



Aligning Development
Finance with Nature's Needs

Estimating the nature-related risks of development bank investments

October 2021

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About this report

This report is an updated and expanded version of the one released in November 2020 ahead of the inaugural Finance in Common Summit. It uses readily available data to estimate the dependency of development banks' balance sheets on vulnerable nature ('dependency risk'), alongside the potential damage to nature from their lending activities ('nature at risk'). Using portfolio data from 12 key development banks, we estimate 'dependency risk' and 'nature at risk' using publicly available information on their lending activities. The results are scaled up to reflect the total value of assets held by public development banks (PDBs) globally. We also summarise the combined nature risk exposure of 11 shareholder countries. The application of this methodology shows that any financial institution can make a credible, first-pass, biodiversity-related stress test of its balance sheet.

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With thanks to our partners on this report:



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About Finance for Biodiversity

F4B's goal is to increase the materiality of biodiversity in financial decision-making and so better align global finance with nature conservation and restoration.

Our work on Development Finance draws from the entirety of our portfolio, which is organised across five workstreams:

- | **Market efficiency and innovation:** including a leadership role in the Taskforce on Nature-related Financial Disclosures (TNFD), and support to a number of data and fintech-linked initiatives.
- | **Enhanced liability:** focusing on extending the legal liabilities of financial institutions for biodiversity outcomes, such as extended use of anti-money laundering rules.
- | **Citizen engagement:** public advocacy and campaigning, and advancing digital approaches to catalysing shifts in citizens' financing behaviour.
- | **Public finance:** advancing measures and advocacy linked to stimulus and recovery spending, and the place of nature in sovereign debt markets.
- | **Nature markets:** catalysing nature markets by developing new revenue streams and robust governance innovations, including the governance of voluntary carbon markets.

F4B has been established with support from the MAVA Foundation, which has a mission to conserve biodiversity for the benefit of people and nature. F4B's work benefits from partnership with, and support from, the Children's Investment Fund Foundation (CIFF) and the Gordon and Betty Moore Foundation.

For more information and publications, visit www.F4B-initiative.net



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Executive summary

The purpose of public development banks (PDBs) is to facilitate sustainable development.

Globally, there are more than 450 PDBs, which collectively invest about US\$2.3 trillion annually, and manage US\$11.6¹ trillion in assets. Almost all are accountable to one or several governments, and ultimately the citizens of those governments. Given their substantial financial firepower and influence, PDBs have a responsibility to progress towards sustainable development goals both through their own lending, and through leading by example to achieve wider financial system change.

Nature has intrinsic value, and supplies vital goods and services to people, sustains the quality of the air and the quantity and quality of our fresh water and soils, balances an equable climate, pollinates, controls pests, and reduces the impact of natural hazards.

These ecosystem services are the foundation for human life and are deteriorating rapidly. PDBs need to protect nature if they are to fulfil their core purpose of sustainable development.

PDBs that finance activities that depend on nature or that damage nature are exposing themselves to nature-related risks and may not be fulfilling their sustainable development purpose.

Where PDB activities depend on nature which is already vulnerable, they are exposed to 'dependency risk'. Where PDBs endanger nature, they create a cost to society by placing 'nature at risk', and may undermine environmental legislation, exposing themselves to the risk of litigation and reputational damage.

Finance for Biodiversity Initiative (F4B) estimates the 'dependency risk' of all PDBs worldwide today at US\$4.6 trillion (or 40% of their total assets).

See Figure 1 below. This estimate aligns with other estimates of dependency risk, such as the one from the Dutch Central Bank (De Nederlandsche Bank) which outlined that ~36% of the assets analysed had exposure to biodiversity risks², or the estimate from the French Central Bank (Banque de France), which found that 42% of the value of securities held by French financial institutions comes from issuers that are highly or very highly dependent on one or more ecosystem services.³

In addition, F4B estimates the 'nature at risk' due to PDB lending activities at US\$800 billion annually (representing ~\$0.07 per \$1 invested).

This is based on the value of the potential damage to nature resulting from deforestation and water use if PDB investments are carried out without effective safeguards to mitigate such harm.

Finance for Biodiversity (F4B) estimates the "dependency risk" of all PDBs worldwide today at US\$4.6 trillion (on average 40% of their assets). See Figure 1 below.

We estimate the "nature at risk" due to PDB lending activities at US\$800 billion annually (representing ~\$0.07 per \$1 of investment).

When accounting for other environmental impacts, the above figure for 'nature at risk' could increase by a factor of two or more (to \$0.14 per \$1 invested, or more).

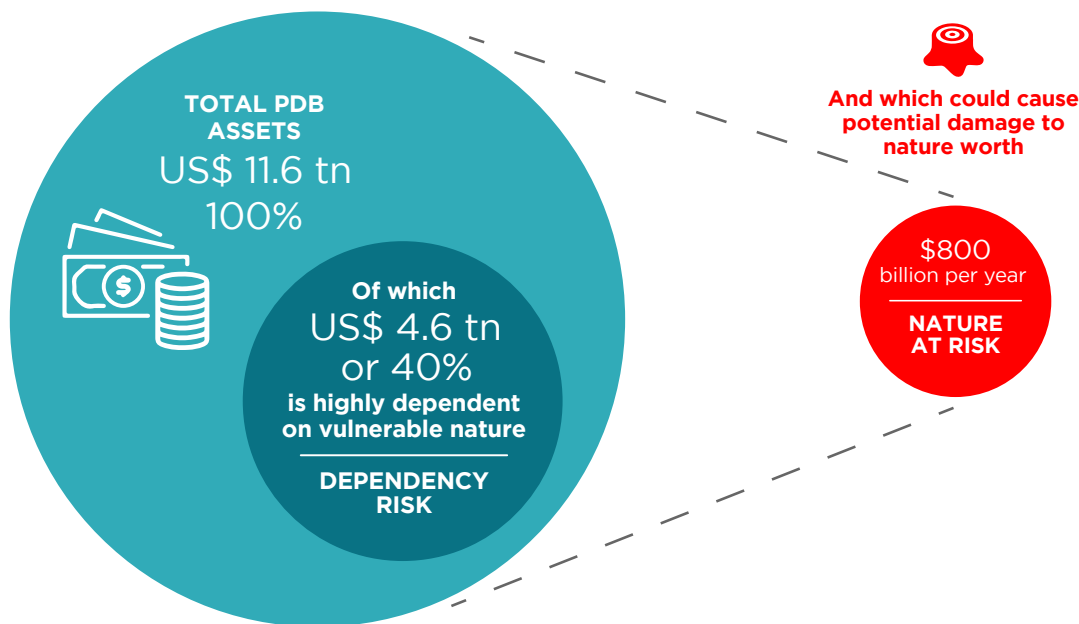
Environmental impacts that are beyond the scope of this paper include: greenhouse gas emissions, air pollution, waste, natural resource exploitation, and habitat loss from sources other than deforestation. PDBs should consider the full range of environmental risks as part of their commitments to climate and nature.

These biodiversity-related risk estimates are leading indicators of financial risk.

The estimates reflect how PDB lending is weighted towards resource-intensive countries with high levels of biodiversity and relatively weak regulation, where negative impacts are most likely, and nature is most vulnerable. This creates significant expected risk to PDB balance sheets. In parallel, impacts imposed on nature itself could undermine development.

The magnitude of the estimate shows that it warrants consideration by PDBs and their shareholders. Within these aggregated results, some PDBs will have greater impact and exposure, and some less.

Figure 1 | Total PDB assets, dependency risk and nature at risk



Source: Basic Roots, Vivid Economics

Note: Dependency risk is defined as the aggregate value of assets that are held in sectors considered highly dependent on nature, and in countries considered highly vulnerable to the deterioration of nature. Nature at risk is defined as the expected value of the damage to nature from lending activities without effective measures to mitigate harm to nature.

PDBs have the ability to reduce their dependence on, and mitigate any risks to, vulnerable nature, and increase their investments in nature-based solutions. PDBs today employ only a limited range of environmental safeguards, in the form of a checklist of harms they should avoid. PDBs need to first better understand the nature-related risks in their portfolios, including their impacts and dependencies on nature. With this, they can transparently and systematically measure, report and manage them.

Impact and risk governance, including public reporting, are two of several changes that would transform the financial sector’s relationship with nature. In F4B’s publication, *‘Aligning Global Finance with Nature’s Needs: A Framework for Systemic Change’*, we identify six areas of change, each underpinned by ambitious and actionable recommendations. PDBs have a vital role to play in this framework. When the financial sector systematically reports nature-related impacts and risks, it will, once stakeholders become accustomed to the idea, receive support from owners, investors and investees to behave sustainably. PDBs could lead in this area, showing private financial institutions that existing data and methods already allow such reporting.

PDBs can support the Taskforce on Nature-related Financial Disclosures (TNFD) in developing and building consensus around a cohesive framework for reporting on nature-related risks⁴. The TNFD, launched in June 2021, will draw together inputs across a wide range of stakeholders including the scientific community, data providers, corporates, and private and public financial institutions. In particular, the TNFD and the French Development Agency (AFD) have convened a Development Finance Hub, which will allow experts to share their considerable experience with peers.⁵ By participating in the efforts of the TNFD and the International Development Finance Club (IDFC)⁶, PDBs can quickly accelerate their stewardship efforts and lead the discussion on nature, by assessing their own balance sheet risks and then engaging through the TNFD to help transfer their learnings to the private sector.

There is an important role for the shareholders of PDBs (primarily G7/G20 country governments) to play, by holding these PDBs to account.

G7 country governments own 40% or more of the shares in the seven largest multilateral development banks, and G20 countries collectively have more than 50% of the shares in 26 of the largest PDBs. G7/G20 governments could take action

through their representatives on the Boards of PDBs, where they can demand assessments of nature-related risks, enhanced environmental safeguards, and commitments to invest in nature positive activities such as nature-based solutions. A companion paper published by F4B provides further data on how voting power is distributed among PDB shareholder countries, and how these shareholders can influence PDBs.⁷

We urge every PDB, within the next year, to publish a whole balance sheet stress test of nature-related financial risks and impacts.

F4B is advancing the methodology and data to do this, in part through its support of the TNFD. F4B is ready to engage with and support PDBs through the stress test process, by providing a framework to evaluate their balance sheets, highlighting potential red flag investments, developing key governance metrics around nature, and helping create an overall strategy around navigating nature-related risks. The box below provides a series of actions that PDBs can immediately take towards this. Now is the time for PDBs to step up and take a leading, progressive role in making systemic change.

An indicative pathway towards managing nature-related risks

1. COMMIT TO UNDERTAKING AN INITIAL NATURE-RELATED STRESS TEST OF THEIR BALANCE SHEETS

- a. Use existing data sources to identify regions with high nature risk and sectors with high nature dependency
- b. Estimate potential losses/impairments building from the methodology presented in this report
- c. Identify plan to improve sophistication of approach over time including data collection

2. PROGRESS DISCUSSION AT BOARD-LEVEL AND WITH SHAREHOLDER GOVERNMENTS

- a. Bring discussion of nature and nature-related risk to board and shareholder fora - focus on nature to match focus on climate
- b. Update the strategy, investment policy and funding objectives to account for outcome of board discussions on nature

3. ENGAGE WITH PEERS AND INDUSTRY GROUPS

- a. Support the Taskforce for Nature-related Financial Disclosures (TNFD) in the development of its framework
- b. Participate in the International Development Finance Club (IDFC) working group on biodiversity
- c. Attend the Finance in Common summit and help promote collaboration on nature-related risks

4. STRENGTHEN ENVIRONMENTAL SAFEGUARDS

- a. Update safeguards to include biodiversity and ecosystem services where required
- b. Publish environmental impact assessments if not done so already

Estimating the nature-related risks of PDB investments

Aligning Development Finance with Nature's Needs

Introduction

This report is an updated and expanded version of the first issue released in November 2020 ahead of the inaugural Finance in Common Summit. Our approach entails evaluating, in detail, dependency risk and nature at risk values for a representative sample set of PDBs. This is then scaled to reach the total value of assets held by PDBs globally. Compared to our initial release from 2020, this version analyses data from more PDBs, uses more granular project-level data, and incorporates a new database of public development banks.

PDBs manage a substantial capital base and exert considerable influence over global finance. Globally, there are over 450 PDBs, with an aggregate US\$11.6 trillion balance sheet, which is the total value of their lending to companies today. They invest about US\$2.3 trillion annually. About US\$160 billion of this is Overseas Development Assistance (ODA), and Organisation for Economic Co-operation and Development (OECD) data shows that ~US\$7 billion⁹ of this ODA, or less than 0.5% of their total annual spending, supports activities that directly lead to biodiversity conservation and restoration.⁹

PDBs are public banks, accountable to governments, and their purpose is to facilitate sustainable development. The term Public Development Bank¹⁰ encompasses a range of institutions with government shareholding, including multilateral, bilateral, national, and sub-national development banks. These banks have public policy-oriented mandates (as opposed to commercial mandates), and deploy financial instruments such as loans, equity, or guarantees (as distinguished from grant-making agencies). A subset of PDBs focused on private sector lending are also known as Development Finance Institutions, or DFIs. The conclusions of this research are relevant to DFIs as well as PDBs.

PDBs have a particular responsibility to drive change in financial markets for the public good. With their ties to governments and substantial financial firepower, they wield great influence and convening clout. They have a responsibility to lead change in private finance towards sustainable outcomes, driving wider value for citizens.

The example of climate action demonstrates the potential for change. Asset owners and managers have put pressure on banks, which in turn have put pressure on their debtors, to reduce their climate impact.

Last year, Boston-based State Street joined a shareholder proposal asking JPMorgan to report on how it plans to reduce greenhouse gas (GHG) emissions associated with its lending business in alignment with the Paris Accord. As banks have drawn fire from asset managers, the banks have in turn begun to put pressure on oil and gas companies to accelerate their renewable energy strategies. We now see the same effect with biodiversity. Last year, asset managers representing over US\$3 trillion wrote to the Brazilian government urging it to uphold the Soy Deforestation Pact to help safeguard investments against deforestation risk.¹¹ In October 2020, the world's biggest asset manager, BlackRock, joined a shareholder revolt, demanding that the world's biggest consumer goods corporation, Procter & Gamble, specifically measure and report its impact on forests.

Ultimately, financial institutions need to consider climate and nature risks in parallel, particularly in sectors such as agriculture, fisheries, and forestry. A recent F4B publication on the 'Climate-Nature Nexus' explains how current climate frameworks can be adapted to capture nature risks and opportunities.¹² If institutions ignore nature, it is less likely that they will be able to solve climate change.

Current and upcoming regulation will accelerate the need to improve disclosure of nature-related risks.

As part of the European Commission's 2018 Action Plan for financing sustainable growth, the Commission introduced the Sustainable Finance Disclosure Regulation¹³. The regulation calls for a legal framework on sustainable corporate governance, including cross-sector corporate due diligence obligations along global supply chains. This means that financial institutions will have to report sustainability-related risks in their portfolios, outline principal adverse impacts of the financing provided by them, and highlight sustainable investments in economic activities that contribute to environmental or social objectives. Forms of such a due diligence obligation are already under legislative debate in both the EU and the UK¹⁴. With that background, our view is that the private sector is likely to require guidance in terms of assessing biodiversity-related dependencies and risks, and PDBs could play a leading role by adopting and developing frameworks that enable such assessment.

PDBs have a core responsibility to fulfil their mandate of sustainable development, to protect nature today, and to prevent damage to nature in the future.

Humanity depends on biodiversity and ecosystem services which sustain the quality of the air, fresh water and soils, distribute fresh water, regulate the climate, provide pollination and pest control, and reduce the impact of natural hazards. These services are the foundation of sustainable development. Biodiversity is declining at an unprecedented rate, however, and the pressures driving this decline are intensifying.¹⁵ The World Economic Forum (WEF) estimates that US\$44 trillion, over half of global GDP, is moderately or highly dependent on nature and its services.¹⁶ The Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) has highlighted how nature-based strategies to prevent future pandemics such as COVID-19 are likely to cost US\$20-30 billion; two orders of magnitude less than the damages pandemics produce.¹⁷ PDBs have a responsibility to manage these nature-related risks.

With the private sector looking for leadership, now is the time for the PDB community to step up and lead systemic change.

Under the Finance for Biodiversity Pledge, 75 financial institutions, including household names such as AXA and HSBC, representing over €12 trillion of assets under management, committed to assess the impact of their financing operations on biodiversity, to set targets, and to report progress publicly. The Taskforce for Nature-related Financial Disclosures (TNFD), which launched in June 2021, will develop and build consensus around a cohesive framework for reporting on nature-related risks. In particular, the TNFD and the French Development Agency (AFD) have convened a Development Finance Hub, which will draw on the experience of Finance in Common (FiC), the International Development Finance Club (IDFC) and the Network of Central Banks and Supervisors for Greening the Financial System (NGFS)¹⁸. The early engagement of PDBs through the TNFD will help build out the infrastructure and practices that can then be adopted at scale by a range of public and private institutions.

In addition to playing a leadership role through the TNFD, PDBs can also look to their peers for examples of biodiversity safeguards and strategies.

Institutions like International Finance Corporation (IFC) and the European Bank for Reconstruction and Development (EBRD) have developed performance standards that can serve as a model for other PDBs (see Box 1 below).¹⁹

Moving beyond safeguards, PDBs should also look at “mainstreaming” nature as part of their strategies, by “embedding nature into their analysis, policy dialogue and operations”, as recommended by the G7 Nature Compact²⁰.

Examples of early steps in this regard taken by some PDBs include publishing biodiversity strategies (AFD), valuation of natural capital (EBRD), developing new financing models (ADB), allocating climate funding to benefit biodiversity (AFD), and investing in conservation projects (KfW). Additional examples are discussed in a benchmarking report published by the International Development Finance Club (IDFC).²¹

The objective of this report is to demonstrate that PDBs can and should perform a stress test of the nature-related risks and impacts on their balance sheets today.

This report employs an approach exclusively and deliberately using readily available data. We prioritise applicability over granularity, distinguishing our methodology from others offered in the space such as the Biodiversity Footprint for Financial Institutions (BFFI). Our work demonstrates the feasibility of undertaking stress tests.

In the sections that follow, we cover the following:

- **Main findings**
- **Conclusions and recommendations**
- **Methodology**

Box 1. IFC and EBRD performance standards on biodiversity

Development banks such as the World Bank Group International Finance Corporation (IFC) and the European Bank for Reconstruction and Development (EBRD) make investment conditional on procedures which safeguard biodiversity. The IFC and EBRD formally recognise the importance of biodiversity and sustainable management of living natural resources in their respective Sustainability Framework and Environmental and Social Policy. Both specify a set of standards or requirements which require clients to identify, mitigate and manage social and environmental risks for projects receiving direct funding, including risks to biodiversity, ecosystem services and living natural resources.

Specifically, the IFC's Performance Standard 6 (PS6) and EBRD's Performance Requirement (PR6) provide detailed guidance to avoid or reduce adverse impacts on biodiversity and living natural resources.

The former specifies three objectives: "to protect and conserve biodiversity; to maintain the benefits from ecosystem services; [and] to promote the sustainable management of living natural resources through the adoption of practices that integrate conservation needs and development priorities." Towards these ends, PS6 requires clients to assess the direct, indirect and residual risks to biodiversity in the initial risk-screening process, and to avoid or minimise adverse impacts on biodiversity where risks have been identified. The EBRD's PR6 establishes similar objectives and risk-screening processes. Both PS6 and PR6 limit project activity in natural and critical habitats, or where significant, adverse and irreversible impacts are identified, to circumstances where there is no other feasible alternative. In such cases, PS6 and PR6 mandate long-term monitoring and evaluation of biodiversity and zero net losses via biodiversity offsets.

Findings

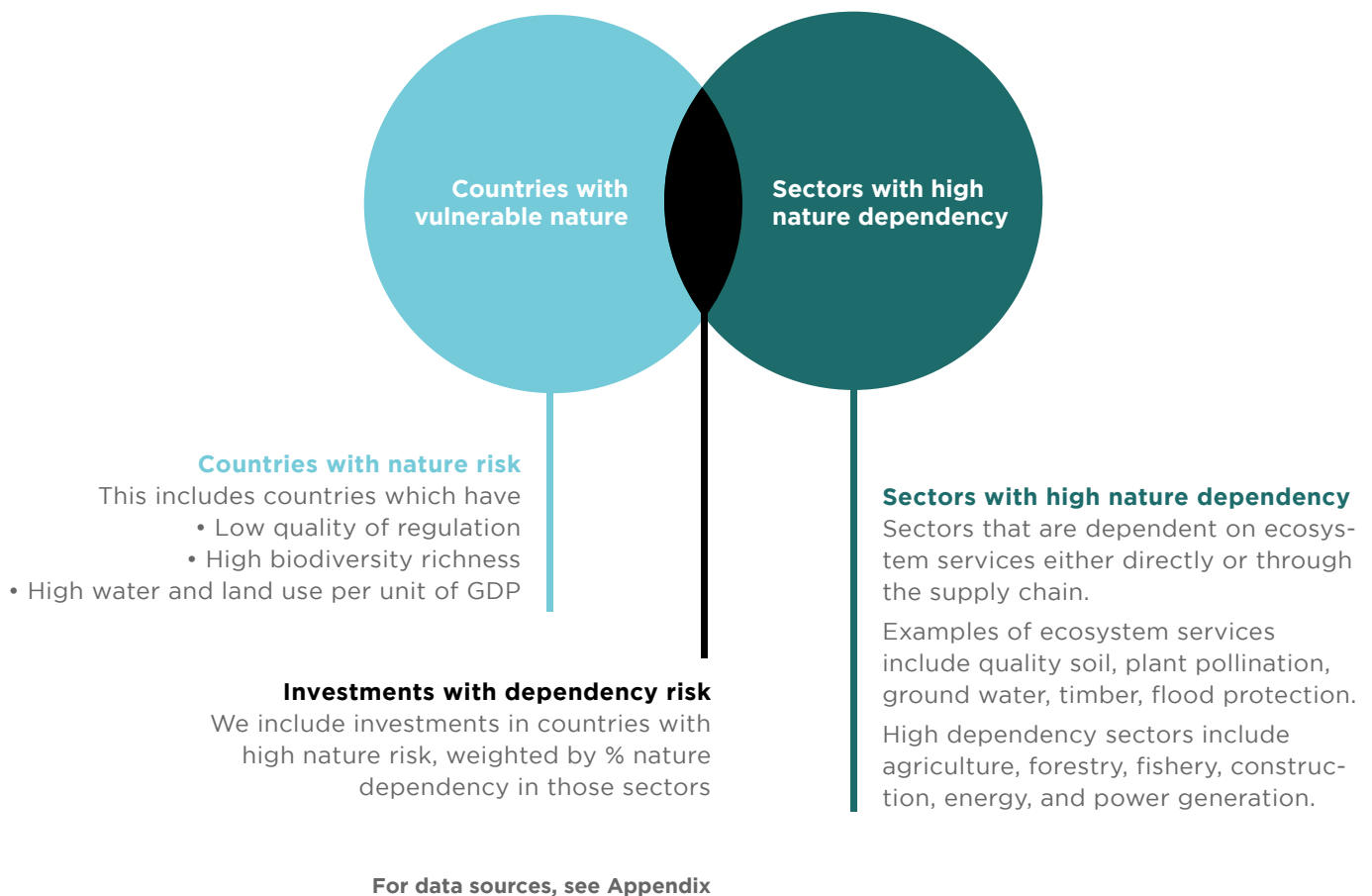
Scope of analysis

Using portfolio data reported by PDBs and other readily available data, we assess two distinct ways in which PDBs' balance sheets are linked to nature:

DEPENDENCY RISK

Dependency risk represents the global PDB asset base that is highly dependent on nature in vulnerable countries.²² Almost all businesses are in some way dependent on nature and ecosystem services. For example, fishers rely on healthy stocks of fish; apple growers rely on wild pollinating bees; and the pharmaceutical industry relies on natural substances for the development of new drugs. If these ecosystem services are lost, businesses will suffer. Figure 2 describes how investments with dependency risk are identified in this paper.

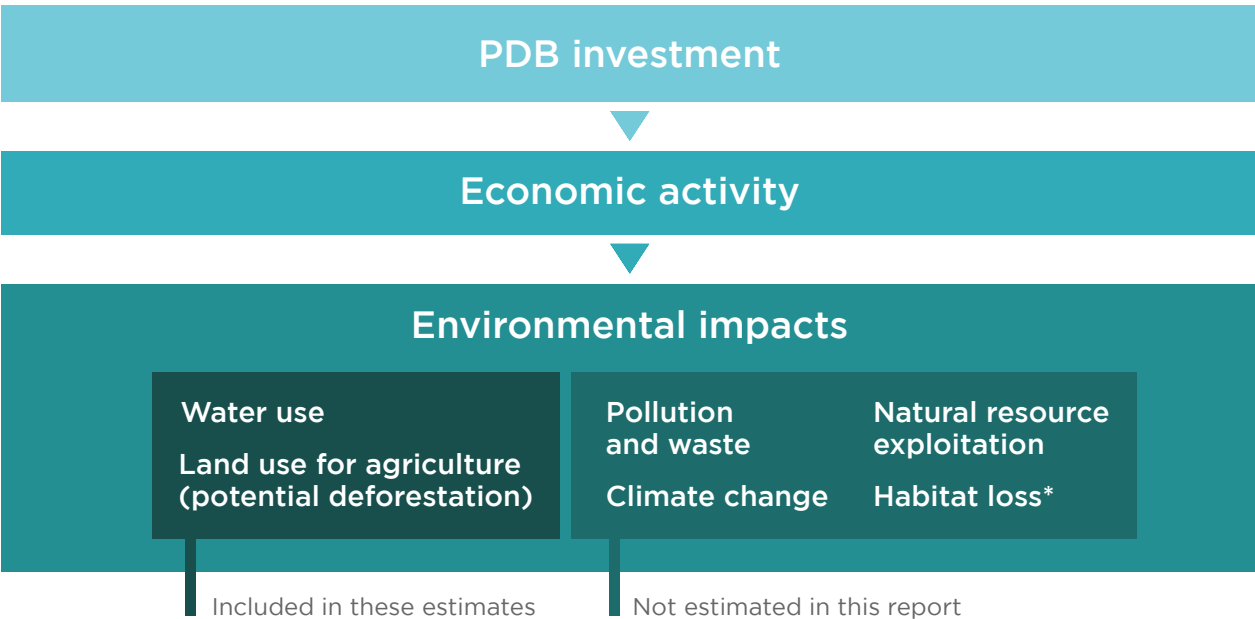
Figure 2 | Assessing dependency risk



NATURE RISK

Nature at risk represents the expected cost to society of the potential damage to nature that the activities the global PDB asset base finances could cause.²³ Some businesses damage nature, for example, by converting tropical rainforest into farmland to produce traded commodities such as palm oil, soya and beef. This damage to nature reduces the supply of essential ecosystem services to society. In our analysis, we do not include direct emissions of GHGs or air pollutants from business processes.²⁴

Figure 3 | Assessing nature at risk



*These estimates for nature at risk do account for habitat loss due to deforestation caused by agriculture. However, habitat loss due to land development, water development, pollution, or climate change is not estimated in this report.

Source: Basic Roots, Vivid Economics

Our analysis draws on portfolio data from 12 PDBs and we analyse a sample set that represents US\$2 trillion in assets. This is combined with a database of public development banks from Finance in Common³², to estimate the impact of all U\$11.6 trillion of global development bank assets. The methodology is detailed in the Appendix.

Global Results

Overall, the analysis suggests a total dependency risk of US\$4.6 trillion (40% of global PDB assets, which are US\$11.6 trillion). The data also estimates an aggregate nature at risk value of US\$800 billion per year, of which approximately two thirds or ~US\$550 billion is driven by water consumption and one third or ~US\$250 billion is linked to deforestation.

The main findings are as follows:

- PDB investments and loans are materially dependent on nature and put nature at risk. Yet PDBs do not currently report on dependency risk or nature at risk (or any other forms of nature-related risks)

- Some sectors are inherently more dependent on nature. Key sectors where PDBs invest, and which are more dependent on nature, include agriculture, utilities, and infrastructure construction. In the same vein, agriculture and utilities are large contributors to land use change and water consumption, driving up the estimates for nature at risk.

- Furthermore, some PDBs may be disproportionately exposed to high-risk sectors as a function of their lending mandates, their geographic focus, and overall portfolio allocation. For example, PDBs focused on Asia and Africa have higher dependency risk compared to European peers, as countries in those regions have the highest dependence on nature, where nature is most vulnerable, and where highly dependent sectors such as agriculture require low cost PDB funding to sustain themselves.

With respect to dependency risk, the global figure of US\$4.6 trillion or 40% of the global PDB asset base, can be attributed to the fact that some sectors financed by PDBs are highly dependent on nature, and are in countries where nature is vulnerable. PDBs often lend to sectors that directly rely on natural resources, such as agriculture, infrastructure construction, and utilities. Moreover, their portfolios may be disproportionately weighted to natural resource-intensive developing countries, with potentially abundant biodiversity, and relatively weak or ineffective environmental regulation.

Our endeavour here is not to limit investment in regions with more vulnerable natural ecosystems and weaker regulations, as these regions also need the most economic support. Instead, PDBs can apply additional safeguards when investing in these regions. This requires a framework to measure and assess nature-related risks.

By omitting to measure dependence on vulnerable nature, PDBs would miss important early signals of future financial risk and compromise their long-term fiduciary duties to investors and society.^{25 26} There is evidence suggesting that high dependence on vulnerable assets could be linked to material financial risks in the medium-term. In June 2020, De Nederlandsche Bank (DNB) outlined that Dutch financial institutions had €510 billion of exposure to biodiversity risks, like disruption of animal pollination. This represents ~36% of the assets that were assessed by DNB.²⁷ In September 2021, Banque de France published the results of a similar exercise, which found that 42% of the value of securities held by French financial institutions comes from issuers that are highly or very highly dependent on one or more ecosystem services.²⁸

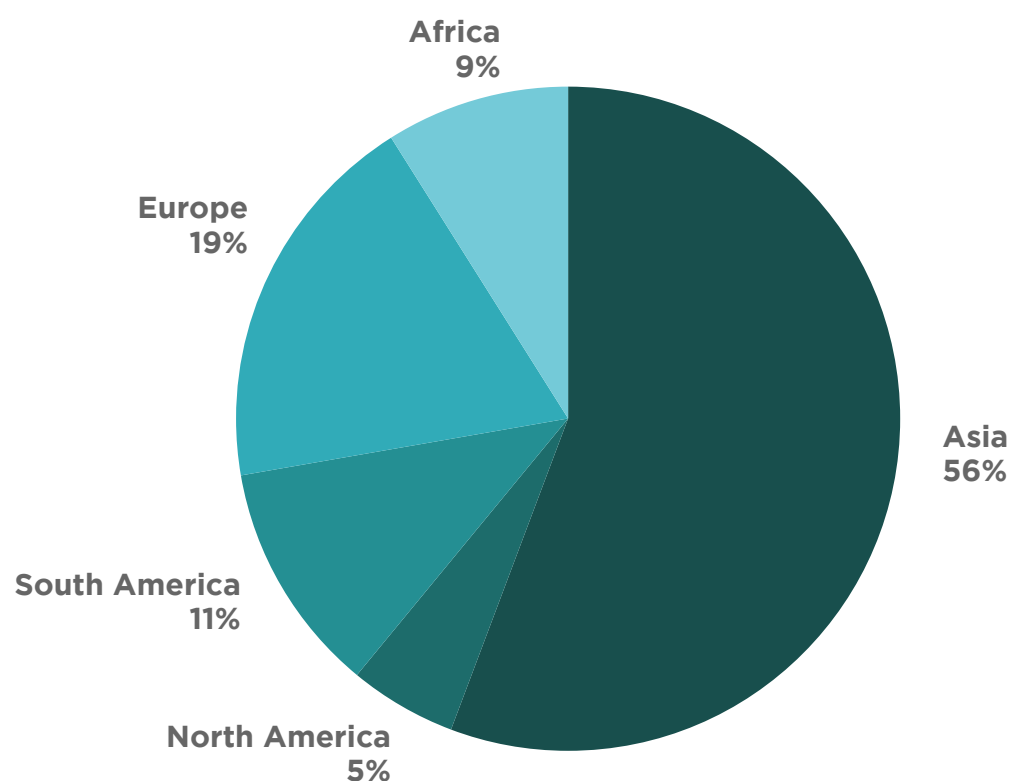
With respect to nature at risk, PDBs finance activities that cause potential damage to nature of up to US\$800 billion to society each year, of which approximately two thirds or ~US\$550 billion is driven by water consumption and one third or ~US\$250 billion is linked to deforestation. The estimates deliberately exclude greenhouse gases (GHG) emissions to keep the discussion focused on nature. As more types of adverse impacts on nature (such as GHGs and air pollutants) are added to the framework, the estimated value of nature at risk is likely to go up.

The results are based on data from a sample of 12 PDBs or an assessed asset base of US\$2 trillion and is then scaled up. Overall, some PDBs are performing better than this estimate indicates, but by implication, some PDBs are performing worse.

Sector and regional hot spots

PDB lending in Asia has the highest level of dependency risk, with US\$3.9 trillion of assets highly dependent on vulnerable nature, as shown in Figure 5. This is driven by two factors. First, 55% of PDB assets are held by banks physically located in Asia, more than in any other region, as shown in Figure 4 below. Second, nature in Asia, alongside Africa, has a higher level of vulnerability relative to other continents with less resource-intensive economies and stronger environmental regulation.

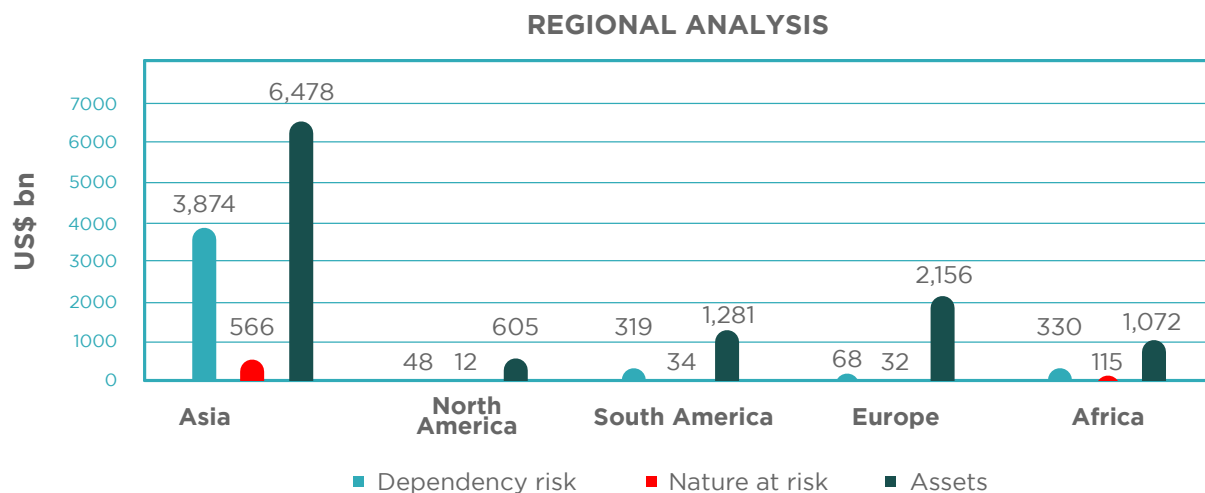
Figure 4 | Distribution of PDB assets by continent



Source: Finance in Common, Extracted from PDB Database in August 2021

Moreover, the presence of agriculture-focused PDBs such as the Agricultural Development Bank of China and the National Bank for Agriculture and Rural Development (India) which deploy their balance sheets solely on agriculture (US\$996 billion and US\$70 billion respectively), drives a higher dependency risk for Asian PDB assets. The sectors with the highest dependency risk include agriculture, fishing, electricity, gas and water, construction, and transport.

Figure 5 | Nature risks associated with PDB lending, by continent

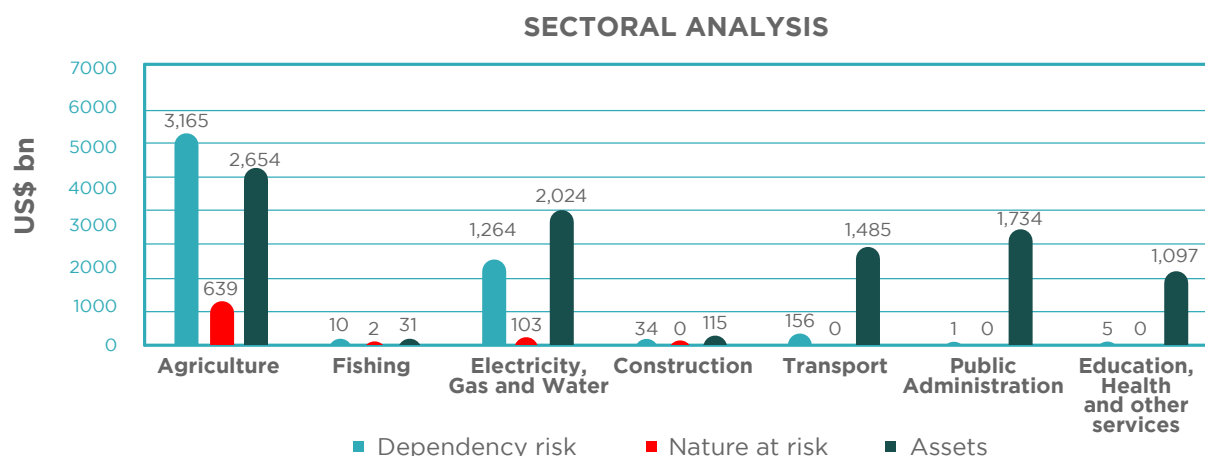


Source: Basic Roots, Vivid Economics

Lending in Asia puts the largest amount of nature at risk, at US\$562 billion. This is partly due to the volume of assets held in Asia, but is primarily driven by the fact that a large number of countries in the region have less focused regulation towards preserving biodiversity or rely on more natural inputs per \$ of economic output. Our approach to analysing this through our Country Biodiversity Risk assessment framework is explained in greater detail in the methodology section. The next highest impacts are seen in Africa, with nature at risk estimated at US\$106 billion. Deforestation, particularly in tropical ecoregions, accounts for roughly half of nature at risk in Africa, Central America and South America. In all three regions, agriculture remains the largest driver of deforestation. To put this in perspective, we estimate nature at risk per dollar of investment at \$0.09 for Asia and \$0.11 for Africa compared to \$0.03 for the Americas and \$0.02 for Europe.

As noted previously, the analysis of nature at risk is limited to water consumption and deforestation. When more adverse impacts are added to the assessment, the full impacts of sectors such as petroleum, construction, energy and water will be apparent.

Figure 6 | Nature risks associated with PDB lending, by sector



Source: Basic Roots, Vivid Economics

Split by type of development bank

Understanding PDBs

PDBs are specialised development organisations that are usually majority owned by national governments. PDBs typically invest with a view to drive economic growth and job creation, either in low- and middle-income countries, and/or in sectors that are less likely to be able to secure private capital. PDBs can be classified into three categories:

Multilaterals

are created by a group of countries to finance and advise with an overall agenda to drive development. Member countries can include both donor countries as well as borrowing countries. Examples include the World Bank, Asian Development Bank (ADB), African Development Bank (ADF) and Inter-American Development Bank (IDB).

Bilaterals

are typically set up by an individual country to finance development projects in emerging economies. Examples include the French Development Agency (AFD), Netherlands Development Finance Company (FMO) and the CDC Group (UK).

National

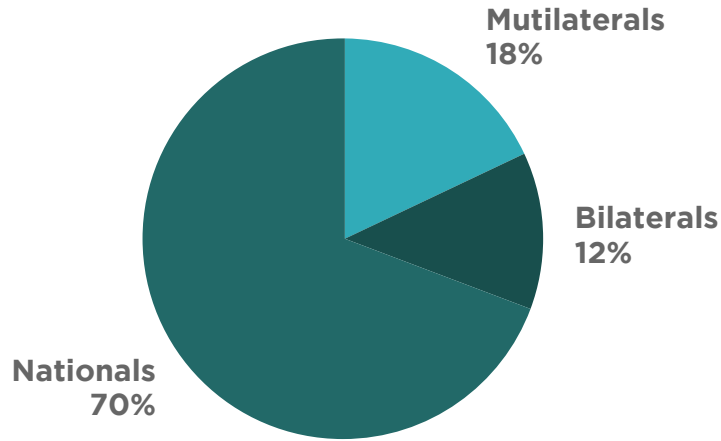
development banks are created by a government to finance projects within its own territory, with funding decisions driven by a development agenda. Examples include the Agricultural Development Bank of China, National Bank for Agriculture and Rural Development (India) and Brazilian Development Bank (BNDES).

More than two thirds (70%) of assets are held by national institutions, 18% by multilaterals and 12% by bilaterals. This is important because the sector distribution varies significantly by type of PDB, which also impacts dependency risk and nature at risk estimates. For example, national development banks can focus on sectors like agriculture, which have high nature dependency and risks.

Figure 7

Distribution of assets by type of development bank

GLOBAL PDB ASSET DISTRIBUTION BY INSTITUTION TYPE

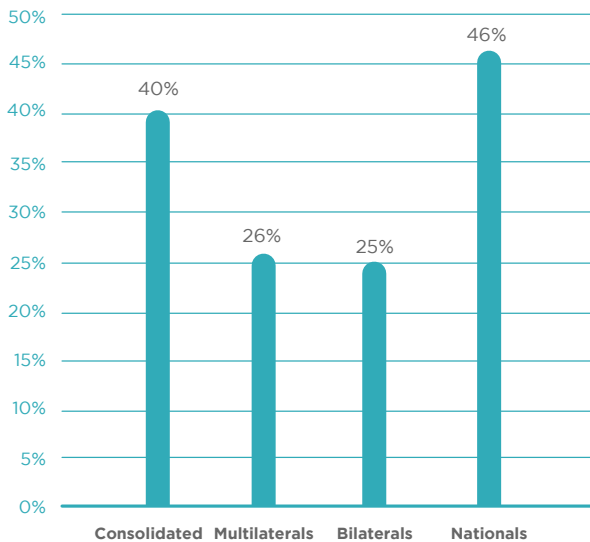


Source: Finance in Common

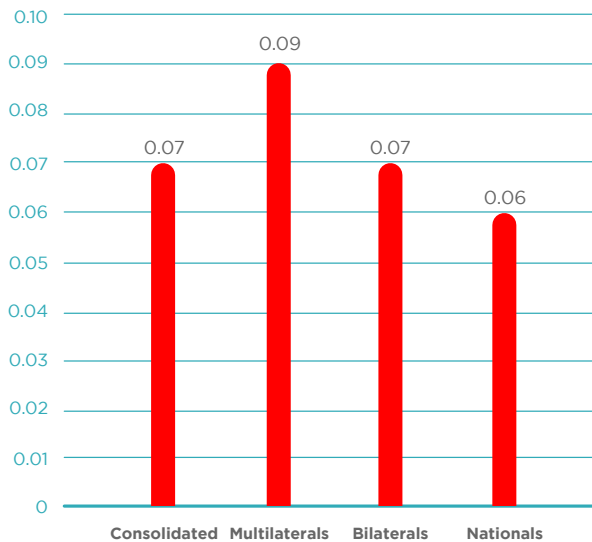
Dependency risk and nature at risk numbers vary by type of PDB as outlined in Figure 8 below. Dependency risks for multilaterals, bilaterals and nationals are estimated to be 26%, 25% and 46% respectively. A list of PDBs that we analysed is included in the Appendix.

Figure 8

Dependency Risk
(As a % of Asset Base)



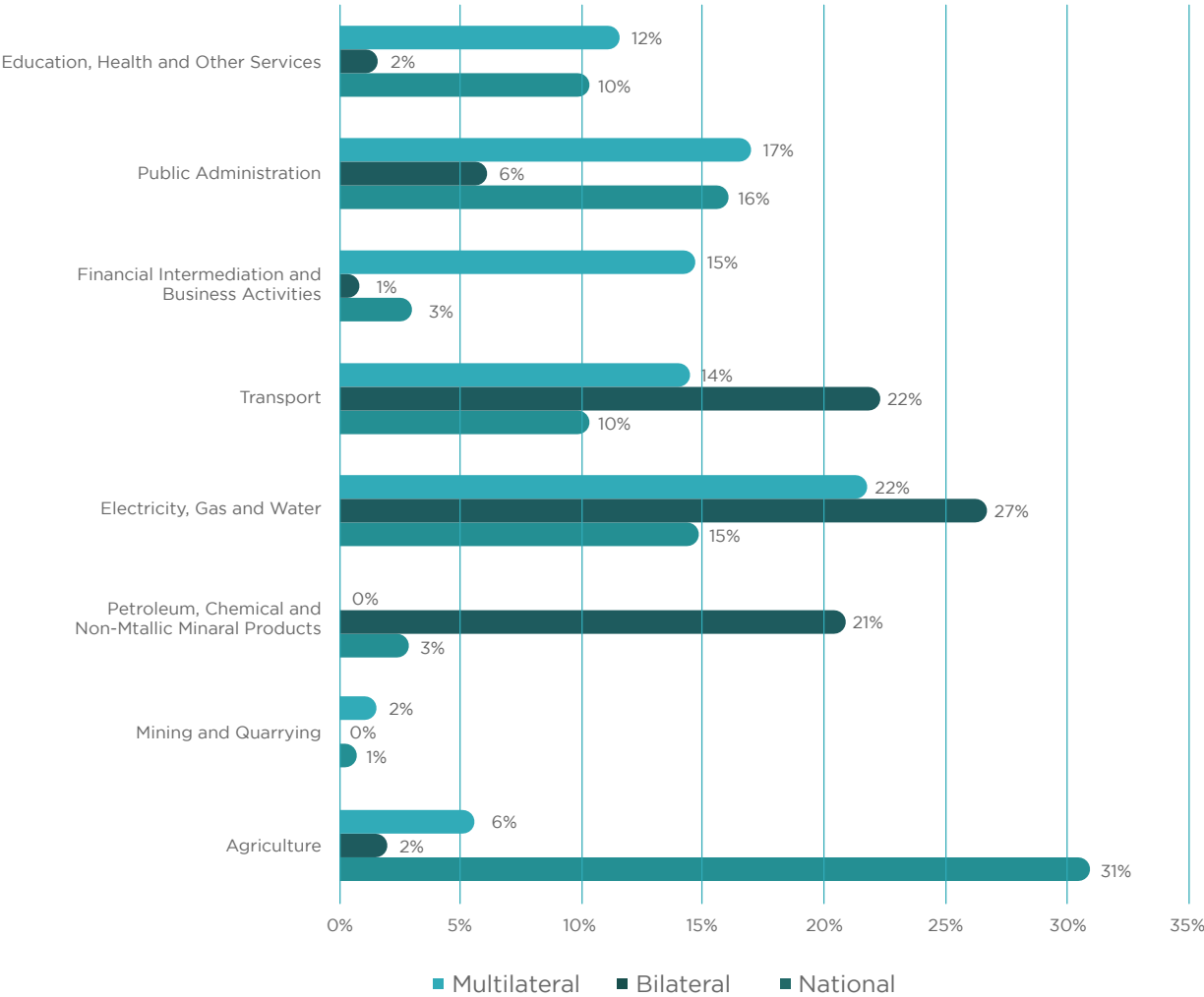
Nature at Risk
(cents per dollar invested)



Source: Basic Roots, Vivid Economics

This is largely driven by the differences in sectoral allocation by each type of PDB, as shown in figure 9 below.

Figure 9 | Portfolio allocation by sector, by type of PDB



Source: Basic Roots, Vivid Economics

Here are some emerging insights from this analysis:

- Focus sectors for multilaterals include electricity, gas and water, public administration, financial intermediation, and transport. Of these, electricity, gas and water have a high dependency on nature. A further breakdown of dependency by sector is included in the methodology appendix.
- Multilaterals do not always deploy capital in an underlying sector directly. Sometimes, they rely on financial intermediation, supplying capital to local banks who further distribute it. These portfolios managed by intermediaries need to be assessed separately to best understand their impacts.
- Nationals tend to focus on sectors such as agriculture, public administration, education, health, electricity, gas and water. These sectors are critical to economic growth and development. For example, the Agricultural Development Bank of China is primarily focused on financing agriculture. Similarly, the Rural Electrification Corporation (India), is focused on supporting access to electricity in less developed parts of the country. Agriculture, electricity, gas and water all have a high dependency on nature.
- Bilateral banks tend to finance sectors such as petroleum, transport, electricity, gas, and water. Of these, electricity, gas and water have the highest dependency on nature.
- The higher values of nature at risk among multilaterals and national development banks are primarily driven by greater exposure to agriculture and utilities.
- These estimates for nature at risk do not include the full range of adverse impacts on nature (for example, the impact of GHG emissions on nature loss), which means that they underestimate impacts for certain sectors like petroleum, electricity, and construction. Bilaterals, in particular, have a high exposure to petroleum and associated industries. PDBs should, however, also consider climate impacts when evaluating their balance sheets.

At a global scale, dependency and impacts are two sides of the same coin: one firm's damage to nature can lead to financial loss for another firm due to its dependency on nature. In this sense, the scale of dependency risk seen across the PDB portfolio demonstrates the need for PDBs not only to mitigate their own potential damage to nature, but also to play a leadership role in helping other financial institutions to do the same. Destruction of nature poses a system-wide risk to financial stability, so it is in every business and financial institution's interest to support others to reduce their impacts on nature, and challenge those that do not.

The role of shareholders and their exposure to nature-related risks

The nature-related risks described above exist not only on PDB balance sheets, but they also cascade to the shareholders of these PDBs. This section examines the role of governments as shareholders, and estimates the dependency risk and nature at risk associated with their shareholding in 12 PDBs. It considers 11 countries including the G7, Brazil, Russia, India, and China.

These estimates are based on the proportion of shares held by each shareholder country in 12 PDBs. For example, given Canada’s 5.2% shareholding in Asian Development Bank (ADB), we attribute 5.2% of ADB’s dependency risk to Canada. These figures are underestimates because they do not include every country’s bilateral and national development banks.

As shown in Table 1, based on their shareholding in six MDBs and three bilaterals, G7 countries have a combined US\$114 billion of dependency risk and US\$43 billion of nature at risk. When including additional countries from the G20, China and India have the highest dependency risk, whereas India has the highest nature at risk. This is primarily because of greater focus on sectors such as agriculture in China and India’s national PDB spending.

Table 1 | Analysis of Dependency and Nature Risk by Shareholding Country for select countries (G7 + BRICs)

(All figures in US\$ bn)

Country	Assets Analysed	Dependency Risk	Nature at Risk	Key PDB Exposure
CANADA	40	9	3	ADB, AfDB, WB, IADB, EBRD, IFC
FRANCE	43	9	4	ADB, AfDB, WB, IADB, EBRD, IFC, AFD
GERMANY	53	12	4	ADB, AfDB, WB, IADB, EBRD, IFC, KfW
ITALY	32	7	3	ADB, AfDB, WB, IADB, EBRD, IFC
JAPAN	100	24	9	ADB, AfDB, WB, IADB, EBRD, IFC
UK	54	11	6	ADB, AfDB, WB, IADB, EBRD, IFC
US	188	42	14	ADB, AfDB, WB, IADB, EBRD, IFC
CHINA	3,592	2,689	317	ADB, AfDB, WB, CDB, China Exim EBRD, IFC, ADIBC
INDIA	104	68	31	ADB, AfDB, WB, EBRD, IFC, NABARD
BRAZIL	236	80	10	ADB, AfDB, WB, EBRD, IFC, NABARD
RUSSIA	67	4	1	IFC, EBRD, WB

Source: Basic Roots, Vivid Economics

The role of shareholder governments is particularly important given the high concentration of PDB assets among a few PDBs, and the high level of influence that key shareholders have in these PDBs. Out of 450+ public development banks, 28 key banks control 66% of the US\$11.6 trillion of total assets. G20 countries collectively own more than 50% of shares in 26 out of these 28 banks.²⁹ These influential shareholders have an important role to play in driving adoption of biodiversity risk assessment frameworks by PDBs and supporting relevant disclosures related to nature.

Governments can do this by exercising their powers as shareholders of PDBs. Through their appointed representatives on the boards of PDBs, they can demand nature-related disclosures and nature positive investment commitments. In some cases, small groups of three to five influential shareholders can reach 30-40% of voting power and secure nature-related commitments through their appointed Directors. Smaller shareholders without a direct voice on the Board of Directors can also engage with the Risk and Sustainability functions of these banks to demand transparency on environmental risks at the project and portfolio level. A companion paper published by F4B provides further data on how voting power is distributed among PDB shareholder countries, and how these shareholders can influence PDBs.³⁰

In addition to engaging with multilateral development banks, which control US\$2.1 trillion of assets, governments should not lose sight of their national and bilateral development banks, which control a further US\$9.3 trillion of assets globally. Governments unilaterally determine the mandates of these banks and hence, their investment policies can easily be revised to ensure they support national policy objectives related to nature and biodiversity.

How are our results different from last year?

In 2020, F4B published a first version of this analysis ahead of the inaugural Finance in Common Summit. In this updated 2021 version, we have expanded the sample set of PDBs, revised our sampling approach, and utilised updated data on the global asset base. As a result of this change in the asset data, some of the estimates have changed relative to last year, but this should not be interpreted as a change in either risk exposure or lending activities.

The approach in this year's report has been strengthened in three ways:

1

Compared to our approach in 2020 where we scaled from a sample data set of US\$300 billion of PDB assets, our updated analysis scales from a sample data set of ~US\$2 trillion. This expansion of the sample data set increases the number of PDBs we analyse from five multilateral PDBs in 2020 to 12 PDBs (multilaterals, bilaterals, and national development banks) in 2021. Please see the appendix for a list of PDBs included in our analysis.

2

We now use a more representative sample of the global PDB asset base, by including multilaterals, bilaterals, and national development banks. In 2020 our analysis was primarily focused on multilateral development banks.

3

We used a detailed breakdown of PDB investments by project (i.e. country, amount, and sector) for the PDBs analysed, thanks to data available from the International Aid Transparency Initiative (IATI) and Boston University. The 2020 analysis relied on the limited country and sector split information published in PDB annual reports.

In our 2020 report, we estimated a global dependency risk of roughly US\$3.1 trillion (28% of global PDB assets) and global nature at risk at US\$1.1 trillion per year (or approximately ~10c per dollar). This was against global PDB assets of US\$11.2 trillion.

The 2021 updated analysis gives a more accurate representation of the global PDB balance sheet in terms of sector and country allocation. It suggests that a greater proportion of PDB assets are deployed in sectors that are more vulnerable to nature and this has increased the estimated dependency risk compared to last year.

The 2021 analysis suggests a total dependency risk US\$4.6 trillion (40% of global PDB assets) and nature at risk of US\$800 billion (or ~7c per dollar of investment) per year, against a global PDB balance sheet of US\$11.6 trillion. The sampling approach this year better accounts for assets deployed domestically by national development banks headquartered in developed countries. As a result, our estimates this year indicate a higher share of overall assets are deployed in developed countries, in particular Europe and North America, relative to last year. This has lowered the average level of nature at risk from ~10c per dollar of investment (2020 assessment) to ~7c (2021 assessment). This is because we are better accounting for the lower risks present in countries with better environmental safeguards, such as Germany, Korea, Japan, US and Canada. Looking at developing countries alone, where the majority of the world's natural assets are located, nature at risk estimates remain unchanged at ~10c per dollar. This implies that there has been no material change in the level of nature at risk across PDB portfolios between 2020 and 2021, and nature at risk remains particularly high in developing countries.

To summarise, our approach to estimating dependency risk and nature at risk is the same as for last year's report, and we have improved the data on the PDB asset base and our sampling approach. Any difference, therefore, between results reported are not indicative of a change in PDB lending activities or associated risk exposure, but rather a consequence of the improved data sources and sampling approach used this year.

Opportunities for future research

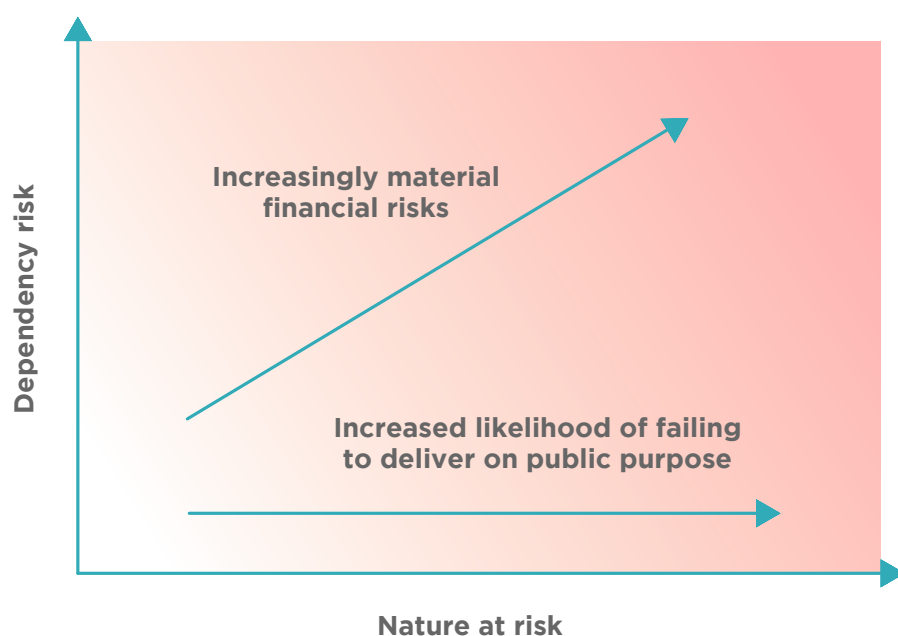
Recognising some of the limitations of this research, we have identified several areas that future research could build on:

- Include additional estimates for ‘nature at risk’: Our estimates for ‘nature at risk’ are primarily based on two factors: water consumption and land use (deforestation) due to agriculture. Other parameters that could be considered include greenhouse gases (GHGs), air pollution, waste, natural resource exploitation, and introduction of invasive species. Based on a preliminary analysis, we estimate that including the above parameters would increase the value of nature at risk by a factor of at least two.
- Provide more detail on under-represented sectors: Given that we evaluate land use due to agriculture as one of the two parameters for estimating ‘nature at risk’, it is possible that our framework selectively highlights investments in economies which are more reliant on agriculture and related sectors. As pointed out elsewhere in the report, our point here is not to suggest that PDBs should not invest in these economies – in fact these economies are likely to require the maximum amount of PDB capital – but to say that PDBs should manage biodiversity risks carefully when deploying capital.
- Expand dataset: To evaluate the footprint of each PDB in our sample (see appendix), we have used data reported via the International Aid Transparency Initiative (IATI); however, not all PDBs report project-level data via the IATI. In addition, some PDBs only report some of their investments via IATI, or do so using custom sector classifications. We encourage more PDBs to make their data available through IATI so that investments become more transparent, and a global biodiversity footprint can be better estimated.

Conclusions

The dependency risk and nature at risk associated with global PDB lending are material and call for closer consideration. It is concerning that PDBs today have no clear view on their nature dependencies and impacts, or how these translate into material financial risk. Most PDBs at best require only certain environmental safeguards in their lending activities - namely a checklist of environmental harms that their lending should avoid. Their approach is insufficient to inform PDBs, or the governments they are accountable to, of the impact they have on nature and the risks they are taking with public resources. It is clear that the more dependent PDBs are on vulnerable nature, and the higher their potential damage to nature, the more likely they are to face material financial risks, and the more likely it is that they may not be fulfilling their public purpose.

Figure 10 | Increasing materiality of nature-related risks



Source: Basic Roots, Vivid Economics

Nature is not adequately considered by PDBs and other financial institutions and it is being depleted as a result. If PDBs fail to prioritise, measure and invest in nature, they will fail in their public purpose, because they will not deliver sustainable economic development. Nature-related risk should become an investment and operational priority.

These results suggest a systemic omission in PDBs' collective approach to the stewardship of assets under management. Today's global financial system is supplying capital, some of which is destroying natural systems upon which we depend and which citizens wish to continue existing. There is much to be done to align global finance with nature, as F4B has highlighted in its framework for systemic change (see Box below),³¹ including action by PDBs and their shareholders. The estimates in this report show the scale of impact PDBs have on nature and the scale of opportunity to reduce risk and impact.

Aligning Global Finance with Nature's Needs: A Framework for Systemic Change

What would it take to align finance with nature?

F4B has published a framework made up of six core elements that would result in global financial flows being consistent with the protection and restoration of biodiversity:

1

ADVANCE CITIZENS' BIODIVERSITY CHOICES:

financial institutions should take account of citizens' individual and collective biodiversity-related rights and preferences in their financing decisions.

2

DISCLOSE IMPACTS ON BIODIVERSITY:

financial institutions should publicly disclose actual and expected biodiversity impacts and associated risks.

3

CREATE LIABILITY FOR BIODIVERSITY:

legal systems should make financial institutions liable for biodiversity impacts.

4

ALIGN PUBLIC FINANCE WITH BIODIVERSITY:

governments and public agencies should transparently align all public finance to biodiversity-related policies, goals and commitments.

5

ALIGN PRIVATE FINANCE WITH PUBLIC POLICY:

financial institutions should ensure that their activities are consistent with biodiversity-related public policies, goals and commitments.

6

INTEGRATE BIODIVERSITY INTO FINANCIAL GOVERNANCE:

institutions governing global finance should ensure that PDBs effectively steward biodiversity.

It is essential that PDBs report nature dependency and nature at risk (impact). By systematically measuring and reporting such impacts and risks, PDBs will be equipped to better understand how to reduce them, increase pressure on the counterparties in which they invest, and inform the shareholders who supervise their management. PDBs can become world leaders in nature impact and risk reporting by conducting assessments - such as the one presented in this report - themselves. This will demonstrate to the private financial sector that existing data and methods allow such reporting. In this way, they can accelerate systemic change, in line with their public purpose mandate.

We recommend that each of the 450+ PDBs commit, within the next year, to publishing a balance sheet-wide stress test of nature-related financial risks, dependencies and impacts. F4B and leading financial institutions such as ASN Bank, BNP Paribas and Mirova are advancing both methodologies and data to do this. The Taskforce for Nature-related Financial Disclosures (TNFD) will develop and build consensus around a central framework for the disclosure of nature-related risks including dependencies and impacts. PDBs have a duty to play a prominent role in both the development and uptake of this framework. The approach offered in this report is based entirely on readily available data and requires minimal technical input. F4B undertakes to engage with and support the PDBs who commit to stress tests of nature-related risks and act upon it. The box below provides a series of actions that PDBs can immediately take towards this. PDBs must fulfil their purpose as progressive financial institutions and lead the way for the rest of global finance.

An indicative pathway towards managing nature-related risks

1. COMMIT TO UNDERTAKING AN INITIAL NATURE-RELATED STRESS TEST OF THEIR BALANCE SHEETS

- a. Use existing data sources to identify regions with high nature risk and sectors with high nature dependency
- b. Estimate potential losses/impairments building from the methodology presented in this report
- c. Identify plan to improve sophistication of approach over time including data collection

2. PROGRESS DISCUSSION AT BOARD-LEVEL AND WITH SHAREHOLDER GOVERNMENTS

- a. Bring discussion of nature and nature-related risk to board and shareholder fora - focus on nature to match focus on climate
- b. Update the strategy, investment policy and funding objectives to account for outcome of board discussions on nature

3. ENGAGE WITH PEERS AND INDUSTRY GROUPS

- a. Support the Taskforce for Nature-related Financial Disclosures (TNFD) in the development of its framework
- b. Participate in the International Development Finance Club (IDFC) working group on biodiversity
- c. Attend the Finance in Common summit and help promote collaboration on nature-related risks

4. STRENGTHEN ENVIRONMENTAL SAFEGUARDS

- a. Update safeguards to include biodiversity and ecosystem services where required
- b. Publish environmental impact assessments if not done so already

As shareholders of PDBs, governments also bear a portion of the nature-related risks that exist on PDB balance sheets and a duty to manage them. By exercising their power as shareholders, governments can mandate PDBs to manage these risks and make commitments to make nature-positive investments. In the case of multilaterals, this requires influential shareholders to pool their votes. In the case of bilateral and national development banks, governments can work through their ministries to review investment policies, ensuring they support national policy objectives related to nature and biodiversity. In stewarding assets under management, now is the time for them to visibly step up to this role.

Appendix: Methodology

Data sources for PDB assets

Using portfolio data reported by PDBs alongside other readily available data, we assess both the 'dependency risk' and 'nature at risk' associated with the global PDB asset base. By this, we mean all loans and investments owed to PDBs globally by the businesses and projects they lend to and invest in.

- We use a Finance in Common (FIC) dataset of Public Development Banks to identify aggregate PDB assets. The combined assets in this database are US\$11.6 trillion based on 450+ public development banks.³² The FIC data also provides a summary of assets by PDB, which we use to determine the global distribution of assets by region.
- For project-level data related to PDB investments, we use the International Aid Transparency Initiative (IATI). IATI is a repository of data reported directly by PDBs which gives a 'by project' breakdown of investments. This provides a more accurate estimation of risks than by using aggregated figures included in annual reports of PDBs.³³ This is because project-level data is more granular and provides sectoral and regional allocation for a given investment, which are the two key inputs for our framework.
- For two Chinese PDBs, we have used a data curated by Boston University Global Development Policy Center³⁴, which provides a comparable breakdown of investments by country, sector, and projects, in a manner similar to IATI.

Using these data sources, we have conducted a detailed analysis of 12 PDBs' balance sheets and scaled up the output to reach an estimate for the global PDB asset base. The PDBs that were part of the sample set are listed in Table 2 below. These were selected based on size, variety, and data availability to create a representative sample of PDBs.

Table 2 | List of PDBs in our analysis sample

Institution	Acronym	Type	Assets Analysed (USD bn)	Data Source
Agence Française de Développement	AFD	Bilateral	26	IATI
World Bank	WB	Multilateral	227	IATI
Federal Ministry for Economic Cooperation & Development, Germany (covers GIZ and KfW)	BMZ	Bilateral	53	IATI
African Development Bank	AfDB	Multilateral	31	IATI
European Bank for Reconstruction and Development	EBRD	Multilateral	43	IATI
Inter-American Development Bank	IDB	Multilateral	38	IATI
Asian Development Bank	ADB	Multilateral	88	IATI
International Finance Corporation	IFC	Multilateral	96	IATI
China Development Bank	CDB	Bilateral	258	Boston University
China EximBank	CExIm	Bilateral	197	Boston University
Agricultural Development Bank of China	ADBC	National Development Bank	996	Annual report
National Bank for Agricultural and Rural Development, India	NABARD	National Development Bank	70	Annual report

Source: Basic Roots, Vivid Economics

Scaling up estimates

To extrapolate these impacts to the total PDB asset base of US\$11.6 trillion, we used the Finance in Common (FiC) database of Public Development Banks. This database contains information about each PDB's location, total assets, and whether it is a multilateral, bilateral, or national bank.

The scaling approach varies by type of development bank:

Multilateral development banks

The six multilateral PDBs analysed account for US\$440 billion, or 21% of all MDB assets. By including key MDBs such as World Bank, IFC, AfDB, EBRD, IADB, and ADB, the sample has good coverage of regions and sectors. This allows us to scale the findings from these 21% of MDB assets to the remaining 79% of MDB assets.

Bilateral development banks

The five bilateral PDBs analysed (AFD, KFW, CDC, CDB, ChinaExim) account for US\$410 billion, or 35% of bilateral assets held by bilateral development banks. For the remaining 65% of bilateral assets, we assume a similar sector and country distribution to the one observed in our bilateral sample. This approach is similar to the one taken for MDBs.

National development banks

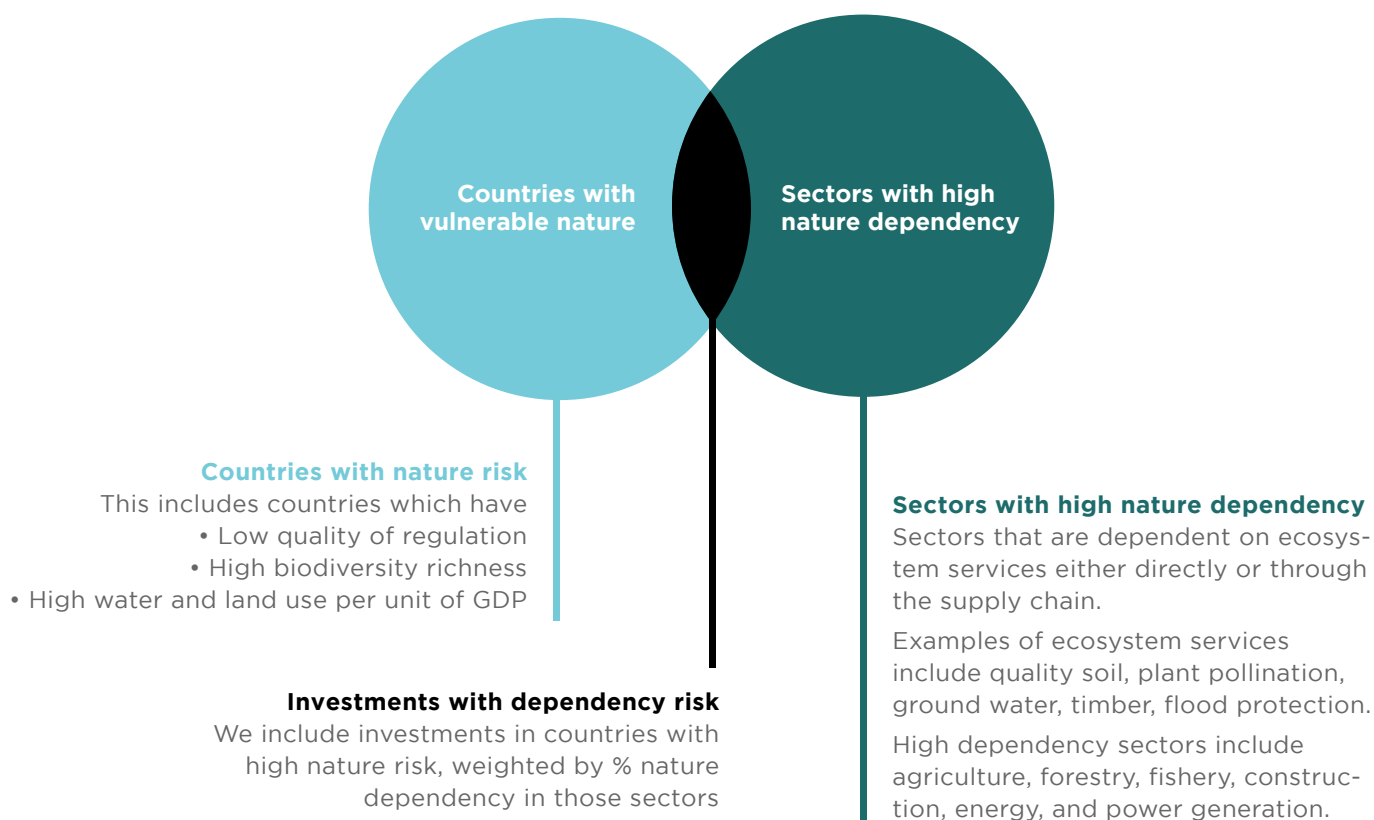
To estimate 'dependency risk' and potential impacts for a bank, our approach requires a portfolio allocation by country and sector:

- Unlike MDBs and bilaterals, who invest in multiple (developing) countries, national development banks tend to invest almost entirely in the country in which they are based. As a result, we assigned the bank's home country from the FiC PDB database as the country where those assets are invested.
- No national development bank provides project-level data to the IATI database, and many do not provide a breakdown of assets by sector in their annual reports. As a result, we need to use a proxy for the sectoral distribution of each national development bank's portfolio. To do this, we calculate the average value of 'dependency risk' and 'nature at risk' for that country based on the data we have from our 12 PDBs, and apply it to the national development bank asset base. For countries where our sample set does not provide representative data, we assume that national development banks in that region use a comparable portfolio distribution as a representative institution (such as World Bank or the largest national development bank in the country). This type of assumption is needed due to the lack of data on national development bank portfolios.
- There are two exceptions to this rule for national development banks that have a sector-specific mandate: the Agricultural Development Bank of China and NABARD India. Collectively, these two banks account for roughly -US\$1 trillion of national development bank assets.

We then sum up the 'dependency risk' and 'nature at risk' value for the aggregate multilateral, bilateral and national development bank asset base to calculate total values of each risk for the global US\$11.6 trillion of assets.

Measuring dependency risk

Figure 12 | Summary of our Dependency Risk assessment approach



Data sources used:

- Quality of environmental regulations by country - using National Biodiversity Index (NBI) from UN Convention on Biological Diversity (CBD)
- Biodiversity richness by country - Environmental Performance Index (EPI) from Yale
- Water + land use by country - calculated using input/output tables from EORA
- Dependency on ecosystem services by sector - using data from WEF/PWC 'Nature Risk Rising' report

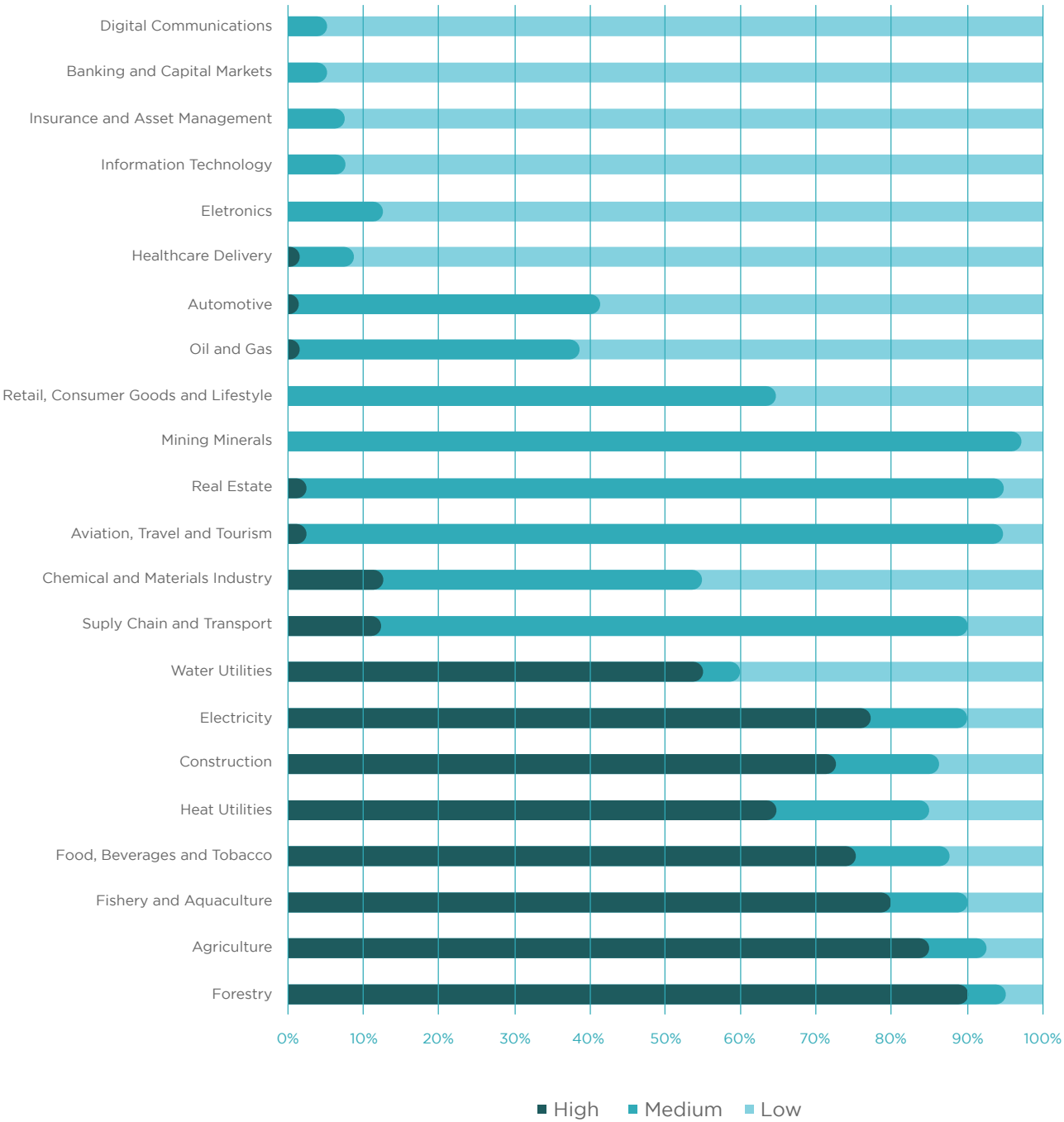
Dependency risk is a function of a PDB's exposure to sectors whose dependency on nature is high, and to countries that are vulnerable to biodiversity-related risks.

To assess this, we measure sectoral exposure, focusing on 26 sectors. We measure the dollar exposure (E) as aggregate lending to a given sector in a given country.

Based on work done by the World Economic Forum (WEF) and PwC as part of their January 2020 publication, 'Nature Risk Rising',³⁵ we estimate a blended percentage of Gross Value Added (GVA) with high, medium and low nature dependency, by industry. This analysis considers both direct, as well as supply chain, dependencies. For sectors that are not covered by the above report, we have estimated dependencies based on comparable industry averages for which data is available.

The WEF/PWC approach is based on an analysis of nature dependency of 163 sectors and their supply chains across a range of ecosystem services. The aggregate sectoral dependency is a function of three factors: a) the number of different individual dependencies identified; b) the mean strength of those dependencies (rated 1-5); and c) the maximum strength of any individual dependency. To determine the nature dependency of a particular industry, the framework aggregated sectors into overarching industry groups. The industry GVA is calculated as the sum of GVA in all relevant sectors. The share of industry GVA in 'high', 'medium' or 'low' dependency categories is then calculated based on the dependency scores of the sectors within that industry.

Figure 13 | Share of GVA of high, medium and low nature dependency, by industry



Source: WEF, PwC, Basic Roots

We then multiply this exposure by the percentage of GVA that has high nature dependence in each sector (D). Sectors which have materially high nature dependency include agriculture, forestry, construction, energy, and natural resources.

Each sector is further evaluated, based on the PDB's exposure across countries. Where sectoral distribution by country is available, we directly use that data. If the information is not available, however, we assume the same geographic distribution of sectoral exposure, as the overall balance sheet (this information is usually available). We then apply a 'country biodiversity risk' (R), based on each individual country's quality of biodiversity regulation (stronger is low-risk); presence of biodiversity (high biodiversity index is high-risk); and nature intensity (high intensity is high-risk).

Overall, we calculate a PDB's dependency risk as follows:

Dependency risk = E * D * R

As a summary, this means that dependency risk is a function of a PDB's exposure to sectors whose dependency on nature is high, and to countries that are vulnerable to biodiversity-related risks.

A NOTE ON COUNTRY BIODIVERSITY RISKS

Our country biodiversity risk assessment takes into account three parameters:

- **Quality of Regulation:** We use the Environmental Performance Index (EPI), developed by Yale, to assess a country's ecosystem vitality. The EPI provides a data-driven summary of the state of sustainability around the world. Using 32 performance indicators across 11 issue categories, EPI ranks 180 countries on environmental health and ecosystem vitality. These indicators provide a gauge at a national scale of how close countries are to established environmental policy targets.

For the sake of our analysis, we use a subseries of the composite EPI that assesses countries' actions toward retaining natural ecosystems and protecting the full range of biodiversity within their borders. Essentially, countries that have already put in place strong regulation or policy towards preserving biodiversity are viewed as lower risk.

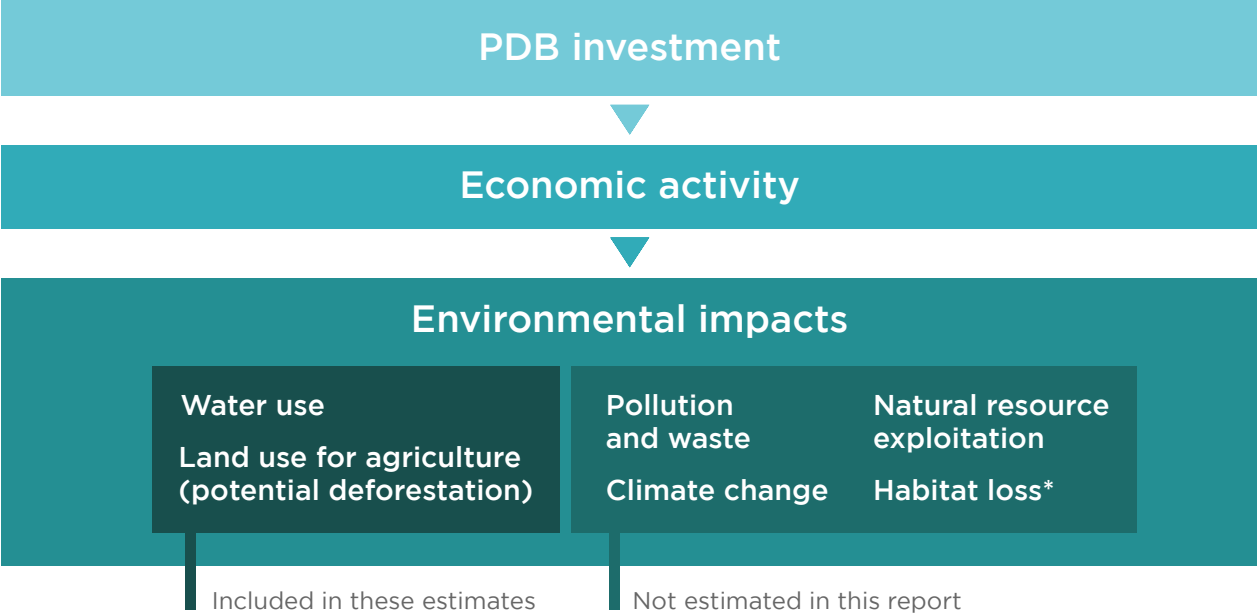
- **Biodiversity richness:** Presence of biodiversity measures the presence of biodiversity in a country. We use the National Biodiversity Index (NBI) calculated by the Convention on Biological Diversity (CBD) to rank countries. This index is based on estimates of country richness and endemism in four terrestrial vertebrate classes and vascular plants; vertebrates and plants are ranked equally.

The index values range between 1.0 (maximum: Indonesia) and 0.0 (minimum: Greenland). The countries with high biodiversity are considered to be at higher risk (i.e. they are at a higher risk of getting affected by industrial activity). The NBI includes some adjustments allowing for country size. Moreover, the index also considers parameters such as natural history, presence of zoological and biological gardens, as well as number and size of protected areas. Countries that have a higher species intactness are viewed as higher risk.

- **Nature Intensity:** Nature intensity is calculated as nature use per unit of GDP, using estimates of land and water use per unit of GDP, each priced according to their estimated nature impact, per hectare and cubic metre respectively. To do this analysis, we use EORA's country footprint data. As outlined previously, EORA is a multiregional input-output (MRIO) database, which means that we are able to analyse a country's impact of resource use not just within its borders but also with other countries due to its trading activities.

Measuring nature at risk

Figure 14 | Summary of our Nature at Risk assessment approach



*These estimates for nature at risk do account for habitat loss due to deforestation caused by agriculture. However, habitat loss due to land development, water development, pollution, or climate change is not estimated in this report.

Source: EORA, Basic Roots, Vivid Economics

To assess nature at risk, we again focus on the allocation of a PDB’s assets by country and one of the 26 sectors used in our framework. For each country and each sector that a PDB is exposed to, we undertake the following:

1

We take the US\$ loan amount (L) and transfer that into a US\$ annual output number by using an asset turnover (AT) ratio. The sector asset turnovers we use are an indicator of the efficiency with which investments/capital are used to generate output (O). We have used industry average asset turnover ratios from CSI Market and a range of other sources. To calculate average sectoral ratios, CSI Market measures reported financial information across businesses within a sector and then aggregates them to derive an industry estimate. While the dataset is primarily based on US businesses, we have assumed that average asset turnover ratios are less likely to vary within the same sector across geographies.

2

We then assess the impact of O in terms of Land and Water consumption by taking intensities from EORA for each parameter (IT). The ‘intensity’ estimates how much land (expressed in hectares) and water (in m³) is likely to be consumed to generate one dollar of output. We calculate these intensities by dividing the aggregate land and water consumption in each sector and country (available directly from EORA) by the total output for that sector in the given country (also available in EORA).

3

We then multiply this land and water consumption by a calculated value of ecosystem services offered by both land and water (V):

Land: From step 2 above, we have, for each PDB, the total agricultural land area that it is financing. We then use this to approximate the amount of deforestation that may occur in the country in question because of this lending. To do this, we first take the average tree cover loss in terms of hectares per year for each country (D). The average is based on data for a ten-year period that was sourced from Global Forest Watch.³⁶ We have used default definitions for deforestation when accessing this data, which is based on canopy cover levels of greater than or equal to 30%. We then take estimates of the share of tree cover loss attributable to agriculture (P) in each region from the literature.³⁷

Finally, we multiply by the share of agricultural land we estimate is financed by PDBs. This assumes that agriculture financed by PDBs and agriculture financed by other means contribute equally to deforestation.

The overall formula is as follows:

Potential deforestation from PDB funding = D x P x R

We recognise that our approach accounts only for potential deforestation and not wider land-use impacts. Given limited availability of data, as well as in the interest of building a framework that can be applied directly to readily available information in annual reports, we believe our approach is reasonable for an initial assessment.

To value this deforestation, we look at two components: (i) the value of the carbon stored in the forest that is released at the point of conversion; and (ii) the value of the future flow of ecosystem services that the forest would have otherwise provided.

To value the first, we follow the latest IPCC guidelines. We take estimates of ecoregion- and continent-specific aboveground biomass from the 2019 revisions to the IPCC 2006 Guidelines Volume 4 on Agriculture, Forestry and Land Use.³⁸ We then apply the IPCC recommended ratios to below-ground biomass to calculate total biomass. For simplicity, we do not consider changes in soil carbon stock or dead organic matter.

We convert to tonnes of CO₂ emissions using the default carbon fraction of biomass and standard mass adjustment of 44/12. Finally, we apply the social cost of carbon recommended in the underlying methodology for Kering's Environmental Profit and Loss (P&L) Account, prepared by PwC, US\$78 per tCO₂.³⁹

To value the second, we rely on work done by Groot et al. in 2012, in the meta analysis "Global estimates of the value of ecosystems and their services in monetary units".⁴⁰ The paper provides monetary values in terms of provisioning services, regulating services, habitat services and cultural services derived per hectare of temperate and tropical forests on an annual basis. For the purpose of our framework, we have taken the mean value among data points and excluded any services for which there was only a single estimate. We then calculate the net present value of the flow of these ecosystem services over time. We use a discount rate of 3.5% in line with UK Treasury Green Book guidelines for public sector analysis.⁴¹ We consider a flow of benefits for ten years which assumes that the land converted will not return to forest for at least ten years.

Finally, we sum the two components to arrive at the net present value of one hectare of forest, specific to the continent, domain and ecoregion of the country.

Water: To estimate the impact of water use on biodiversity, we use two water footprints need to be considered: (i) green water footprint – water from precipitation stored in soil that is evaporated or incorporated by plants; and (ii) blue water footprint – water sourced from surface or groundwater incorporated into a product, including irrigated agriculture, industry and domestic water use.

We apply a variant of the country-level value for water that was incorporated in the Corporate Bond Water Credit Risk Tool (CBWCRT) developed by GIZ, NCD and VfU.⁴² In the CBWCRT, shadow prices for water are used as a proxy for exposure to potentially increasing costs for water resulting from water stress. It applies a total economic value (TEV) framework accounting for the external benefits of water to society and the environment, in addition to private benefit gained by consumers.

While the CBWCRT framework estimates the value of water as a hybrid function of four dependent variables (agricultural values, domestic supply values, human health impacts, and environmental impacts), we have incorporated only the value related to environmental impact in our study. These values are based on the life-cycle impact factors estimated by Pfister et al. (2009).⁴³ The impact factors are measured as “area of ecosystem damage” in m² per m³ of water consumed. This environmental value is more directly linked with the object of our study. It should be highlighted, however, that this valuation is based on values that are considered conservative by the CBWCRT developers.

4. The overall nature at risk is calculated as:

$$O = L \times AT$$

$$\text{Nature at Risk} = O \times IT \times V$$

References

¹ The total PDB assets as included in the Finance in Common database, is US\$11.3 trillion. To this, we add -US\$300 million of assets belonging to two Korean PDBs (Korea Development Bank and Korea EXIM) which are not included in the Finance in Common database.

² <https://www.unep-wcmc.org/news/how-the-dutch-central-bank-is-leading-on-nature-related-risks>

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⁴ TFND (2021) Proposed Technical Scope for TNFD. <https://tnfd.info/publication/proposed-technical-scope-for-tnfd/>

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⁶ <https://www.idfc.org/>
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⁷ Aligning Development Finance with Nature’s Needs: The role of government shareholders of development banks <https://www.f4b-initiative.net/publications-1>

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- ²¹ <https://www.idfc.org/wp-content/uploads/2020/11/idfc-benchmark-on-biodiversity-practices-of-development-banks-1.pdf>
- ²² This figure refers to the aggregate value of assets that are held in sectors considered by the authors to be 'highly dependent' on nature and in countries considered by the authors to be 'highly vulnerable' to the deterioration of nature. It does not reflect an assessment of the resultant financial risk to a PDB's balance sheet based on an analysis of default rates and non-performing loans. Further detail on the approach is given in the methodology.
- ²³ This figure refers to the aggregate expected value of damage to nature that could potentially arise from PDBs' current lending portfolio, without effective measures to mitigate harm to nature. It combines estimates of the scale of biophysical impacts with valuations of the ecosystem services that would be lost. It does not reflect an assessment of the resultant financial risk to a PDB's balance sheet if this damage were to occur. No adjustment is made for how this cost may translate to changes in the default rate of loans and investments. Further detail on the approach is given in the methodology.
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