectors
Definition	Share of total export value that comes from exposed sectors (sectors highly dependent on ecosystem services and/or with high nature impact). It represents how much of a country's export earnings rely on nature-dependent or nature-impacting industries.
Relates to	Trade (exports) exposure (nature-linked sectors in exports)
Primary Data Source(s)	WITS / UN Comtrade (export data by sector)
Secondary Source	ENCORE (dependency & impact ratings)
Primary Link	https://wits.worldbank.org/
Secondary Link	https://encorenature.org/en/explore
Coverage	Global (country-level)
Data Format & Access	% of total exports value. GLORIA data via SCP-HAT
Interpretation Notes	Shows the extent to which exports (and thus foreign income) depend on nature-related sectors. Method: Using the same "exposed" sector list as in #4, sum the value of those sectors' exports and divide by total exports (from GLORIA or trade stats). Interpretation: A high percentage indicates the country's export base is concentrated in agriculture, natural resources, or other nature-sensitive goods. Such economies could be vulnerable to external shocks – for instance, ecosystem collapse or changing consumer preferences/import regulations (e.g. bans on unsustainably sourced products) could affect export revenues. This metric highlights potential trade-offs between export-led growth and biodiversity. Countries heavily reliant on exposed exports (e.g. commodity exporters) may need strategies to add value sustainably or diversify exports to manage nature-related financial risks.

2B4	Employment generated by Exposed Sectors
Indicator	% employment generated by high dependency sectors and high impact sectors
Definition	Percentage of national employment (jobs) that is in exposed sectors (either highly nature-dependent or high-impact sectors). This indicates the share of the workforce whose jobs are linked to ecosystems – either relying on nature's services or in activities that affect nature.
Relates to	Socio-economic exposure (labour force in nature-dependent/ impacting sectors)
Primary Data Source(s)	GLORIA / SCP-HAT (employment by sector data) via SCP-HAT
Secondary Source	ENCORE (dependency & impact ratings)
Primary Link	https://scp-hat.org/data-download/
Secondary Link	https://encorenature.org/en/explore
Coverage	Global (many countries; may use ILO data if unavailable in GLORIA)
Data Format & Access	% of total employment. GLORIA MRIO includes modelled employment by sector (with global coverage); or use ILO/national labour force data.
Interpretation Notes	Highlights how many jobs depend on nature-related sectors. Method: Identify "exposed" sectors via ENCORE, then use sectoral employment data (from GLORIA's MRIO extensions or national statistics) to calculate the share of total employment in those sectors. Interpretation: A high percentage means a large portion of the population works in agriculture, fisheries, forestry, mining, or similar sectors. These jobs could be at risk if ecosystems degrade or if industries must shift to more sustainable practices. This is crucial for assessing just transition needs – regions with many nature-dependent jobs may require support to adapt. For example, globally about 26% of the workforce is employed in agriculture alone, illustrating how livelihoods, especially in developing countries, are tied to nature. Policymakers should interpret high values as a need to invest in resilience (e.g. sustainable farming, ecosystem restoration) and job diversification/training in case of ecological shocks.

2B4	Employment generated by Exposed Sectors – Gender-related
Indicator	% of women employed in high-dependency sectors (e.g., agriculture, forestry, fisheries, tourism)
Definition	Measures the share of female employment in sectors that are directly dependent on ecosystem services or highly exposed to nature-related risks. This highlights gender-based differences in vulnerability to environmental degradation and ecosystem collapse.
Policy Theme	Socio-economic vulnerability
IPBES Pressure	N/A (enabling)
Data Source(s)	ILOSTAT
Link	https://ilostat.ilo.org/
Coverage	National-level statistics by sector and gender; global coverage varies by sector and country
Data Format & Access	Public database with downloadable tables (Excel, CSV) and interactive dashboards
Interpretation	Indicates gender-differentiated exposure to nature-related risks through employment patterns. High values suggest greater vulnerability of women to environmental shocks, especially in nature-dependent economies. Useful for assessing social equity in transition risk.
Accessibility/Usage	Freely accessible through ILOSTAT's online portal. Tools support country-level filtering, cross-year comparison, and gender-disaggregated insights. Some gaps may exist for certain countries or sectors.
Complementary Indicator/Source	FAO Gender and Land Rights Database, UN Women & UNEP sectoral data, World Bank Gender Data Portal

2C Environmental Pressures

2C1	Land Use Change
Indicator	Habitat Loss Trend
Definition	The proportion of suitable natural habitat remaining for the species found within a country, relative to historical baselines. It reflects habitat availability and ecosystem integrity.
Biome(s)	Terrestrial
Primary Data Source(s)	Species Habitat Index
Link	https://epi.yale.edu/measure/2024/SHI
Resolution & Coverage	Index; national
Update Frequency	Annual
Format & Access	Online database, CSV
Interpretation	The Species Habitat Index (SHI) measures the proportion of suitable habitats for a country's species that remain intact, relative to a baseline set in the year 2001. While the SHI can be calculated for single species, Map of Life aggregates these metrics into a single score, with each species weighted according to the proportion of their global range that is found within the country. This weighting scheme encourages countries to take special care to ensure the protection of rare or endemic species. The SHI serves as a proxy for potential population losses and the extinction risk to individual species. A score of 100 indicates that a country has experienced no habitat loss since the year 2001, and a score of 0 indicates the worst levels of habitat loss.
Accessibility/ Usage	Available via EPI website. Results are aggregated from Map of Life data. Downloadable as national scores. Search for “SHI” under indicators. Each species is weighted by range-share, emphasizing endemic and rare species.

2C1	Land Use Change
Indicator	Land cover change (natural versus anthropogenic)
Definition	Change in the area (km^2) and share (%) of national land mapped as “natural” versus “anthropogenic” cover over a selected period, using a consistent global land-cover time series hosted on UN Biodiversity Lab (e.g., ESA WorldCover or ESA CCI). Natural cover groups classes such as tree/shrub/grass/wetlands; anthropogenic cover groups cropland, built-up and other human-modified classes; grouping follows the product legend.
Biome(s)	Terrestrial and Freshwater
Primary Data Source(s)	UN Biodiversity Lab (hosting ESA WorldCover / ESA CCI Land Cover)
Link	https://map.unbiodiversitylab.org/earth
Resolution & Coverage	Global; 10 m (WorldCover) or ~300 m (CCI)
Update Frequency	Annual
Format & Access	Raster GeoTIFF with class codes; web map viewers
Interpretation	Reports the annual and cumulative change in natural and anthropogenic cover (km^2 and %) between the chosen baseline and end year, with optional net/gross conversions where a change matrix is available. Uses consistent class groupings across years; apparent changes can reflect reclassification or cloud/shadow handling rather than true land dynamics. Marine areas are excluded.
Accessibility/Usage	Access via UNBL: add the land-cover layers for baseline and end year, group classes into “natural” and “anthropogenic”, run country-level zonal statistics or the change tool, export results, and cite dataset year/version and grouping rules.
Complementary Indicator/Source	Forest degradation Rate & Drivers - Annual rate of tree cover loss (km^2/yr and %/yr) and its principal drivers within national forests, derived from Global Forest Watch (UMD/Hansen tree cover loss) combined with the WRI “Global Drivers of Forest Loss” classification. Source: https://www.globalforestwatch.org/

2C2	Exploitation of Resources
Indicator	Pressure on Water Resources (Water Stress)
Definition	The ratio of total annual freshwater withdrawals to internal renewable water resources, indicating the pressure on available freshwater supply. A high ratio reflects water stress.
Biome(s)	Terrestrial, Freshwater
Primary Data Source(s)	FAO AQUASTAT
Link	https://data.apps.fao.org/aquastat/?lang=en
Resolution & Coverage	National level; global data (150+ countries)
Update Frequency	Annual (data collected via country surveys; new values released each year)
Format & Access	Online database (interactive query portal); data downloadable in bulk (CSV) with open license (CC-BY)
Interpretation	Indicates the overall pressure on water resources in a country. It also provides the contribution of the agricultural and industrial sectors to water stress.
Accessibility/ Usage	AQUASTAT provides country data on total renewable water resources and freshwater withdrawals, enabling calculation of the “water stress” percentage (freshwater withdrawal as % of resources, SDG 6.4.2). Exceeding 25% may indicate high stress conditions.

2C2	Exploitation of Resources
Indicator	Projected Water Stress (2030/2050/2080)
Definition	The projected ratio of total annual freshwater withdrawals to available renewable water supply in a given country for future years (2030/2050/2080), indicating expected water scarcity.
Biome(s)	Freshwater
Primary Data Source(s)	WRI Aqueduct Future Projections
Link	https://www.wri.org/aqueduct
Resolution & Coverage	National, basin
Update Frequency	~5-year updates
Format & Access	CSV, GIS
Interpretation	Based on climate and socio-economic projections (CMIP6). Useful for identifying future hotspots of water scarcity and planning resilience strategies. Values express future freshwater stress ratios.
Accessibility/Usage	Use the WRI Aqueduct platform. Navigate to “Future Projections” section. Data available by country and basin for selected future years. Downloads in CSV and GIS formats, based on SSP/CMIP6 scenarios.

2C2	Exploitation of Resources
Indicator	Overfished share
Definition	Share (%) of a country's assessed marine fish stocks that are overfished, calculated as 100 – SDG 14.4.1 ("proportion of fish stocks within biologically sustainable levels") from FAO. The metric reflects stock status relative to biological reference points for assessed stocks and is attributable to the national marine jurisdiction where reported.
Biome(s)	Marine
Primary Data Source(s)	FAO SDG 14.4.1.
Link	FAO SDG 14.4.1: https://www.fao.org/state-of-fisheries-aquaculture Sea Around Us (data & methods): https://www.seaaroundus.org/data/#/spatial-catch
Resolution & Coverage	Global
Update Frequency	Biennial/periodic
Format & Access	Tabular time series (CSV/Excel) and dashboards.
Interpretation	Reports the percentage of assessed stocks that are overfished (biomass below that needed to produce MSY). Coverage is limited to assessed stocks and may under-represent data-poor fisheries; shared/straddling stocks complicate attribution.
Accessibility/Usage	Access via FAO (SDG 14.4.1): open the country view, download the latest value/time series. Optionally, consult Sea Around Us to provide catch context for the same country/EEZ.
Complementary Indicator/Source	Sea Around Us (context on catches).

2C3	Invasive Species
Indicator	Terrestrial Invasive Alien Species (IAS) Threat
Definition	Modelled terrestrial IAS threat/pressure at country level derived from the UN Biodiversity Lab "Global distribution of terrestrial invasive alien species threat" layer, complemented by Seebens et al.'s Global Alien Species First Record Database to indicate establishment pressure through counts of first records per country/period.
Biome(s)	Terrestrial
Primary Data Source(s)	UN Biodiversity Lab (IAS threat layer); Seebens et al., Global Alien Species First Record Database (GASFRD).
Link	UNBL layer: https://map.unbiodiversitylab.org/earth GASFRD: https://zenodo.org/records/3690748 https://dataportals.senckenberg.de/dataset/global-alien-species-first-record-database
Resolution & Coverage	Global; country summaries from a gridded pressure layer (UNBL) and country/decade counts (GASFRD).
Update Frequency	Irregular updates
Format & Access	Web map (UNBL) and downloadable tables/CSV (GASFRD).
Interpretation	Reports national IAS threat (e.g., mean/percentile of the pressure index) and/or the number of new alien species first records per period, signalling introduction and establishment pressure. Represents potential pressure and recorded arrivals.
Accessibility/Usage	Access via UNBL: add the IAS threat layer, select the national boundary, run the summary tool, and note the layer name/date. Access GASFRD: download the country table, filter for terrestrial taxa and desired decades, and report counts.

2C3	Invasive Species
Indicator	Introduced Marine Species
Definition	Count of introduced marine species recorded for a country's EEZ, based on the WoRMS taxonomic checklist (filters: Introduction = Introduced; Environment = Marine; Geounit = EEZ), optionally cross-checked with the IUCN Global Invasive Species Database (GISD)
Biome(s)	Marine
Primary Data Source(s)	WoRMS (World Register of Marine Species) Checklist; IUCN GISD.
Link	WoRMS Checklist: https://www.marinespecies.org/aphia.php?p=search&adv=1 GISD: https://www.iucngisd.org/gisd/
Resolution & Coverage	Global species lists by EEZ
Update Frequency	Rolling updates
Format & Access	Tabular species lists (web/CSV).
Interpretation	Reports the cumulative number of introduced marine species known for the EEZ as a proxy for establishment pressure. Values depend on survey effort and taxonomic attention.
Accessibility/Usage	Access via WoRMS: open Advanced Search, set Environment = Marine, Introduction = Introduced, Geounit = [Country EEZ], export the species list. Optionally cross-check counts in GISD for marine/coastal species by country.

2C4	Climate Change
Indicator	GHG Emissions
Definition	Total anthropogenic greenhouse gas emissions (CO_2-equivalent, GHG-100) and intensity (e.g., per capita or per km^2) from the EDGAR country inventory, excluding and/or including LULUCF as reported. Provides an annual time series suitable for trend and peer comparison.
Biome(s)	Terrestrial
Primary Data Source(s)	EDGAR — Emissions Database for Global Atmospheric Research (JRC)
Link	Country profiles & downloads: https://edgar.jrc.ec.europa.eu/country_profile/WORLD
Resolution & Coverage	Global; annual national totals
Update Frequency	Annual, two-year reporting lag
Format & Access	CSV/Excel; charts
Interpretation	Reports total GHG emissions and a chosen intensity normalisation (per capita or per km^2).
Accessibility/Usage	Access via EDGAR country profile: download "GHG total" (specify incl./excl. LULUCF), compute per-capita or per-area intensities as needed.
Complementary Indicator/Source	Air Pollutant emissions intensity. Reports pollutant-specific emission intensities to enable cross-country comparison. Source: https://edgar.jrc.ec.europa.eu/country_profile/WORLD

2C5	Pollution
Indicator	Nitrogen Surplus
Definition	Cropland nitrogen balance (kg N/ha/yr), where positive values indicate surplus (inputs minus removals) as reported by FAOSTAT agri-environmental nutrient balances. Serves as a pressure proxy for eutrophication and N losses to air and water.
Biome(s)	Terrestrial
Primary Data Source(s)	FAOSTAT — Agri-environmental indicators (Nutrient Balances)
Link	https://www.fao.org/faostat/en/#data/ESB
Resolution & Coverage	Global
Update Frequency	Annual
Format & Access	CSV downloads; interactive tables
Interpretation	Reports cropland nitrogen surplus in kg N/ha/yr. Indicates potential pressure, not measured emissions or water quality; estimates reflect model assumptions and agricultural statistics.
Accessibility/Usage	Access via FAOSTAT → Agri-environmental indicators → Nutrient Balances → Cropland Nutrient Balance; select country and "Nutrient balance (Total), Nitrogen", selected aggregated option.

2C5	Pollution
Indicator	Plastic Emissions to Oceans
Definition	Estimated mass of plastic waste entering the ocean from a country each year (t/yr), based on modelled riverine emissions (The Ocean Cleanup) and the Meijer et al. (2021) baseline compiled by Our World in Data. Values are model estimates and vary by reference year.
Biome(s)	Terrestrial (land-based pressure to marine)
Primary Data Source(s)	The Ocean Cleanup — River plastic emissions; Our World in Data (Meijer et al. compilation)
Link	TOC sources: https://theoceancleanup.com/sources/ OWID plastic pollution dataset: https://ourworldindata.org/plastic-pollution
Resolution & Coverage	Global
Update Frequency	Ad hoc model updates
Format & Access	Web map and CSV
Interpretation	Reports modelled tonnes per year entering the ocean; comparable across countries, but with uncertainty. Estimates exclude some direct coastal inputs and depend on waste and hydrology assumptions.
Accessibility/Usage	Access TOC or OWID: open the country table/map.

Pillar 3 – Governance

3A Commitments & Action

3A1	International Environmental Commitments
Indicator	Participation in Global Biodiversity Treaties
Definition	Measures whether a country is party to key biodiversity-related multilateral environmental agreements: Convention on Biological Diversity (CBD), Convention on International Trade in Endangered Species (CITES), and Ramsar Convention on Wetlands.
Policy Theme	International Commitment
IPBES Pressure	N/A (enabling)
Data Source(s)	InforMEA
Link	https://www.informea.org/
Coverage	Global (196 CBD, 184 CITES, 172 Ramsar Parties)
Data Format & Access	Web portals, downloadable treaty lists, legal references
Interpretation	Measures baseline political will. Binary status (yes/no) for each treaty. Does not capture quality of implementation or enforcement.
Accessibility/Usage	Treaties searchable by country at InforMEA. Web interface allows browsing ratification status, legal texts, and dates of entry into force. Downloadable lists available by treaty.

3A2	Translation into National Planning
Indicator	Existence of a Current National Biodiversity Strategy and Action Plan (NBSAP)
Definition	Assesses if the country has submitted a recent (post-2022) NBSAP aligned with the Kunming-Montreal Global Biodiversity Framework (GBF).
Policy Theme	National Planning
IPBES Pressure	N/A (enabling)
Data Source(s)	CBD NBSAP Repository, WWF NBSAP Tracker
Link	https://www.cbd.int/nbsap/targets
Coverage	Global (CBD has 196 Parties; ~20 updated post-2020 as of 2024)
Data Format & Access	PDF (country plans), online dashboards
Interpretation	Indicates alignment with global biodiversity goals. Post-2020 updates reflect national ambition and readiness to implement the GBF. Quality varies.
Accessibility/Usage	Download national NBSAP documents from the CBD site. WWF's tracker provides interactive summaries. Some documents may be in local languages; most are PDF. Not all countries have submitted post-2020 updates.
Complementary Indicator/Source	https://wwf.panda.org/act/nbsap_tracker_check_your_countrys_nature_progress/

3A2	Translation into National Planning
Indicator	National Biodiversity Strategy and Action Plan (NBSAP) Ambition
Definition	Qualitative assessment of the ambition and GBF coverage of a country's NBSAP using the WWF NBSAP Tracker, which reviews whether national targets address GBF goals/targets and the extent to which they are specific, measurable and time-bound, and include enabling measures (e.g. finance, monitoring).
Policy Theme	National Planning
IPBES Pressure	N/A (enabling)
Data Source(s)	WWF NBSAP Tracker
Link	https://wwf.panda.org/act/nbsap_tracker_check_your_countrys_nature_progress/
Coverage	Global
Data Format & Access	Web dashboard with country summary pages; narrative and indicator flags (download options may vary)
Interpretation	Reports how comprehensively the plan covers GBF targets and the strength/clarity of commitments. It is indicative (not an official CBD rating); results depend on the tracker's methodology and the latest document available. Older pre-2020 plans may score lower due to framing, not necessarily lower effort.
Accessibility/Usage	Open the WWF Tracker; search your country; read the summary and GBF-target coverage/quality flags; note any finance/implementation sections and the tracker update date; cross-check against the official NBSAP on the CBD site for citations.

3A3	Translation into Economic Transformation
Indicator	Biodiversity in Sectoral Transition Plans
Definition	Indicates whether biodiversity is explicitly addressed in national development strategies for key sectors (e.g. agriculture, forestry, infrastructure, finance), and whether associated financing mechanisms are in place.
Policy Theme	Economic Transformation
IPBES Pressure	Cross-cutting
Data Source(s)	Nature4Climate NbS Policy Tracker
Link	https://airtable.com/appjyjWDKMWjibXQP/shrEVi4ecyV3QDNrF
Coverage	191 countries
Data Format & Access	Airtable dashboard, PDFs
Interpretation	Reflects systemic integration of biodiversity in broader development and economic policy. Financing mechanisms are key to implementation.
Accessibility/Usage	Access policy details via the Airtable interface. Each country entry includes whether biodiversity is integrated and which sectors are covered. Exportable summaries and source references provided.
Complementary Indicator/Source	https://nature4climate.org/n4c-policy-tracker-2024/

3A3	Translation into Economic Transformation
Indicator	Biodiversity Finance Plan Status
Definition	Indicates whether the country has developed and published a Biodiversity Finance Plan (BFP) under UNDP's BIOFIN approach, and whether priority finance solutions are identified for implementation. Where a plan is not yet published, records status (in development / no plan).
Policy Theme	Economic Transformation
IPBES Pressure	Cross-cutting (enabling)
Data Source(s)	UNDP BIOFIN (country profiles and BFPs)
Link	https://www.biofin.org/countries
Coverage	BIOFIN countries
Data Format & Access	Country pages (web)
Interpretation	Signals progress on mainstreaming biodiversity into public finance and economic planning. A published BFP indicates a structured roadmap but does not guarantee resourcing or execution; scope and quality differ across countries.
Accessibility/Usage	Open BIOFIN "Countries," select the country, and look for "Biodiversity Finance Plan" and "Finance Solutions". Download the BFP where available; if not available, record the latest status shown on the profile.

3A4	Habitat and Species Protection
Indicator	% of terrestrial areas covered by protected areas
Definition	Share (%) of national land territory that falls within legally designated protected areas (PAs) according to the WDPA (as served via IBAT/UN Biodiversity Lab). Optional variants may include OECMs; methods should specify inclusion/exclusion rules.
Policy Theme	Habitat Protection
IPBES Pressure	Habitat protection (state/response)
Data Source(s)	IBAT (WDPA/OECM); UN Biodiversity Lab (WDPA/WD-OECM layers)
Link	https://www.ibat-alliance.org/ https://map.unbiodiversitylab.org/earth
Coverage	Global
Data Format & Access	Vector polygons (shapefiles); dashboards/web maps
Interpretation	Reports the national land share in designated PAs. It measures coverage, not ecological representativeness, connectivity, or management effectiveness. Results depend on choices about including proposed areas/OECMs and on de-overlapping methods; cross-border sites should be clipped to the national boundary.
Accessibility/Usage	IBAT: sign in (free option), search under "Country Profiles" UNBL: add WDPA/WD-OECM layers, select country boundary

3A4	Habitat and Species Protection
Indicator	% of marine areas covered by protected areas
Definition	Share (%) of the country's Exclusive Economic Zone (EEZ) that is within legally designated marine protected areas (MPAs) recorded in WDPA (via IBAT / UN Biodiversity Lab). Partial-marine sites are counted by their marine component.
Policy Theme	Habitat Protection
IPBES Pressure	Habitat protection (state/response)
Data Source(s)	IBAT; UN Biodiversity Lab
Link	IBAT: https://www.ibat-alliance.org/ UNBL: https://map.unbiodiversitylab.org/earth
Coverage	Global
Data Format & Access	Vector polygons (shapefiles); dashboards/web maps
Interpretation	Reports the EEZ share in designated MPAs. Coverage does not imply effective management or protection level. Estimates are sensitive to whether OECMs/proposed sites are included and to treatment of overlapping polygons and multi-zone sites.
Accessibility/Usage	IBAT: sign in (free option), search under "Country Profiles" UNBL: add WDPA/WD-OECM layers, select country EEZ/admin maritime layer.

3A5	Social Inclusivity Efforts
Indicator	Legal status and recognition of Indigenous Peoples and Local Communities (IPLCs) in biodiversity and land policies
Definition	Assesses the extent to which national legal frameworks recognise the land, resource, and governance rights of Indigenous Peoples and local communities. This reflects national commitments to rights-based approaches to biodiversity conservation and sustainable land management.
Policy Theme	Rights-based governance
IPBES Pressure	N/A (enabling)
Data Source(s)	Rights and Resources Initiative (RRI), IWGIA, UN DESA
Link	https://rightsandresources.org https://iwgia.org/en/countries.html UN DESA 2020 Report
Coverage	Global
Data Format & Access	Public reports, comparative tables, qualitative assessments, and case studies.
Interpretation	Countries with stronger legal recognition of IPLC rights tend to show greater environmental integrity, less conflict, and higher social legitimacy. This indicator reflects national political will toward inclusive governance.
Accessibility/Usage	Publicly accessible reports and country summaries. Some datasets (e.g., forest tenure tools) provide structured, filterable data. Others are narrative-based and require manual extraction.
Complementary Indicator/Source	LandMark, WDPA (Governance type: "Indigenous Peoples", "Local communities"), ICCA Registry

3A5	Social Inclusivity Efforts
Indicator	Presence of gender-specific targets in NBSAPs or related national biodiversity strategies
Definition	Evaluates whether national biodiversity strategies include measurable gender-specific targets or references to gender equality, as a proxy for institutional inclusion and gender-sensitive governance in environmental policy.
Policy Theme	Gender-responsive governance
IPBES Pressure	N/A (enabling)
Data Source(s)	NBSAP Tracker (WWF), CBD Gender Plan of Action Reporting
Link	https://wwf.panda.org/act/nbsap_tracker_check_your_countrys_nature_progress/
Coverage	Global
Data Format & Access	Online dashboards, spreadsheets, and national reports (HTML, Excel, PDFs)
Interpretation	The presence of gender targets suggests a baseline level of commitment to inclusive biodiversity governance. While it does not assess implementation, it can serve as a signal of national policy direction and awareness.
Accessibility/Usage	Tracker and reports are public and easily accessible. Data may be qualitative (yes/no presence) or descriptive (target text), with country filters.
Complementary Indicator/Source	UN Women & UNEP gender assessments, ILO sectoral data, CBD Gender Plan of Action documents

3B1	Land, Freshwater and Ocean Use Change
Indicator	Land and Ocean Use Change Policy Instruments
Definition	Presence of legislation or planning frameworks aimed at limiting habitat conversion, including tools such as land-use zoning, marine spatial planning, and deforestation moratoria.
Policy Theme	Land/Ocean Use Change
IPBES Pressure	Habitat Loss
Data Source(s)	Nature4Climate NbS Policy Tracker
Link	https://airtable.com/appjyjWDKMWjibXQP/shrEVi4ecyV3QDNrF
Coverage	191 countries
Data Format & Access	Airtable dashboard, PDFs
Interpretation	Strong land/ocean policies mitigate primary biodiversity loss drivers. Coverage is qualitative; presence, not enforcement quality.
Accessibility/Usage	Explore the Nature4Climate policy tracker online. Use filters to view national profiles and policy categories. Export summaries or access source PDFs where available. Ideal for rapid scoping of land-use policies.
Complementary Indicator/Source	https://nature4climate.org/n4c-policy-tracker-2024/

3B2	Exploitation of Resources
Indicator	Overexploitation Economic Policy Instruments
Definition	Presence of policies or regulatory frameworks addressing the overuse of natural resources, including controls on overfishing, overlogging, unsustainable hunting, and mechanisms like circular economy strategies.
Policy Theme	Overexploitation
IPBES Pressure	Direct exploitation
Data Source(s)	OECD PINE
Link	https://oecd-main.shinyapps.io/pinedatabase/
Coverage	OECD + Global
Data Format & Access	CSV, policy databases
Interpretation	Reflects regulatory attention to unsustainable extraction. Coverage varies by country and income level. Emphasis on emerging circular economy trends. Data not linked to enforcement strength or outcomes.
Accessibility/Usage	Use PINE filters to find policies by theme (e.g., overexploitation). Each entry includes legal scope, policy type, and environmental domain. Results can be downloaded or browsed online via interactive dashboards.
Complementary Indicator/Source	https://www.oecd.org/en/data/datasets/policy-instruments-for-the-environment-pine-database.html

3B3	Invasive Alien Species
Indicator	Budget for Invasive Alien Species Management
Definition	Indicates whether a country reports having an official budget line allocated for the management of invasive alien species (IAS).
Policy Theme	Invasive species
IPBES Pressure	Invasive species
Data Source(s)	Our World in Data (compiled from the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) Global Assessment and UNEP/GEF datasets)
Link	https://ourworldindata.org/grapher/budget-to-manage-invasive-alien-species?tab=table
Coverage	Global; includes reporting from over 100 countries, primarily based on national submissions to IPBES or biodiversity-related surveys and environmental reports.
Data Format & Access	Available as a simple binary (Yes/No) indicator by country via Our World in Data; interactive chart view and downloadable CSV format with open-access licensing.
Interpretation	This is a binary (Yes/No) indicator for policy commitment. It does not assess budget adequacy or implementation. Proxy for national priority on IAS.
Accessibility/Usage	Open-access chart available on Our World in Data. Switch to “table” view to explore by country and download the dataset in CSV format. Based on official self-reporting and environmental assessments.

3B4	Climate Change
Indicator	Climate Change Commitment
Definition	Assessed through rankings and evaluations from climate policy indices (e.g. Climate Change Performance Index - CCPI) and sovereign sustainability trackers such as the Assessing Sovereign Climate-related Opportunities and Risks (ASCOR) platform.
Policy Theme	Climate Change Commitment
IPBES Pressure	Climate Change
Data Source(s)	CCPI, ASCOR
Link	https://ccpi.org/ranking/
Coverage	Multi-country; expanding
Data Format & Access	Ranking tables, policy reports
Interpretation	Captures ambition, progress, and policy strength around climate mitigation and adaptation. Supports biodiversity indirectly via climate resilience. Some countries not yet assessed.
Accessibility/Usage	Review country rankings and profiles via CCPI site. ASCOR platform provides sovereign ESG risk insights. Country factsheets and evaluation criteria available for download. Rankings updated annually.
Complementary Indicator/Source	https://transitionpathwayinitiative.org/ascor

3B5	Pollution
Indicator	Pollution Control Economic Policy Instruments
Definition	Existence of national measures to address major sources of pollution, including bans or restrictions on harmful substances (e.g., pesticides, plastics), emissions limits, and wastewater treatment or discharge regulations.
Policy Theme	Pollution Commitment
IPBES Pressure	Pollution
Data Source(s)	OECD PINE
Link	https://oecd-main.shinyapps.io/pinedatabase/
Coverage	OECD + Global
Data Format & Access	CSV, policy databases
Interpretation	Indicates the existence of pollution control measures, but not their scope or implementation level. Patchier coverage in low-income countries. Broad topic includes multiple pollutant types.
Accessibility/Usage	Search OECD PINE using pollution-related keywords. Results include legislation and regulatory instruments across multiple domains. Can be exported for offline review or national policy benchmarking.
Complementary Indicator/Source	https://www.oecd.org/en/data/datasets/policy-instruments-for-the-environment-pine-database.html

3B6	Water Governance
Indicator	Integrated Water Resource Management (IWRM)
Definition	SDG 6.5.1 composite score of policy integration, institutional frameworks, and stakeholder engagement in water management.
Policy Theme	Water Governance
IPBES Pressure	Freshwater Dependency
Data Source(s)	UN SDG 6.5.1 Portal
Link	https://iwrmdataportal.unepdhi.org/interactive-map
Coverage	170+ countries
Data Format & Access	CSV, interactive maps
Interpretation	IWRM scores reflect institutional readiness to manage water sustainably. Based on self-reporting—so subject to optimism bias and country-specific interpretation of scoring questions.
Accessibility/Usage	Access national IWRM scores on the interactive portal. Filter by region or year. CSV downloads and metadata available. Used in SDG 6 tracking and commonly cited in water governance assessments.

3C Resources & Implementation

3C1	National Natural Capital Accounts
Indicator	Natural Capital Accounting Adoption
Definition	Whether a country compiles official Natural Capital Accounts under the UN System of Environmental-Economic Accounting (SEEA), such as accounts for water, forests, land, or ecosystems.
Policy Theme	Natural Capital Accounting
IPBES Pressure	Enabling
Data Source(s)	UN SEEA Global Assessment – UN Statistical Division's survey tracking SEEA implementation (feeds SDG 15.9.1(b))
Link	https://seea.un.org/content/2024-global-assessment
Coverage	Global: 94 countries implementing SEEA as of 2024 (67 regularly publishing accounts). Data since 2014; updated via 2020, 2023 benchmark surveys and annual updates.
Data Format & Access	Results available as tables (HTML/Excel) on UN SEEA website; open-access. SDG global database also provides country adoption status.
Interpretation	The UN SEEA site provides a country-by-country table with each nation's implementation stage and types of accounts compiled . Reflects institutional capacity for ecosystem-economic integration. Helps track nature-related assets and flows. Data is categorical—"no activity" to "regular reporting".
Accessibility/Usage	Browse implementation tables on the SEEA website. Download Excel for full country-by-country adoption status by account type and year. Cross-referenced in SDG indicator 15.9.1(b).

3C2	Corporate Disclosures
Indicator	Mandatory Corporate Biodiversity Disclosure
Definition	Countries with legal requirements for companies to disclose biodiversity-related risks, dependencies, or impacts (e.g. EU CSRD requiring nature disclosures, France's Article 29 law on biodiversity reporting).
Policy Theme	Corporate sustainability transparency
IPBES Pressure	Enabling
Data Source(s)	To be determined
Link	To be determined
Coverage	To be determined
Data Format & Access	To be determined
Interpretation	To be determined
Accessibility/Usage	To be determined
Complementary Indicator/Source	Mandatory Corporate Biodiversity Disclosure: https://itpn.global/interactive/

3C2	Corporate Disclosures
Indicator	TNFD adoption by economic sector
Definition	Number of organisations headquartered in the country that have formally committed to publish TNFD-aligned disclosures, disaggregated by economic sector (e.g., ISIC/GICS). Reflects uptake and sectoral spread of TNFD adoption; it is not an assessment of disclosure quality or completeness.
Policy Theme	Corporate sustainability transparency
IPBES Pressure	Enabling
Data Source(s)	To be determined
Link	To be determined
Coverage	To be determined
Data Format & Access	To be determined
Interpretation	To be determined
Accessibility/Usage	To be determined

3C3	Governance through Subsidies
Indicator	Subsidy Reform for Biodiversity
Definition	Countries that have implemented policies to reduce or eliminate subsidies harmful to biodiversity – e.g. phasing out fossil fuel subsidies, pesticide/fertilizer subsidies, or harmful fisheries subsidies (only actual reforms or removals, not just pledges).
Policy Theme	Governance through Subsidies
IPBES Pressure	Multiple (indirect)
Data Source(s)	OECD PINE Database
Link	https://oecd-main.shinyapps.io/pinedatabase/
Coverage	Global ~146 countries
Data Format & Access	Dashboard, interactive tool
Interpretation	Indicates government action to remove perverse incentives that degrade biodiversity. Focus is on enacted, not pledged, reforms. Scope and enforcement vary.
Accessibility/Usage	Filter PINE database by country and subsidy type. Look for categories on harmful subsidies or environmentally positive instruments. Export CSVs or access online summaries.

3C4	Government spending on Biodiversity Conservation
Indicator	Budget allocation to biodiversity
Definition	Government Biodiversity Expenditure – Public budget allocations to biodiversity actions, including PA management, research, or restoration.
Policy Theme	Government Spending
IPBES Pressure	Enabling
Data Source(s)	IMF Data
Link	https://climatedata.imf.org/datasets/d22a6decd9b147fd9040f793082b219b_0/explore
Coverage	~80 countries
Data Format & Access	Database, interactive tool
Interpretation	Reflects national prioritization of biodiversity via financial commitment. Useful when normalized per GDP, land area, or biodiversity richness.
Accessibility/Usage	IMF dashboard includes biodiversity-related spending as part of green budgeting. Use country selector and thematic filters. Data downloadable in CSV format for country comparison.

3C5	Sovereign Nature Finance Instruments
Indicator	Nature finance instruments issued
Definition	Countries that have issued sovereign green or blue bonds, engaged in debt-for-nature swaps, or launched biodiversity-linked sovereign investments (e.g. sustainability-linked bonds with biodiversity targets).
Policy Theme	Nature Finance Instruments
IPBES Pressure	Enabling
Data Source(s)	Climate Bonds Initiative (CBI) – tracks all green, sustainability, and blue bonds, including sovereign issues. IMF Climate Change Dashboard – "Green Bonds" data series for sovereign green bond issuance volumes.
Link	https://www.climatebonds.net/market/data/
Coverage	Global: ~60 countries have issued sovereign green/sustainability bonds.
Data Format & Access	Data on bond issuances is available in CSV/Excel via CBI (registration may be required) and on the IMF's interactive portal. Debt-for-nature swap info is in reports/news (no single dataset). **Details on TNC's deals can be found here.**
Interpretation	Indicates mobilization of public markets for biodiversity finance. Bonds with biodiversity performance targets show innovation. Debt swaps must be compiled manually.
Accessibility/Usage	Use the CBI database to filter sovereign issuances. IMF dashboard provides country-level volumes of green bonds. Debt swaps are not yet centralized—must consult TNC, UNDP, or news databases for tracking.
Complementary Indicator/Source	https://climatedata.imf.org/pages/climate-finance#cf2

Appendix 2: Key Nature Instruments for Sovereign Finance

Name of Tool	Description	Example
Use of proceeds bonds with Biodiversity criteria	Green bonds: The most common use-of-proceeds bonds – are debt instruments issued to raise capital for environmentally friendly projects, with an emerging subset specifically focused on biodiversity – such as conservation, reforestation, or ecosystem restoration. Blue Bonds: These have emerged to finance marine and ocean-based projects (protecting marine biodiversity, restoring coastal ecosystems, financing sustainable fisheries).	The Indonesia's Green Sukuk Framework includes nature conservation and sustainable land use. Proceeds of these bonds have amongst others supported peatland restoration and forest management. Also, the Colombia Biodiversity Bond addresses reforestation and wildlife habitat restoration (United Nations Indonesia, 2025; IFC, 2024). The Seychelles Blue Bond (2018) and the Ecuador blue bond (2023) focus on marine biodiversity protection (GEF, 2018; Pew Bertarelli Ocean Legacy Project, 2024).
Sustainability-Linked Bonds (SLBs)	Unlike green bonds, SLBs do not limit the use of proceeds to environmental projects. Instead, they link the cost of borrowing to performance on predefined sustainability metrics. When applied to biodiversity, this can include reduction in deforestation rates, expansion of protected areas, improvement in biodiversity intactness indices. SLBs introduce a direct incentive for sovereigns to improve biodiversity performance. If the targets are missed, the interest rate on the bond rises, creating an economic cost for underperformance.	Sovereign SLBs are rare, with Chile, Uruguay and Thailand the only issuers so far. Among those three, only Uruguay has a biodiversity-linked KPI in its framework. Uruguay issued a USD 1.5 billion sovereign SLB - the first of its kind - where interest payments are linked to climate and deforestation performance. One KPI is the average annual native forest area, directly tying biodiversity to financial outcomes (Addleshaw Goddard, 2022; GGGI, 2023; Ministry of Economy and Finance of Uruguay (MEF), 2022).
Debt-for-Nature Swaps	Debt-for-nature swaps (DFNS) are financial arrangements in which a portion of a developing country's external debt is forgiven in exchange for commitments to invest in conservation projects. These instruments have gained renewed attention in light of mounting debt burdens and biodiversity crises in emerging economies.	In 2023, Ecuador completed a record-setting USD 1.6 billion debt conversion tied to marine conservation in the Galápagos Islands. The deal reduces debt burden while directing USD 450 million of the savings toward a USD 450 million conservation trust fund over the next two decades (Pew Charitable Trusts, 2023; DFC, 2023; Galápagos Life Fund, 2023). The USD 500 million refinancing of Gabon's sovereign debt is expected to free up USD 163 million for ocean conservation projects, supporting Gabon's ambitious national effort to protect 30% of its lands, freshwater systems, and ocean by 2030 (TNC, 2023; White & Case LLP, 2023).
Biodiversity Credit Markets	Still in early stages, biodiversity credit markets aim to create tradable units representing measurable biodiversity outcomes – such as habitat restoration or species protection. Sovereigns can act as both market regulators and participants, by issuing biodiversity credits based on national conservation efforts. The success of such markets will heavily depend on robust methodologies for baseline assessment, monitoring, and verification.	The Australian government is developing a national biodiversity credit trading scheme called the Nature Repair Market. Landholders who restore or manage land for biodiversity will be able to earn credits, which can then be sold to businesses or investors (DCCEEW, 2025a & 2025b; CER, 2025; White & Case, 2023).

Appendix 3: Checklist for Indicator and Data Point Selection

Some notes

This checklist is a practical guide for users of the Assessment Model. It offers methodological principles that can help financial institutions adapt the Assessment Model to their own needs. Users may decide to follow the proposed indicators, substitute them with more context-specific measures, or expand coverage as new data becomes available. By applying the principles below, users can ensure that the Model remains flexible, replicable, and relevant across different geographies, mandates, and analytical purposes.

To ensure credibility and country-level relevance, indicator selection should follow key principles outlined in the checklists below. At the same time, it is important to acknowledge data limitations. While bias mitigation can be improved by applying these principles, data incompleteness will persist. Proxies may broaden scope, but must be identified transparently with recognition of their limitations. Discrepancies in reporting and measurement may, in part, be addressed through geospatial data for state-of-nature indicators, and through stronger policy and reporting alignment for governance and economic pillars. Users should also remain attentive to potential overlaps, such as capturing biome diversity within countries, accounting for cultural and governance contexts, and situating data within historical environmental impacts.

1. Indicator Selection: Key Principles

To ensure credibility and country-level relevance, indicator selection should follow key principles:

A. Relevance to Sovereign Risk and Opportunity

Indicators should reveal how nature shapes (and is shaped by) a country's economic performance, financial stability, and policy response. They should support the analysis of key dimensions of sovereign materiality, such as:

- Exposure to nature-related risks may compromise long-term productivity or stability.
- Contribution to pressures on biodiversity, particularly from key economic sectors.
- Institutional readiness and capacity to respond, reflected in the existence and strength of environmental governance.
- Opportunities for nature-positive financial flows, supporting restoration, conservation, and sustainable investment.

By covering these areas, indicators help ensure that nature-related issues are not only ecologically meaningful but also relevant in sovereign analysis and decision-making.

B. Coverage of Nature Dimensions

Indicators should, where possible, capture both the natural capital and the risks or opportunities tied to its condition, use, and governance. To reflect the complexity of its interactions, indicators may span multiple dimensions, such as:

- Biome representation (terrestrial, freshwater, marine, and transitional ecosystems like wetlands).
- State or condition (species extinction risk, ecosystem integrity).
- Trends (forest cover loss, land degradation, pollution, or water stress projections).
- Pressures (pollution, land-use change, overexploitation).
- Ecosystem services (carbon storage, flood protection, water supply).
- Dependencies (economic reliance on nature-sensitive sectors such as agriculture or mining).
- Impacts (sectoral contributions to nature loss, e.g. deforestation drivers).
- Vulnerability (exposure to physical risks such as drought or erosion).
- Opportunities (restoration potential, unprotected Key Biodiversity Areas).

C. Policy Alignment and Interpretability

Indicators should align with relevant policy goals (such as NBSAPs) and reporting frameworks (e.g. TNFD) while staying easy to interpret for both governments and financial institutions. When indicators align with policy frameworks, it becomes easier for financial institutions and sovereign issuers to engage meaningfully – and to refine or challenge the indicators when needed.

D. Data Accessibility and Feasibility

To ensure indicators can be replicated and applied over time, they should ideally:

- Be available across a wide range of countries;
- Use transparent, peer-reviewed, and verifiable methods;
- Derive from public or open-access sources;
- Require reasonable technical capacity to apply and interpret.

E. Indicators assessment principles

Investors can assess indicators against the following questions:

- **Clarity**: Does the indicator clearly represent the characteristic?
- **Sensitivity**: Can it detect meaningful changes over time or policy influence?
- **Comparability**: Does it allow for consistent cross-country analysis?
- **Timeliness**: Is it updated frequently enough to reflect recent changes?
- **Granularity**: Is the scale or resolution appropriate for national-level use?
- **Credibility**: Is the source scientifically robust and widely accepted?
- **Transparency**: Are the calculation methods and assumptions disclosed?

2. Principles for Data Point Selection

Alongside indicator design, the selection of data points must be carefully considered in order to ensure robustness. Users should apply the following principles:

A. Coverage and Scope

- Ensure full geographic coverage within a country: in order to capture the full picture of a country's ecological profile, it is necessary to ensure that the whole scope of its territory is captured including overseas territories. In the case where the data is not available for the entirety of it, gaps should be documented and limitations acknowledged.
- Ensure full geographic coverage in between countries: In order to limit the biases that can be induced by the lack of information coming from one country compared to another, a first analysis of the scope of countries covered by the data point/dataset is essential and the coverage on the investment universe should be taken into account when arbitrating on the data point to select.
- Prefer datasets with long-term historical series: Accessing historical information enables the use of trends and captures the progress made by a country on nature through its changes in policies and practices.

B. Data Quality and Methodological Robustness

- **Use data points with clear definitions, consistent units and standardized measurement methods across all countries:** in order to ensure comparability, the data points used must have been computed consistently in between the different countries; ideally following a protocol. Alignment with globally recognised protocols facilitates comparability.
- **Require transparent methodologies and documented changes throughout time:** Both methodologies and limitations should be documented, especially if changes occur throughout time in order to reflect it in the analysis.
- **Prefer peer-reviewed or independently validated datasets:** Widely reviewed data, ideally by independent parties, is more likely to be scientifically robust.
- **Select datasets updated regularly and predictably:** Prefer sources with long-term continuity.
- **Be mindful of the delayed reporting:** Some data reported on a specific year may contain information that has been collected and measured several months or years prior. Remaining mindful of this time delay by coupling the information with news, events or changes that occurred between the measure and the time of reporting may allow the investor to have a more precise view on the information.

C. Bias Detection and Mitigation

- **Check for over-representation:** Due to the reporting cost and maturity, certain regions or countries with different income levels might be over-represented in some datasets involving missing data that might be challenging to deal with.
- **Avoid indicators overly dependent on reporting capacity:** Reporting capacity may vary from one country to another; not relying on resources-intensive data points in terms of reporting may help to limit the bias in favour of countries with more reporting capacity.
- **Include non-English sources where relevant:** Some countries report in their national language; while AI and translation is allowing these sources to be interpreted; not limiting the scope of the data used to English sources only might allow broadening the analysis and limit missing data.

D. Handling Qualitative and Contextual Information

- **Ensure transparent and replicable assessment approach:** In order to impartially replicate the assessment process, the data point used must present the same level of information for each country.
- **Validate against multiple sources:** When possible, qualitative data benefits being cross-checked among different sources to limit the risk of interpretation.
- Account for initial **natural capital baselines.**
- **Normalise data** (per capita, per GDP, per km^2) to avoid size/income bias.
- **Account for socio-economic history** when doing cross-country comparisons, especially when selecting baseline years

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