ssfa
Singapore Sustainable Finance Association

Financing our Natural Capital

A practical guide for FIs getting started on nature financing

Prepared by the Singapore Sustainable Finance Association in partnership with Oliver Wyman

OliverWyman

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This document does not necessarily represent the views of the Workstream Co-leads, any individual member of the workstream, or the SSFA EXCO.

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Executive summary

Human life is inextricably intertwined with nature. We rely on plants, animals, air and water to sustain life and economic activity. This reliance, however, has left its mark. As we draw down on our stock of natural capital, we are edging close to – or in some cases even past – the "planetary boundaries" that scientists use to define the safe limits for human existence on earth.

This paper calls on financial institutions to recognise their position in this relationship between economic activity and nature. The degradation of nature represents a risk to companies' activities and, by extension, to financial portfolios. Revenues may come under threat, or companies may have to incur additional costs from new regulations or increased consumer scrutiny. Both lenders and investors must bear these risks in mind.

The first step for financial institutions is to better understand the materiality of those risks to their portfolios. This paper offers a roadmap for such an assessment, mapping Southeast Asia's GDP figures to publicly available data on the impacts and dependencies of industries and sectors.

Our analysis suggests that several sectors of economic importance to the region – namely agriculture, mining, manufacturing and real estate – have large impacts and/or dependencies on nature. This means investors and banks in the region may face material nature-related risks. The next step, then, is for financial Institutions to examine specific areas of risk (which are often hyper-local), the specific practices of the companies they invest in or lend to, and the policy environments where these companies operate. This paper outlines the case for such specificity, and presents (in the addendum) a practical guide on how to get started.

The risk posed to nature comes also with opportunities for financial institutions to finance nature-positive technologies. This investment opportunity is not well recognised, partly because definitions of what is nature-positive may be too theoretical or focused only on niche, non-viable investments. We propose taking a broad view of nature-positive activity that encompasses a wider range of opportunities – such as green building development, regenerative agriculture, water efficiency improvements, pollution reduction and waste management – and is more likely to catalyse investment.

We believe now is a good time for financial institutions to increase their proactivity in nature financing. That means understanding the materiality of nature risks and opportunities, embedding these considerations in internal processes and pursuing new business opportunities. In doing so, financial institutions will both address nature degradation in the real economy and grow their businesses.

Our discussion would not be complete without also touching on the involvement of policy makers, financial regulators and real economy players. At the policy level, we advocate work at a national level on a regulatory agenda for nature conservation and restoration. This should be anchored in expectations for economic sectors, with guidance by financial regulators for financial actors. The development of local nature risk scenarios (a requirement for the quantification of nature risk) and sectoral pathways (needed for further target setting) should complement that guidance.

At the industry level, we recommend collaboration between the financial services sector and real economy players. In particular, industrial sectors with high impacts or dependencies on nature will require financing; both sides must work on unlocking barriers to this. Collaboration should also include standardising data reporting and metrics, and the standards around nature financing – both of which can enable the scaling up and reporting of nature financing efforts.

Chapter 1:
Natural capital – Getting started

Introduction to natural capital

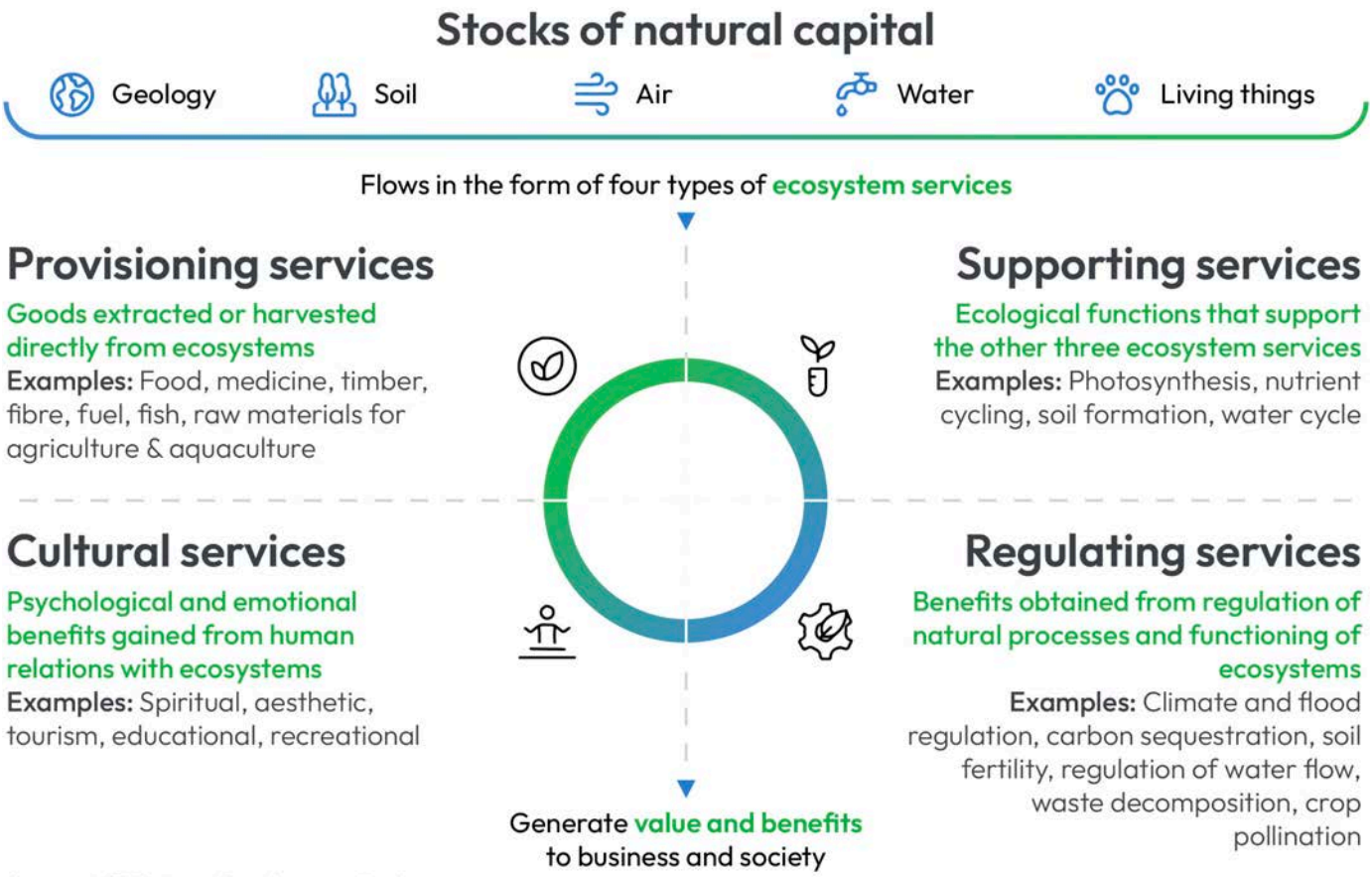
This paper proposes that financial institutions should proactively incorporate nature in their approach to financing.

The case for this is clear:

- Economic activity both depends on nature and impacts nature.
- Such impacts include the depletion of the stock of natural capital in ways that breach safe limits and have severely negative effects.
- Policy and technology responses are emerging to protect, restore and reduce negative impacts on nature.
- The degradation of nature, and the resulting policy and technology responses, create risks to the portfolios of financial institutions that must be managed.
- They also create commercial opportunities for financial institutions that can provide the right products and services to support the preservation and restoration of nature.

Throughout this paper, **nature** is defined as including both the living (biotic) and non-living (abiotic) elements on our planet. Both rocks and plants, rivers and fish, and even the rain and atmosphere fall within this definition of nature. When viewed through an economic lens, nature becomes **natural capital** – a stock of natural assets from which humans can derive a range of services[1].

Figure 1: Natural capital provides four types of ecosystem services



Source: NGFS; Asian Development Bank

[1] Natural Capital Forum, n.d.

These services, known as **ecosystem services**, can be divided into four categories, as outlined in Figure 1[2].

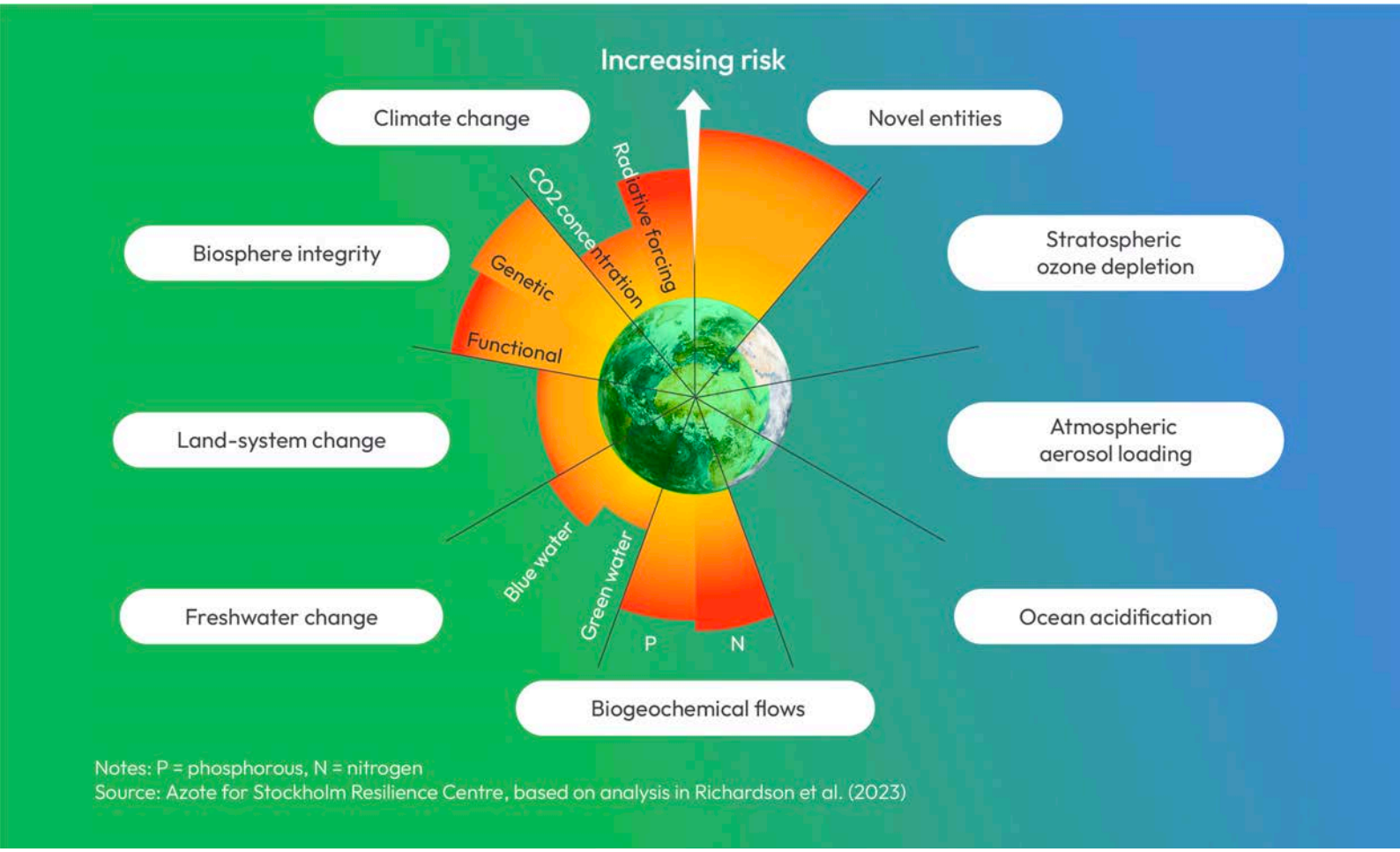
These ecosystem services are under stress from economic activity. Recent research indicates that human activities have transgressed six of the nine planetary boundaries essential for maintaining the resilience and stability of the earth[3]. The six boundaries crossed are set out in Figure 2.

Planetary boundaries mark the limits of safety for the earth. Once these boundaries are crossed, it becomes more likely that the earth reaches so-called "tipping points"[4] – thresholds beyond which even relatively small disturbances can trigger abrupt, large-scale and potentially irreversible shocks to our planet's life-support systems[5].

In order to halt and reverse nature loss, the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) has identified **five key drivers of nature degradation** (see Figure 3):

- Land/sea use change
- Climate change
- Pollution
- Natural resource use and exploitation
- Invasive alien species

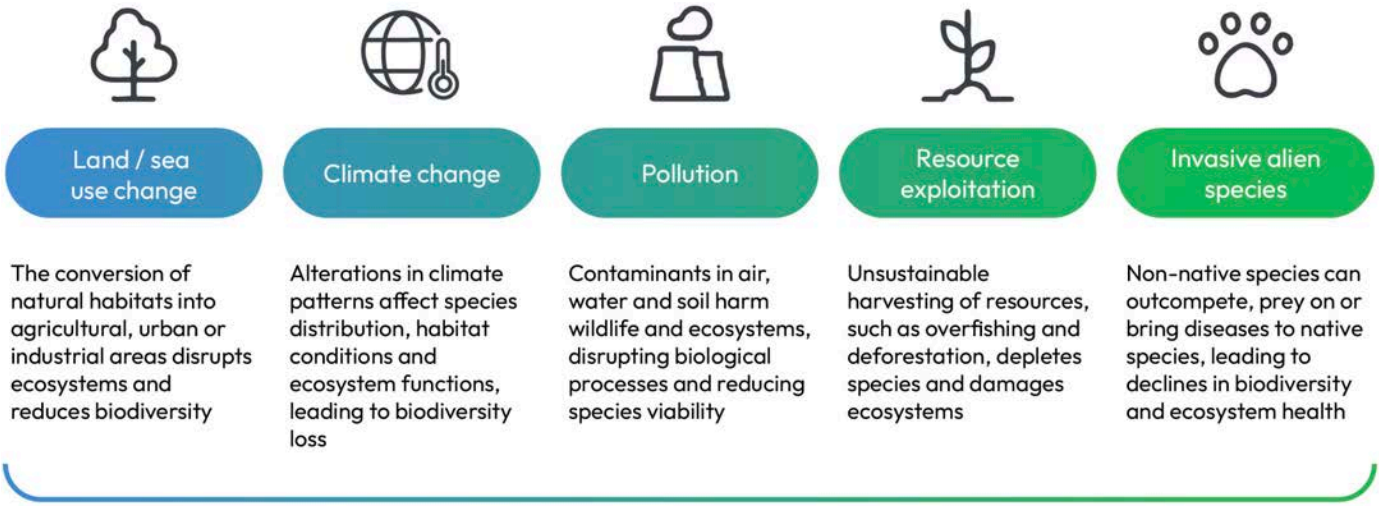
Figure 2: Six of the nine planetary boundaries have been transgressed



Notes: P = phosphorous, N = nitrogen
Source: Azote for Stockholm Resilience Centre, based on analysis in Richardson et al. (2023)

[2] Development Asia, 2018
[3] Stockholm Resilience Centre, 2023
[4] NGFS, 2023
[5] Green Central Banking, 2024

Figure 3: Five IPBES drivers of nature loss



Source: Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services

The loss of natural capital poses a serious risk to humanity's survival. It also threatens our economy and financial system, which cannot exist and thrive without nature. The World Bank estimates that global GDP could decrease by US$2.7 trillion in 2030 if there was a collapse in select ecosystem services[6]. The risks are significant in Asia Pacific, where more than 60% of GDP relies directly or indirectly on nature and its ecosystem services[7] (see Figure 4).

The silver lining is that investment in the protection and restoration of nature promises significant economic opportunities. Nature transition – i.e., plans to reverse negative impacts and restore nature – could unlock US$10 trillion in global business opportunities and create 395 million jobs by 2030[8], according to the World Economic Forum. Of those figures, US$4.3 trillion and 232 million jobs are likely to accrue to Asia[9] (see Figure 4).

Policymakers have recognised these risks and opportunities and are responding. A United Nations-led process for nature has gathered pace in recent years, with the landmark Global Biodiversity Framework (GBF) agreed at the Kunming-Montreal COP15 meeting in 2022. Global targets have been set and governments are forming National Biodiversity Strategies and Action Plans (NBSAPs), with regulations for key sectors[10].

International direction, national policy and economic incentives must also be supported by the financial sector. Financing alone cannot create a transition, given the scale of the investment needed, but financial institutions play a critical role[11]. Risks to the real economy equate to risks in financing portfolios; whilst investment needed for transition represents an opportunity for the financing sector.

The scale of both problem and opportunity make nature transition a material issue for the financial sector. Indeed, financial regulators have begun taking action on nature (see Figure 5)[12] – although mandatory requirements are limited.

[6] World Bank Group, 2021
[7] Temasek, 2021
[8] World Economic Forum, 2020
[9] Temasek, 2021
[10] Convention on Biological Diversity, 2024
[11] This was recognised in the COP15 GBF in Target 19, which aims to mobilise US$200 billion per year for biodiversity (as one element of Nature). This funding is to come from a mix of government provision and private sector finance. Based on the UNEP State of Finance for Nature paper, 82% (~US$165 billion) is expected from government provision; whilst 18% (US$35 billion) is expected from the private sector.
[12] The London School of Economics and Political Science, 2022

Figure 4: Economic risks and opportunities from nature loss and transition

Economic risks
from nature loss

$2.7TN

Decrease in global GDP in 2030 if there were a collapse in select ecosystem services

60%

of **Asia Pacific's GDP relies directly or indirectly** on Nature and its ecosystem services

Economic opportunities
from nature transition

$10TN

of **global business opportunities** could be unlocked from nature transition

$4.3TN

of **business opportunities** could be unlocked in Asia

Figures in USD
Source: The World Bank, The World Economic Forum, Temasek

Figure 5: High-level summary of biodiversity-related actions taken by central banks and financial supervisors

Source: The London School of Economics and Political Science

State of natural capital in Southeast Asia

Southeast Asia hosts four biodiversity hotspots[13] and three of the world's 17 megadiverse countries[14]: Indonesia, Malaysia and the Philippines[15]. The region has the highest percentage of endemic bird and mammal species (9% and 11%, respectively) and the second highest percentage of endemic vascular[16] plant species (25%)[17]. It is home to the most extensive coral reefs in the world, accounting for over 28% of the global total[18].

This rich natural capital is under threat because the region is economically reliant on the extraction and production of raw materials. Two key sectors – agriculture and mining – are both highly dependent on natural capital and have a high impact on nature[19].

Deforestation and pollution are two major culprits in the depletion of Southeast Asia's natural capital, and biodiversity is on a worrying trajectory.

Southeast Asia is experiencing some of the highest rates of **tropical deforestation** globally[20] due to the expansion of oil palm and rubber plantations, logging activities, and urbanisation. The resulting **habitat loss is threatening biodiversity**. Southeast Asia has the highest proportion of vascular plant, reptile, bird and mammal species classified as globally threatened by the International Union for Conservation of Nature's Red List[21]; and an estimated 42% of all species in the region could be lost by the turn of the century[22].

The **Biodiversity Intactness Index (BII)**[23], published by London's Natural History Museum[24], also reveals that Southeast Asia is experiencing a more rapid decline in natural biodiversity versus the global average.

Box 1: Depleting natural resources in Southeast Asia

Deforestation

12.9%

Reduction in forest cover in Southeast Asia **between 1990 and 2015; projected to suffer severe losses by 2090 in 3 of 4 scenarios modelled**

Biodiversity loss

42%

Of all **species** in **Southeast Asia could be lost** by the turn of the century and **at least half** of these would be **global extinctions**

Water pollution

37%

Of aquatic species are estimated to be affected by water pollution in Southeast Asia

Source: World Economic Forum, The Straits Times, Asian Development Bank

[13] ASEAN Centre for Biodiversity, n.d.
[14] Megadiverse countries are defined as those with a high total number of species (including marine species) and a significant percentage of endemic species.
[15] ASEAN, n.d.
[16] Vascular plants have rigid tissues for conducting water and minerals.
[17] ASEAN, n.d.
[18] ASEAN, n.d.
[19] Based on ASEAN Statistics' database, agriculture, forestry and fishing contributed 9.8% of ASEAN's GDP in 2022; while mining and quarrying contributed 6.6%. See Appendix 2 for some statistics on Nature dependencies and impacts of the agriculture and mining sectors.
[20] Storymaps, 2024
[21] Botterill-James, 2024
[22] World Economic Forum, 2021
[23] This index measures the extent of an area's natural biodiversity as a percentage of the original number of species. Note that BII is a terrestrial indicator and does not cover marine ecosystems. See Appendix 3 for more details.
[24] Natural History Museum, 2021

In 2020, Southeast Asia's average biodiversity intactness was estimated at 52% while the global average was approximately 63%. Southeast Asia's BII score has decreased by 4 percentage points since 2000 while the global average has remained relatively stable.

Coastal areas in countries such as the Philippines and Vietnam, meanwhile, have experienced a 50% **reduction in mangrove coverage** between 1980 and 2005[25]. In Singapore, home to 35 out of the 70 mangrove species, mangrove cover declined by more than 80% between 1958 and 2014[26]. These losses are a significant cause for concern as mangroves prevent flooding and land erosion, and serve as habitats for fishery resources.

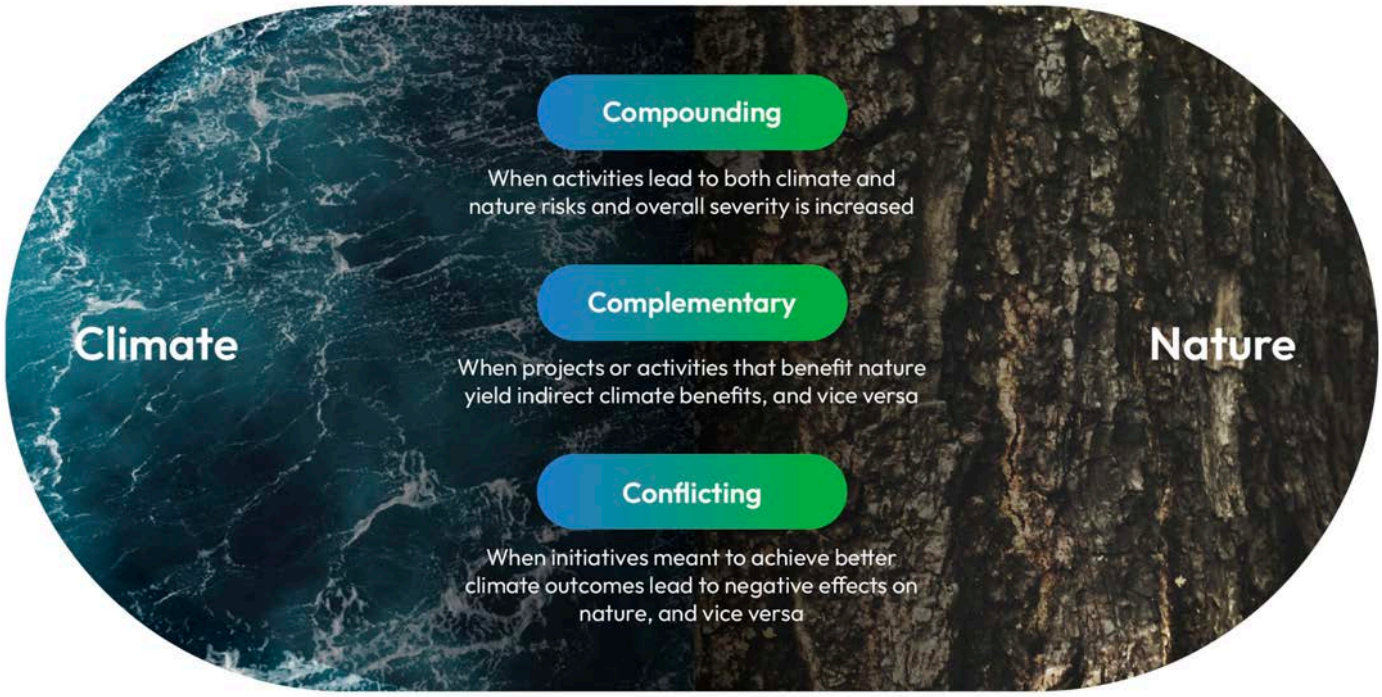
Water pollution is another severe issue, affecting about 37% of aquatic species[27]. Southeast Asia has a low wastewater treatment rate of 14%[28].

This is exacerbated by plastic pollution, which contaminates marine ecosystems, harms wildlife and degrades coastal habitats, including mangroves. Plastic pollution in the region is 10 times what it was in 1980, and now accounts for 80% of all marine debris in the ocean. Just six of the 10 member states in The Association of Southeast Asian Nations (ASEAN) generate more than 31 million tons of plastics annually[29].

The link between nature and climate

Discussions on natural capital and the importance of nature transition parallel those on climate change and climate transition as climate change and nature are closely related. The link between climate and nature is often referred to as the

Figure 6: The relationship between nature and climate can be compounding, complementary or even conflicting



[25] Global Mangrove Alliance, 2021
[26] Channel News Asia, 2021
[27] Asian Development Bank (ADB), 2024
[28] ADB, 2024
[29] ASEAN Centre for Biodiversity, 2023

climate-nature nexus and covers compounding, complementary and conflicting interactions between climate and nature[30]. Supporting nature is frequently complementary to climate goals. For example, action to protect forests will not only preserve biodiversity and soil conditions but also preserve carbon sinks that mitigate climate change.

In some cases, nature destruction compounds climate change. Flooding, which has become more likely and more severe due to climate change, is worsened by the destruction of mangroves. But nature and climate also occasionally have conflicting objectives. Transitioning to clean energy technologies could require 6.5 billion tonnes of materials between 2022 and 2050, according to estimates by the Energy Transitions Commission[31]. About 95% of this requirement would be in the form of steel, copper and aluminium. Extraction and mining of these materials could harm the environment if not done sustainably and responsibly.

For financial institutions, the climate-nature nexus has important practical implications. Financial institutions that have incorporated climate transition across their operations will have the necessary infrastructure in place to do the same for nature. They do not need to start from scratch on reporting, risk analysis of financing approaches, for instance. By leaning on climate processes and governance, they can simplify the work ahead and accelerate the progress that can be made.

[30] The IPBES Nexus Assessment Report provides a scientific assessment of the complex interconnections across five nexus elements: biodiversity, water, food, health and climate change; and assesses 186 scenarios to project interactions between three or more of the nexus elements. One finding from the report is that scenarios that prioritise objectives for a single element of the nexus without regard to other elements will result in trade-offs across the nexus. For example, an exclusive focus on climate change can result in negative outcomes for biodiversity and food, reflecting competition for land. (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, 2024)

[31] Energy Transitions Commission, 2023

Chapter 2: How should financial institutions get started?

This chapter summarises some frameworks and guidelines for policymakers and the private sector as they respond to the threat to nature, including parallels to the climate response and lessons to be drawn.

The framework for policy and private sector response

The financial sector's response to the threat to nature can draw much from the experience of addressing climate change, which is today well established as both a risk and an opportunity. The risk of climate change requires both measurement and management, and is regulated via financial supervisors. The business opportunity is a far-reaching decarbonisation movement demanding investment and financing.

This climate position has come about over years of international negotiation (via the United Nations' COP process and supported by scientific groups such as the IPCC[32]); national government policy (articulated through Nationally Determined Contributions and including subsidies and taxes);

Figure 7: The framework for managing nature and a comparison with climate change (non-exhaustive)

The framework for managing climate change

Global agreement:
"Paris Agreement" on Global Warming
(UN Climate Change Conference - COP 21, 2015)

Vision:
Limit the global average temperature rise to well below 2°c above pre-industrial levels, and to aim for 1.5°C

National Policies:
Nationally Determined Contributions

Reporting:
Taskforce on Climate-related Financial Disclosures, International Sustainability Standards Board

TCFD Task Force on Climate-Related Financial Disclosures | ISSB

Risk management:
Network for Greening the Financial System

Target setting:
Glasgow Financial Alliance for Net Zero
Other examples: The Net-Zero Industry Act, The Science Based Targets initiative

New business:
Sizeable green bond and loan markets; climate funds and portfolio alignment

NGFS | GFANZ | Science Based Targets

The framework for managing nature

Global agreement:
"Kunming-Montreal" Global Biodiversity Framework
(UN Biodiversity Conference - COP 15, 2022)

Vision:
By 2050, all ecosystems are maintained, enhanced or restored; human-induced extinction halted, with 2030 goals of 30x30*; harmful incentives reduced by USD 500bn; USD 200bn mobilised; & business disclosure on nature

National Policies:
National Biodiversity Strategies and Action Plans

Reporting:
Taskforce on Nature-related Financial Disclosures

TNFD Taskforce on Nature-related Financial Disclosures

Risk management:
Network for Greening the Financial System

Target setting:
UNEP FI Principles for Responsible Banking
Only applicable for banks

New business:
Limited nature-focused sustainable bond or loan issuance; limited debt products for nature transactions and nature funds

NGFS | UNEP Finance Initiative Principles for Responsible Banking

*The 30x30 concept refers to Target 3 of the Global Biodiversity Framework, which calls for the effective protection and management of 30% of the world's terrestrial, inland water, and coastal and marine areas by the year 2030

[32] Intergovernmental Panel on Climate Change

financial sector regulation, with a focus on reporting (through groups such as the Task Force on Climate-related Financial Disclosures (TCFD) and accounting standards in the form of IFRS[33] S1 and S2); and a voluntary response from the industry, notably through industry associations such as the Glasgow Financial Alliance for Net Zero (GFANZ).

A purposefully analogous solution is taking shape for nature (see Figure 7). Nature has a parallel COP process, with the 2022 COP15 producing a global ambition. This has set in motion a process by which countries create policies for nature (**NBSAPs**), with the first plans created for COP16 in 2024. Regulatory groups such as the Network for Greening the Financial System (NGFS) are also outlining a global regulatory response that would require improved reporting and risk analysis. The **Taskforce on Nature-related Financial Disclosures (TNFD)** has deliberately created reporting standards that are directly comparable with those for climate reporting. The voluntary elements are less well developed, but initial papers from groups such as the UN Environment Programme Finance Initiative (UNEP FI) have laid the groundwork for future voluntary target setting and financial sector crowding in.

Financial institutions can thus learn from their climate experiences and prepare accordingly for nature-related risks and opportunities. In anticipation of regulatory requirements, they can respond early to reporting needs, begin assessing risks and business opportunities, and understand data and other operational requirements.

The industry can also learn from the successes and limitations of the climate experience. Voluntary efforts to support decarbonisation from financial institutions helped accelerate the scaling up of technological adoption, but only where a positive economic case existed. Policymakers and regulators could only stimulate investment when they also considered economic viability. The takeaway from this experience is that financial institutions focused on real risks and scalable financial opportunities in managing nature will need to engage with policymakers on priority areas where the conditions for financial crowding in[34] do not yet exist.

Getting started on nature for financial institutions

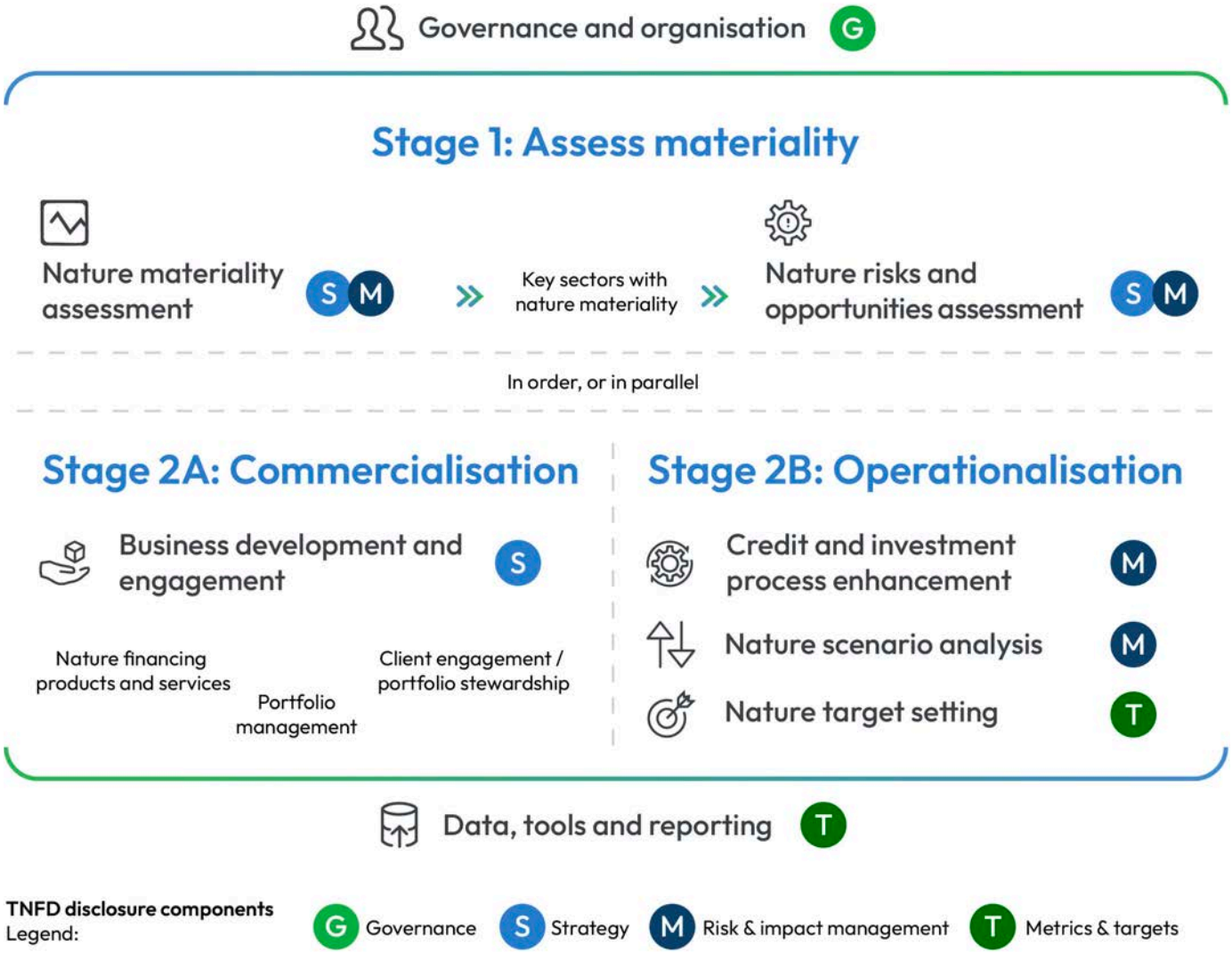
Figure 8 gives an illustration of how financial institutions might kickstart efforts to manage nature-related risks and pursue commercial opportunities, while aligning with global policy and regulatory direction.

A logical starting point for financial institutions could be to establish their governance and organisation structure for nature, and assess the materiality of nature within their portfolios (Stage 1). This is primarily a prioritisation effort. Nature is multi-faceted, and any analysis of risks and opportunities would be hyper-local and require in-depth analysis. Financial institutions can simplify this problem with a materiality assessment that narrows down the area of analysis. This filtering can utilise existing tools to screen sectors and geographies, and understand key hotspots; but financial institutions will also need to apply expert judgement in line with local corporate, technological and policy environments.

After this prioritisation, financial institutions can direct financing to supporting nature and engage clients to identify nature-related risks and opportunities (Stage 2A). They can also begin to embed nature considerations into their business models and processes (Stage 2B). These two stages need not be sequential. Nature-financing opportunities are immediately available (see Chapter 5), including green buildings, sustainable agriculture and circular economy projects, and innovative debt-for-nature swaps. Financial institutions can also improve elements of their internal processes in advance of full analysis, and can judge for themselves the appropriate order and pace of these efforts.

[33] International Financial Reporting Standards
[34] Financial crowding in is an economic theory that government spending boosts private investment and demand.

Figure 8: Proposed practical steps for financial institutions to kickstart their journey towards nature



Chapter 3: The nature materiality and risk assessment

This chapter offers a framework for a nature risk and materiality assessment. Further practical details on how financial institutions could conduct this analysis for their own portfolios are provided in the addendum.

Defining materiality assessment

Economic activity interacts with nature in two ways: Economic activity has **dependencies** on nature, and it creates **impacts** on nature[35].

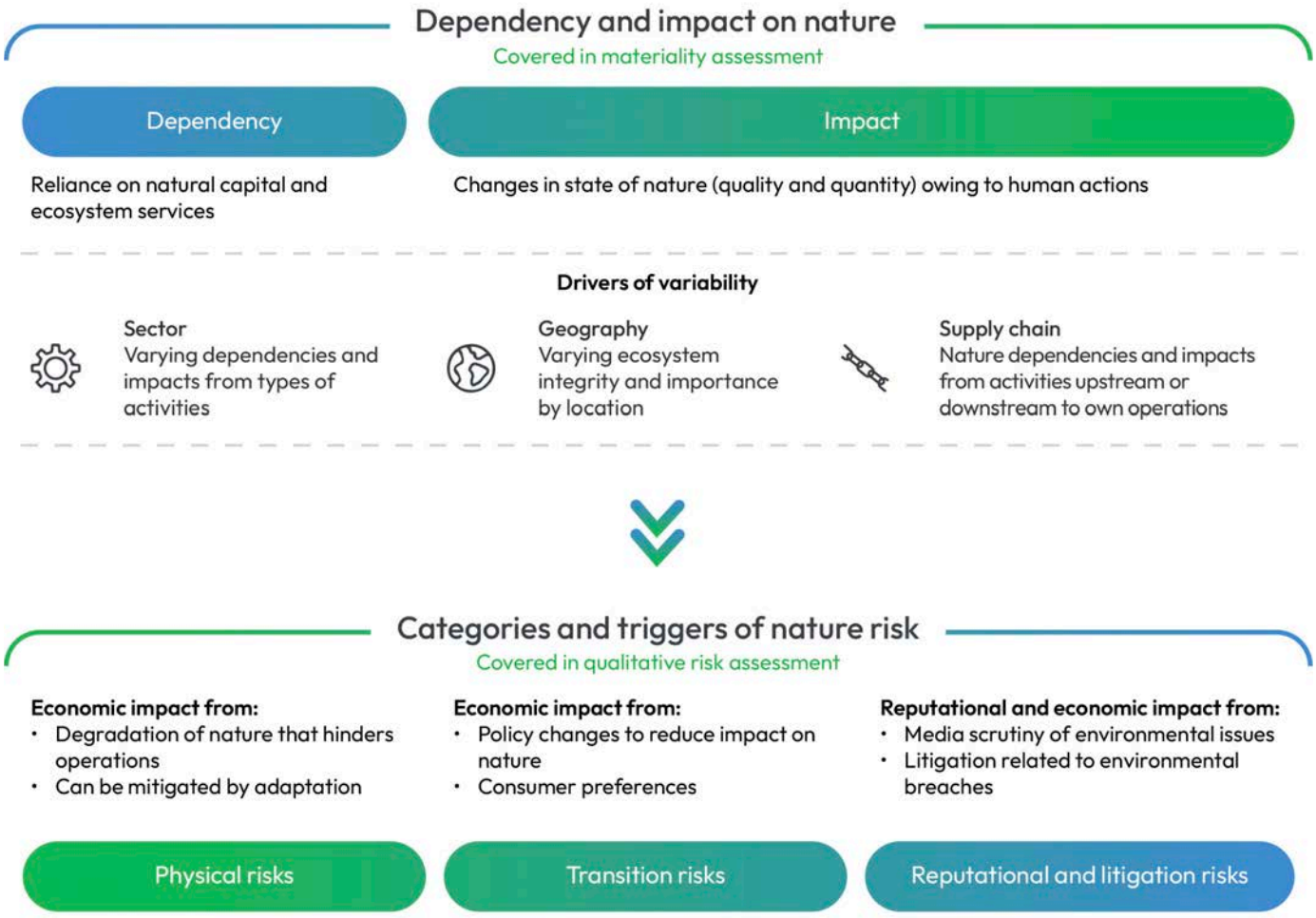
Dependencies arise from a reliance on natural capital and the ecosystem services that nature provides. These ecosystem services can be sub-divided into:

- Provisioning services: clean water, food and raw materials
- Supporting services: photosynthesis and nutrient cycling
- Regulating services: water purification and climate regulation
- Cultural services: aesthetic value and recreation

Threats to the integrity of these services create an economic risk to businesses that are dependent on them.

Impacts refer to the effects that human activities have on natural capital and their ability to provide these services. Economic activity that causes habitat destruction, pollution, climate change

Figure 9: Our framework linking dependencies and impacts to risks



[35] Taskforce on Nature-related Financial Disclosures (TNFD), n.d.

and resource depletion, for example, all lead to negative impacts on nature. A nature materiality assessment starts by analysing these dependencies and impacts to understand where they arise and are material.

There are three layers to this assessment:

1. Looking at the inherent dependencies and impacts of an economic sector
2. Looking at where that activity is geographically located, and how the specifics of that geography could affect risks
3. Looking across the activity value chain[36] (see Figure 10).

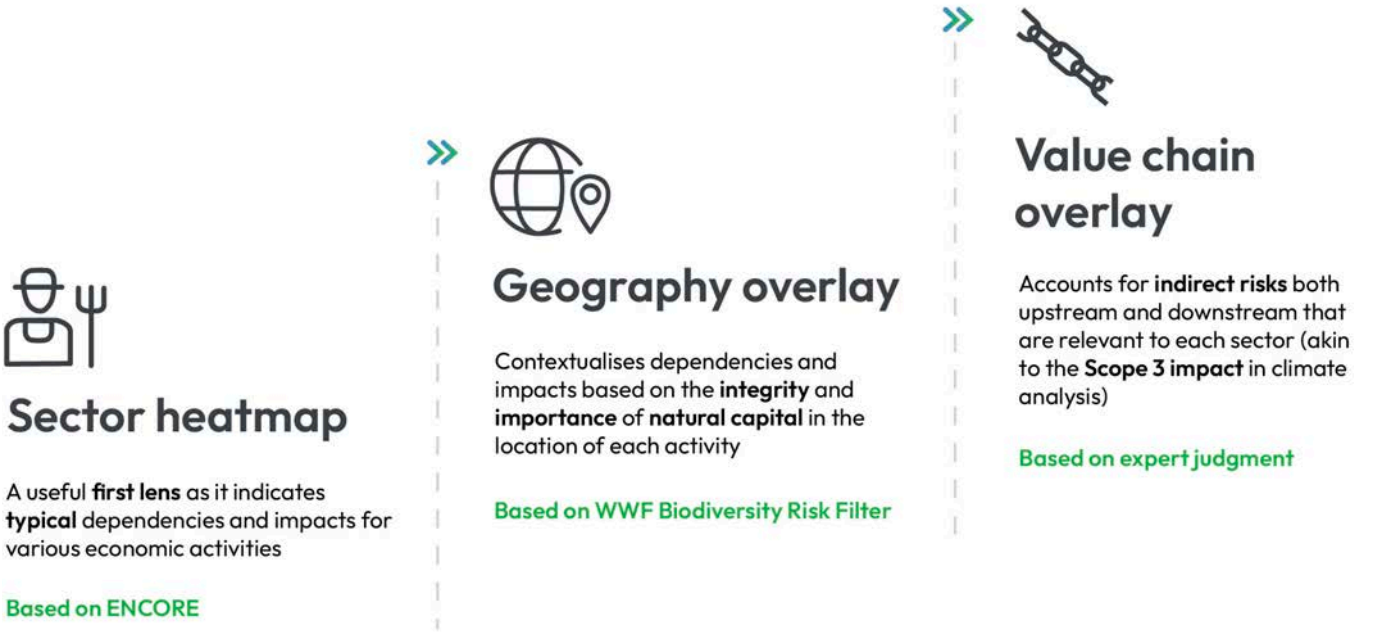
There are various free and open-sourced data and tools to facilitate materiality assessments. The UN's ENCORE (Exploring Natural Capital Opportunities, Risks and Exposure) tool, for example, provides an overview of underlying impacts and dependencies by sector. The WWF's Risk Filter shows current levels of nature integrity and trajectories by geography. These need to be combined, together with a look through to value chains, to create a starting analysis.

How dependencies and impacts create risks

Defining material impacts and dependencies makes it possible to then assess potential exposure to four key types of risks. These are:

- **Physical risks** arise when the degradation of ecosystem services hurts economic activities,

Figure 10: Steps in a materiality assessment



Notes:
- Order of analysis can be determined based on relevance to financial institutions' portfolio (e.g., geography analysis could be conducted before sector analysis)
- Financial institutions should complete the end-to-end materiality assessment before concluding on the prioritisation of top material sectors and locations

[36] Geography and value chain considerations are non-sequential. Financial institutions should avoid filtering on geography before considering value chain in order to avoid missing important risks. Further details are provided in the Addendum.

leading to financial loss[37]. These risks are more likely to occur in industries with significant dependencies on nature and/or in geographies where ecosystems are degraded or degrading fast. Such risks may, however, be partially mitigated by both government and corporate measures.
Crop growing is dependent on soil quality and faces greater physical risk in a location with degraded and deteriorating soil conditions. This risk may be mitigated by agricultural practices to protect soil quality.

- **Transition risks** stem from potential policy, technological or behavioural changes aimed at preventing further damages to nature, which can create financial costs or reduce revenue for companies[38]. This risk is highest in sectors or geographies where ecosystems are heavily degraded and policy makers may act to protect the remaining ecosystem services; in places where ecosystems are intact but vital to the country (for example in tourist hotspots); or when public and political opinion is in favour of action.
  Oil palm plantations in Southeast Asia face greater transition risk because European regulators and consumers see the industry as a significant driver of deforestation.

- **Reputational risks** arise when a company is associated with environmentally harmful activities, such as pollution, resource depletion or unsustainable practices, leading to public backlash, negative media coverage or consumer boycotts. A tarnished reputation can result in financial losses, decreased market share and challenges in attracting talent.
  A palm oil producer associated with deforestation or the practice of burning to clear land may face reputational risk of consumer boycotts.

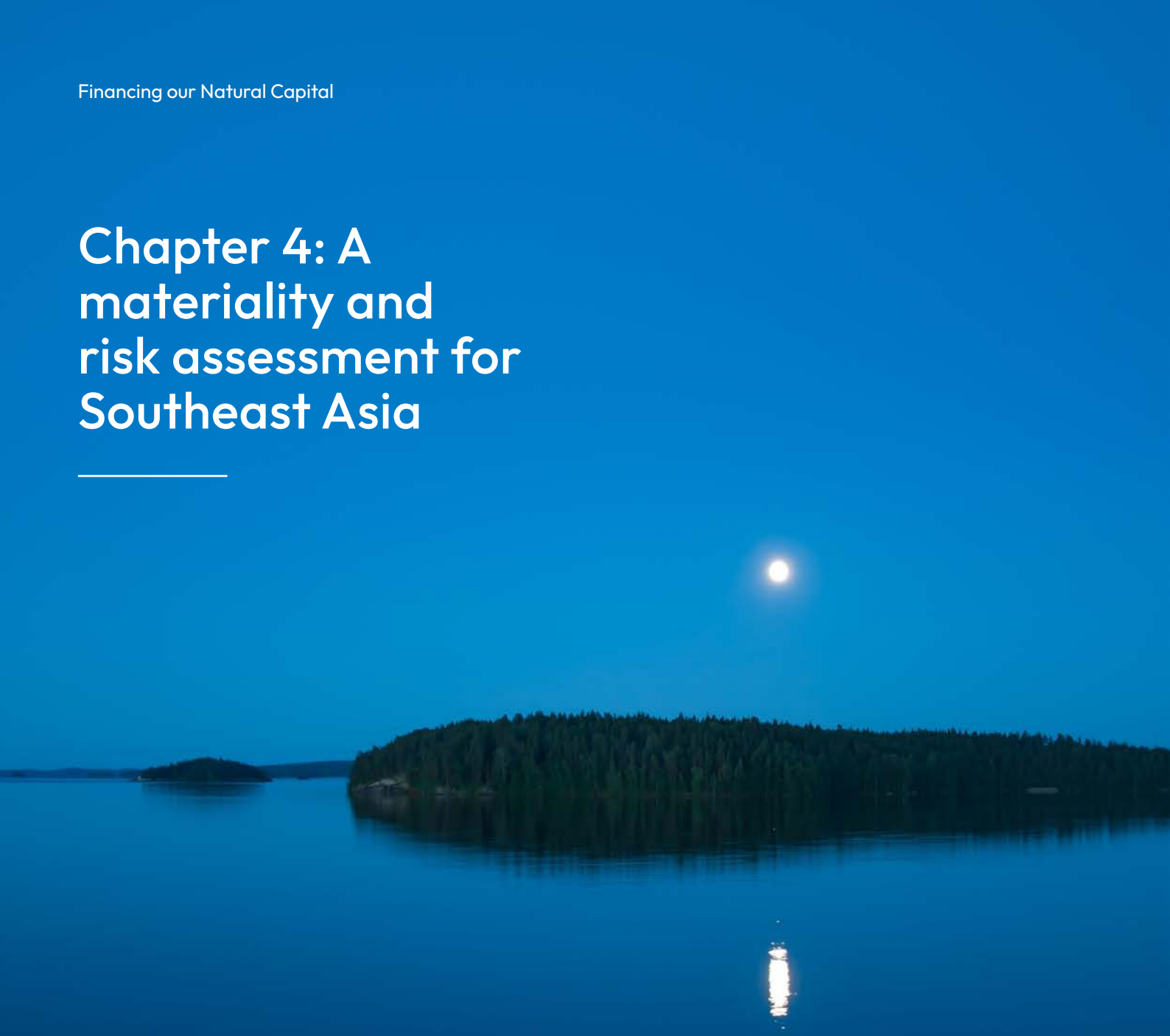
- **Litigation risks** typically arise from environmental damage or violations of environmental legislation. Besides legal costs and damages, ongoing litigation tarnishes the reputation and image of the companies involved, thus impacting stock prices and creditworthiness[39].

Figure 11 offers sample questions for assessing how dependencies and impacts translate into risks.

Figure 11: Translating impacts and dependencies to risks

[37] Financial Stability Board, 2024
[38] The Coalition of Finance Ministers for Climate Action, 2022
[39] NGFS, 2024

Chapter 4: A materiality and risk assessment for Southeast Asia



To better illustrate the assessment approach outlined in the previous chapter, this chapter attempts a materiality and risk assessment for Southeast Asia.

Using GDP contribution to show materiality, it is possible to conduct a high-level materiality assessment of the dependencies and impacts of sectors in the Southeast Asian economy. This assessment can then be used to uncover market and credit risks for financial institutions.

Such an exercise is instructive because financial institutions typically have limited direct dependencies or impacts on nature, but companies in their financing portfolios can have material dependencies and/or impacts.

Sector heatmap – Analysing impacts and dependencies of sectors in Southeast Asia

The starting point of the materiality assessment is a sector-level assessment. This does not distinguish between different companies within a sector, nor does it make distinctions across countries. We have utilised the UN's ENCORE tool and combined this with reported GDP[40] data at the most granular sector level available in each Southeast Asian country[41].

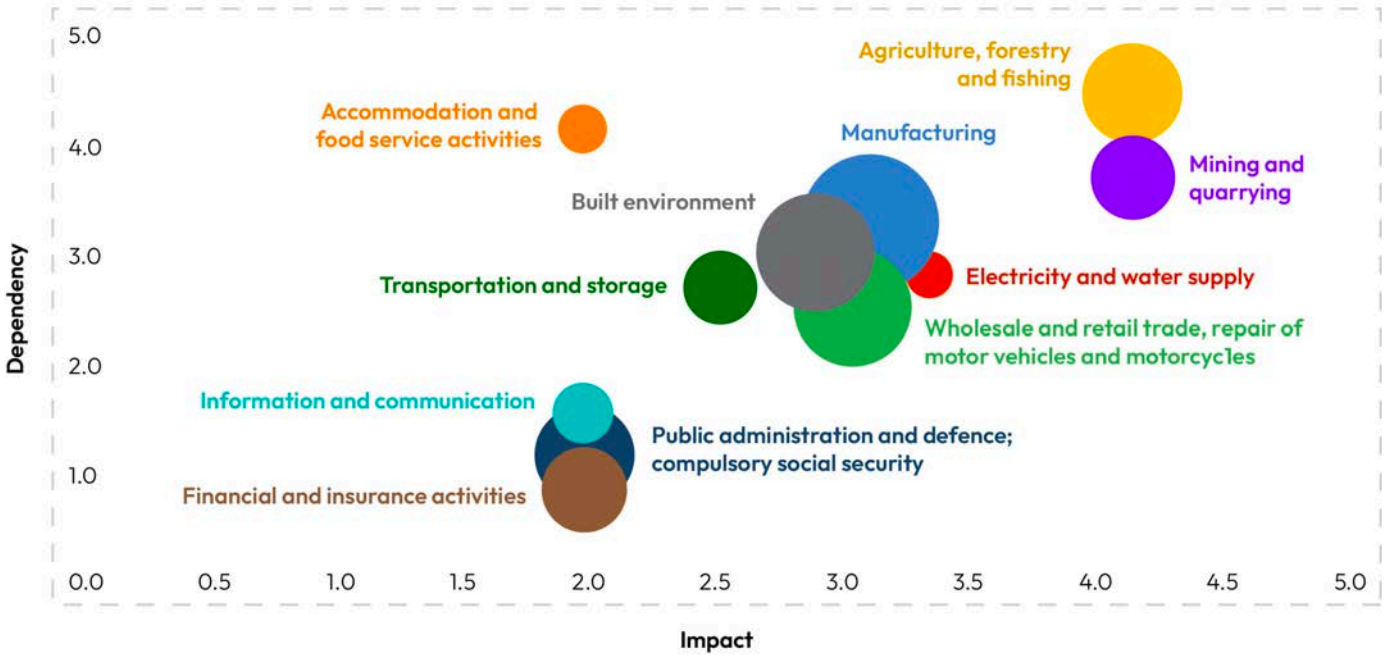
The results of the materiality analysis are shown in Figure 12. Looking at the **dependency** axis (y-axis), the following sectors have higher dependencies on nature: agriculture, forestry and fishing; mining and quarrying; accommodation and food service activities; manufacturing; and built environment. Sectors with higher **impact** (x-axis) are: Agriculture, forestry and fishing; and mining and quarrying. For Southeast Asia, the sectors in the top and right – those likely to be more exposed to nature risks – are also economically important to the region. This suggests that nature risks **are** material to the region.

The ENCORE tool also gives details of the key dependency and impact drivers by sector. In agriculture, for example, ENCORE identifies the following.

Key impact drivers[42]:

- **Soil and water pollution:** Agricultural practices, such as fertilisation, can contaminate water bodies and soil, negatively impacting both human health and ecosystem functionality.

Figure 12: Sector heatmap of Southeast Asia



Size of bubble indicates GDP contribution

[40] Similar analysis can be conducted using market capitalisation or price index data to more accurately represent equity opportunities across various sectors, which may be more relevant for investors and asset managers. For reference, this analysis has been published by the Asia Investor Group on Climate Change (AIGCC) in its "Nature at a Tipping Point" report (Asia Investor Group on Climate Change, 2024).
[41] This is meant as an illustration of the prioritisation analysis financial institutions may wish to conduct for their own portfolios, where they could rely on measures of exposure rather than GDP to understand materiality. Further details are provided in the Addendum.
[42] Excluded biotic resource extraction as a key driver since activities such as fishing, hunting and gathering only constitute a small portion of Southeast Asia's GDP.

- **Volume of water use:** Agriculture is a major consumer of water, and unsustainable water use can result in scarcity and ecosystem degradation.
- **Area of land use:** The expansion of agricultural land can result in habitat loss and fragmentation, which threatens biodiversity.

Key dependency drivers[43]**:**

- **Soil quality:** Healthy soil is essential for productive agriculture, and degradation can lead to reduced yields and increased reliance on synthetic fertilisers.
- **Water quality:** Ecosystems play a vital role in filtering and purifying water, which is crucial for agricultural sustainability.
- **Pollination services:** Many crops depend on pollinators, and the decline in pollinator populations can significantly impact agricultural productivity.

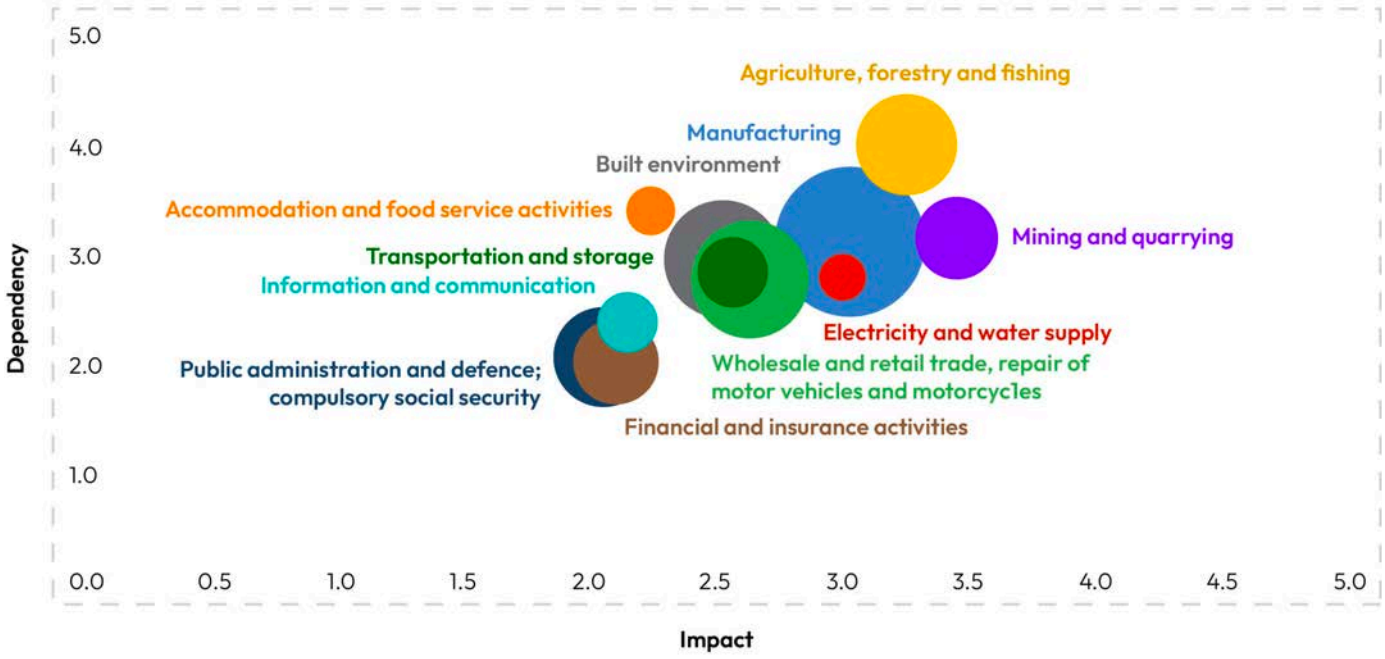
Geography overlay – Integrating local ecosystem integrity into sector insights

As ENCORE only provides a sector level analysis, it does not consider the state of the natural ecosystem in the geographies analysed. Yet, ecosystem integrity is critical in understanding the extent to which a dependency constitutes a risk.

Ecosystem integrity is the ability of an ecosystem to autonomously maintain its health. Much as a healthy human body can recover naturally from mild illness, an ecosystem with high integrity is able to restore itself through natural processes.

The same economic activity faces different levels of risk when conducted in locations with different ecosystem integrities.

Figure 13: Post-geography overlay of Southeast Asia's sectors



Size of bubble indicates GDP contribution

[43] List excludes drivers without an associated WWF risk indicator, and those related to climate change and cultural services.

To refine our sector analysis, we use a geography overlay based on ecosystem integrity data from the WWF Risk Filter.

This filter shows locations that have suffered greater ecosystem degradation across multiple indicators. For instance, Thailand's water ecosystem shows lower integrity versus other Southeast Asian nations. This suggests businesses with a high dependency on water are more likely to face physical risks from water shortages in Thailand than in other parts of Southeast Asia.

The post-geography overlay result is summarised in Figure 13. Most Southeast Asian countries have moderate ecosystem integrity, with a wealth of natural resources that has not been fully degraded. This results in a moderation of risk.

However, sectors identified earlier as having the highest impact and dependency – agriculture, forestry and fishing; mining and quarrying; manufacturing; and built environment – are still showing high risks. Thus, the prima facie case for nature as a material risk in the region remains.

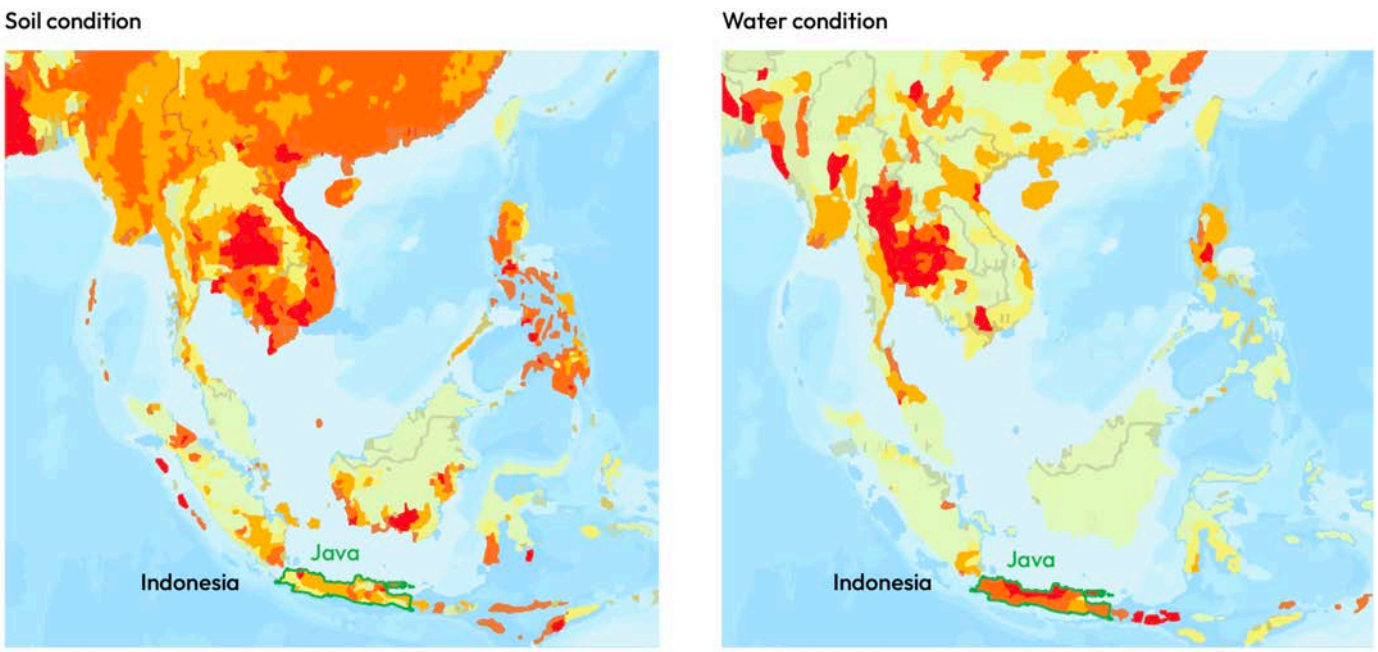
This analysis helps with prioritisation for further interrogation. With agriculture identified as facing highly material impacts and dependencies, even after accounting for geographical differences, we can drill down to understand the key areas of concern.

Table 1 shows variations among countries based on WWF Risk Indicators for soil and water.

Agriculture in Vietnam appears most at risk, with soil conditions highly degraded. Farmers in Vietnam are most likely to face the highest physical risks within Southeast Asia.

This analysis has been conducted at a country-level, but nature risks are highly location specific.

Figure 14: WWF Biodiversity Risk Filter maps



Source: WWF Risk Filter Suite

Table 1: Selected WWF Risk Indicator scores relevant to agriculture for top 5 contributors to ASEAN's agricultural production

Country	Contribution to ASEAN agri GDP	Country WWF score	Soil condition	Water condition
Indonesia	46.2%	2.80	Low risk	Very low risk
Vietnam	13.6%	3.50	Very high risk	Medium risk
Thailand	12.4%	3.21	High risk	Medium risk
Philippines	10.9%	3.00	High risk	Medium risk
Malaysia	10.3%	3.14	Very low risk	Medium risk

Legend: Very high risk; High risk; Medium risk; Low risk; Very low risk

Notes:
- Indicators in table represent level of biodiversity and ecosystem risks, ranging from "very low risk" to "very high risk"
- Higher biodiversity and ecosystem risks translate to lower ecosystem integrity
- Country WWF score represents an average of aggregated dependency and impact score based on our specific materiality assessment methodology applied

Ecosystem integrity can differ greatly within the same country. WWF's Risk Filter Suite includes maps highlighting these differences. While Indonesia as a whole has high ecosystem integrity, Figure 14 shows degraded soil and water in Java.

This analysis identifies sectors and geographies where nature risks are likely to be highest, but does not account for policy impacts or company measures. It does, however, enable prioritisation for further analysis.

Physical risks[44]

Geography plays a role in translating dependency into physical risk, because it allows for the consideration of national or regional policy and corporate standards.

Example 1: Physical risk assessment for the data centre industry in Singapore

Singapore hosts over 70 data centres, making it one of the biggest such hubs in the world[45]. These data centres require substantial amounts of water to cool their servers.

[44] See Appendix 4 for additional examples on risk translation.
[45] Nikkei Asia, 2024

Data centre water consumption in Singapore is estimated to reach 48.75 billion litres in 2025, and 65.55 billion litres by 2030 – a compounded annual growth rate of 6.1%[46]. Singapore is also one of the most water-stressed countries in the world. It lacks natural water resources and has limited land available for water storage facilities[47]. This indicates high physical risk.

To address water supply risk, the Singaporean government has implemented proactive policies and measures. Investments in water management infrastructure such as reservoirs, recycling plants and desalination plants have enhanced the resilience of the country's freshwater supply[48]. Singapore's high-grade recycled NEWater meets around 30% of its water needs and could fulfil up to 55% by 2050, while desalination is estimated to meet 85% of its needs in future. Water self-sufficiency is expected by 2061[49]. These initiatives mitigate the physical risks from water dependency, reducing the overall physical risk for the data centre industry in Singapore to low or moderate.

Transition risks[50]
Geography also affects transition risk. Policy, technological or behavioural responses may be highest where ecosystems are either highly degraded (and thus in urgent need of protection), but may also be high where ecosystems are highly intact (and therefore of the highest value to protect). The risk depends significantly on the salience of nature in national political and public discourse.

Example 2: Transition risk assessment for palm oil industries in Southeast Asia from international pressures[5l]

Transition risks in the palm oil industry primarily arise from international pressures and initiatives, especially the European Union Deforestation Regulation (EUDR). Expected to be applicable from Dec 30, 2025, the EUDR requires all products imported into the EU to be deforestation-free. Concerns regarding oil palm-related deforestation have also led to boycotts and campaigns advocating alternatives such as rapeseed oil and sunflower oil.

Malaysia's government has responded by implementing mandatory Malaysian Sustainable Palm Oil (MSPO) certification for all palm oil producers, and approximately 87% of plantations were compliant as at April 2024[52]. It is widely expected that MSPO will be enhanced to become more EUDR complaint[53]. Hence, the transition risk is likely to be high for the palm oil industry in Malaysia.

In Indonesia, historical national strategies for agriculture have prioritised socio-economic outcomes and poverty alleviation over environmental sustainability. The country's palm oil sector has, however, transitioned from voluntary to mandatory Indonesian Sustainable Palm Oil (ISPO) standards; and there is an increased focus on deforestation regulations. Only 33% of Indonesian palm oil plantations are ISPO certified[54], indicating the need for further progress. Additionally, ISPO has faced criticism for being too lenient and failing to meet the standards set by the global Roundtable on Sustainable Palm Oil. Driven by international export pressures, the transition risk is also likely to be high in Indonesia.

Reputational and litigation risks
A geographical lens may be relevant in assessing reputational risks when there are disputes with local and/or indigenous communities, such as land-use conflicts that threaten livelihoods. Litigation risks also vary by geography because each country has its own environmental legislations[55].

[46] Mordor Intelligence, 2021
[47] National Library Board Singapore, 2020
[48] Ministry of Sustainability and the Environment Singapore, 2024
[49] Eco-Business, 2024
[50] See Appendix 4 for additional examples on risk translation.
[5l] European Commission Regulation on Deforestation-free Products, 2024
[52] Ministry of Plantation and Commodities Malaysia (KPK), 2024
[53] KPK, 2024
[54] Hasnah, 2021
[55] NGFS, 2024

Value chain overlay – Accounting for upstream and downstream nature materiality

The analysis above presents Southeast Asia's sectors at a high-level categorisation. In practice, sectors could be further broken down. Poultry farming has very different impacts and dependencies from palm oil production, although both fall under the agricultural umbrella.

Impacts and dependencies will also vary across the value chain. Oil palm farmers face different impacts and dependencies from palm oil refineries. Nevertheless, **value chain analysis** requires looking through the whole value chain to avoid underestimating risks.

This is illustrated in Figure 15. The direct risk for a food manufacturer is low, but if the upstream value chain is concentrated then the food manufacturer may face high physical or transition risks.

The analysis above provides a prima facie indication of the materiality of nature to the Southeast Asian economy and illustrates the approach and challenges of materiality assessments. We see that several material sectors in Southeast Asia have high or very high impacts and dependencies on nature. Incorporating geographical analysis moderates that slightly because of relatively high ecosystem integrity in the region, but does not change the overall conclusion. It also points to geographical hotspots at a country level (such as Vietnam), and sub-country hotspots (such as Java in Indonesia).

This analysis is not the final answer. Further analysis is possible with more data – more granularity by sector; the inclusion of value chain considerations; local analysis of ecosystem integrity and transition risks; and analysis of practices and mitigants in place. Financial institutions may wish to consider all these layers of analysis, with simplified heatmapping to prioritise where that effort is best spent.

Figure 15: Illustration of value chain analysis

Chapter 5: Opportunities for nature financing

This chapter aims to highlight business opportunities from nature by taking a broader definition of nature financing. Doing so reveals a large span of economically viable and advantageous activities in the real economy, including pricing risk, providing equity financing to investments with attractive returns, providing debt to scale up mature technologies, mitigating risks in development and easing payments.

Overview of nature financing opportunities

There is a lack of consensus on what constitutes nature finance. Much of the literature tends to one of two extremes:

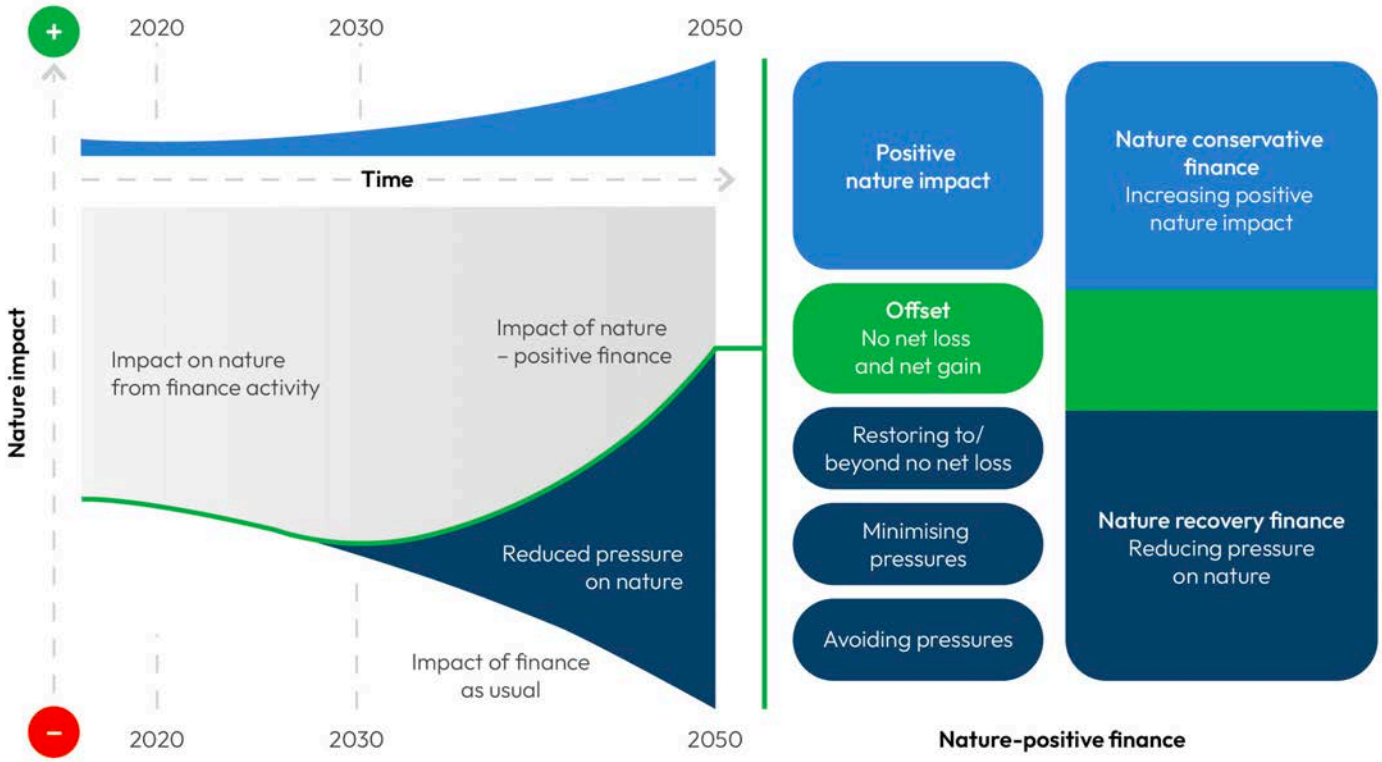
1. Limiting nature finance to conservation and restoration projects requiring government intervention, or novel schemes that due to their innovative nature tend to be small-scale
2. Broadening nature finance to encompass any economic activity with dependency on nature

Neither approach has been successful in enlisting the financial sector at scale. We therefore prefer a broad definition of nature finance as any activity that supports corporate activities aimed at reducing negative impacts on nature or creating positive impacts.

The **Cambridge Institute for Sustainability Leadership (CISL)** proposes defining nature-positive finance as including conservation activities, business activities that avoid or minimise pressures on nature, activities that restore nature, or offsetting activities by corporates[56]. We believe this broad definition will best serve to encourage and thus crowd in private sector investment.

The financial industry's experience with climate change shows that a wider definition can guide financial institutions to extend financing towards activities with a net positive impact. Many existing sustainable finance frameworks and taxonomies already include elements of nature. These include support for the circular economy; and avoiding

Figure 16: CISL's definition of nature-positive financing



Source: CISL – Scaling Finance for Nature

[56] Cambridge Institute for Sustainability Leadership (CISL), 2024

water pollution, over-exploitation of natural resources and prohibited land use)[57]. This means financial institutions are already providing financing to support nature. Nevertheless, comprehensive definitions and qualifications have a signalling effect that can help scale up this financing. We thus see merit in financial institutions explicitly defining and recognising nature financing within their sustainable finance frameworks.

Financial institution case study 1: Nature-related opportunities in UOB's sustainable finance framework

UOB currently has sustainable finance frameworks in place that help drive growth in sustainable finance. These include the Circular Economy Framework that supports companies in the renew, reuse and reduce business; and the Food and Agribusiness Framework that supports companies along the value chain towards sustainable food systems. Although UOB's initial sustainable finance framework was primarily geared towards addressing climate financing, many nature elements – such as circular economy and sustainable water use – are already included in its sustainable finance framework, though they are not explicitly labelled as such.

To pinpoint its current baseline for nature financing, UOB estimated the share of climate-only, nature-only and climate-nature financing across its entire sustainable finance portfolio. Through this analysis, UOB found that close to 60% of its existing green and sustainability-linked loan portfolio of SGD 58 billion is already supporting nature-related activities (see Figure 17).

Given the lack of a nature financing taxonomy available in the market, this breakdown is based on UOB's internal classification. This allows UOB to continue tracking, monitoring and scaling its sustainable finance portfolio to ensure a holistic growth in financing across both climate and nature aspects.

Figure 17: Estimated breakdown of UOB's sustainable financing

Source: UOB

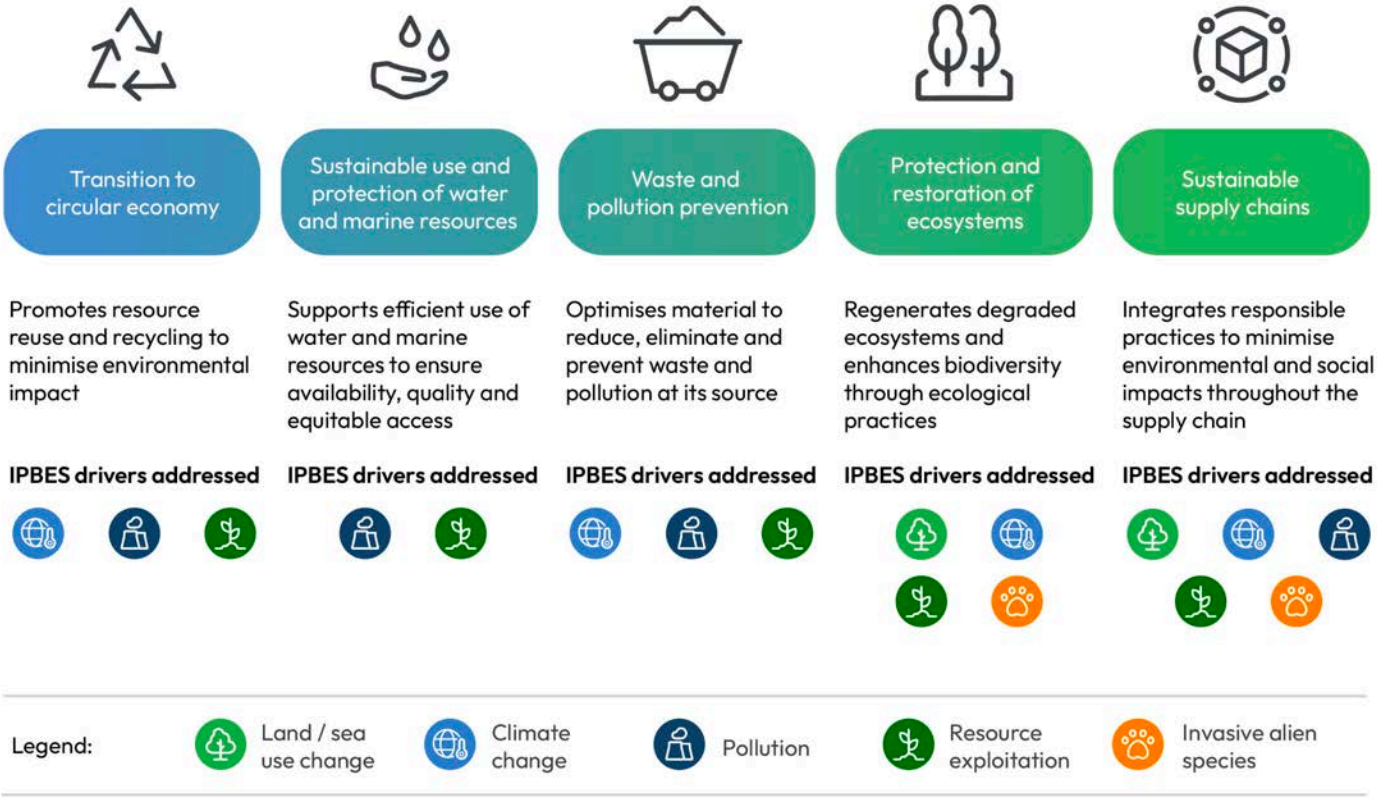
As illustrated by the UOB example above, deliberate nature reporting and target-setting can have multiple benefits. This discipline ensures the nature elements of sustainable finance are interrogated and made comprehensive; creates a framework to support targets for nature financing; and sends a clearer signal to stakeholders, peers and policymakers.

Using the above definition, we reviewed the literature on nature opportunities and analysed initiatives undertaken by real economy players in the region to develop a list of nature initiatives and investable themes. Below, we detail opportunities in material industries such as agriculture and the built environment. We have focused on bankable and investable nature financing opportunities by considering factors such as technological readiness, commercial viability (based on potential return on investment) and regulatory pressures.

Figure 18 shows five key themes that fit these criteria (excluding climate change, which is well established). The intention here is not to be exhaustive or to propose fresh possibilities, but to demonstrate that viable nature financing opportunities exist today.

[57] ASEAN Taxonomy Board, 2024

Figure 18: Key nature thematic opportunities



Transition to a circular economy

A circular economy is one that minimises waste and maximises the use of resources through reusing, refurbishing and recycling[58]**.** It reduces pollution from waste disposal and reduces the need for new raw materials, helping to conserve natural resources and protect ecosystems from over-exploitation.

Many companies adopting circular economy models are integrating recycled materials into their products and operations. In the agriculture industry, for example, biomass from organic materials is being converted into biofuels and fertilisers. This process provides a renewable energy source and reduces waste from agricultural residues, animal manure and food waste. Many palm oil companies, including IOI, FGV and Sime Darby Plantations, have established biogas facilities to convert palm oil by-product into biofuels[59]. These facilities also have positive economic returns for the companies, making them viable and bankable.

Financial institutions can scale up such efforts by providing targeted finance or offering investment instruments that support circularity while delivering competitive financial returns. This opportunity is also likely to be supported by large multinational corporations, which are exerting pressure on and providing price advantages to sustainable suppliers, thus creating opportunities for supply chain finance and insurance.

[58] Elisha, 2020
[59] See Appendix 5 for additional case studies

Financial institution case study 2: BNP Paribas Asset Management Circular Economy ETF

IPBES drivers addressed:
- Climate change
- Pollution
- Resource exploitation

The BNP Paribas Easy ECPI Circular Economy Leaders UCITS ETF provides investors with exposure to the performance of 50 international large-cap companies that actively engage in circular economy practices.

This ETF employs a methodology primarily based on ESG criteria to select global companies. The selected firms are evaluated based on their involvement in the circular economy and are categorised into several areas, including circular design; material recovery; extending product lifecycles; sharing platforms; and offering products as services, such as cloud solutions, leasing and goods exchange.

Among the top companies included in this ETF are 3M, Oracle and Hitachi, which all invest heavily in circular economy technologies. For example, 3M's Scotch Cushion Lock Protective Wrap, made from 100% recycled paper, offers a sustainable alternative to conventional plastic bubble wrap. With a fund size of EUR 636 million and 5-year returns of 73.26%, this investment vehicle exemplifies investor interest and confidence towards a commitment to sustainable business models that prioritise the circularity of goods, resources and raw materials.

Source: BNP Paribas Asset Management

Sustainable use and protection of water and marine resources

As global water scarcity intensifies due to climate change, population growth and urbanisation[60], innovative solutions for water conservation and management become essential. In Southeast Asia, it is estimated that 15% to 25% of the region's population live in drought hotspots[61]. Recognising the significance of sustainable water use and management, many real economy players have implemented projects to optimise freshwater usage, with the majority citing significant economic savings.

An example of this is wastewater treatment and recycling[62]. This multi-step process includes physical, chemical and biological methods – such as screening, sedimentation, filtration and disinfection – to remove contaminants. Treated water is then reused or released into the environment. This practice reduces reliance on traditional water sources, mitigates the negative impact of untreated wastewater on ecosystems and improves the efficiency of water infrastructure.

Real economy case study 1: BHP water stewardship at Olympic Dam

IPBES drivers addressed:
- Land/sea use change
- Climate change
- Pollution
- Resource exploitation

BHP's Olympic Dam, located in South Australia, contains one of the world's most significant deposits of copper, gold and uranium. However, the mine faces considerable challenges related to water usage due to its arid environment. In response, BHP has implemented several innovative initiatives aimed at recovering and reusing water throughout its operations.

[60] He, 2021
[61] ASEAN, 2020
[62] See Appendix 5 for additional case studies

Key strategies include reusing rejected water from the desalination process in the processing plant, capturing water that accumulates in the underground mine for drilling and repurposing liquor from tailings. Additionally, BHP has focused on water recovery from the grinding process, enhancing overall water efficiency. Together, these initiatives contributed significantly to BHP's achievement of a 30% reduction in global freshwater withdrawals from 2017 to 2022, highlighting the company's commitment to sustainable water management.

Furthermore, BHP has addressed the wastewater treatment needs of the Olympic Dam Village, which supports a population of up to 1,000 residents. The existing wastewater treatment plant was upgraded to accommodate the increased sewage load, allowing approximately 200-400 kilolitres of water per day to be sent for reuse. This initiative not only supports the operational needs of the mine but also fosters positive relationships with the local community by ensuring responsible water resource management.

Source: BHP

Financial institution case study 3: UBS Sustainability Bond for Manila Water Company[63]

IPBES drivers addressed:

- Pollution
- Resource exploitation

UBS successfully executed a USD 500 million sustainability bond offering for Manila Water Company in 2020, reinforcing its commitment to water and environmental sustainability. The proceeds from this issuance are earmarked for refinancing maturing obligations and funding capital expenditures for projects aimed at sustainable water and wastewater management, terrestrial and aquatic biodiversity conservation, and affordable basic infrastructure.

Source: UBS

Waste and pollution prevention

Waste and pollution prevention practices aim to reduce, eliminate or prevent waste and pollution at source. These practices help to inhibit the release of pollutants to the environment.

Such practices are observable in precision agriculture. For example, GPS mapping can be used for targeted chemicals application thanks to precision equipment such as aerial spraying drones and mechanised boom sprayers. This minimises chemical runoff and reduces soil and water pollution[64].

In the built environment industry, prefabricated modular homes and manufactured homes represent a similarly preventive approach. Prefabricated homes are constructed off-site in sections or panels, then assembled on-site; while manufactured homes leave a factory as complete units. These methods allow for precise material management and limit residual waste to one location, making it easier to manage and prevent pollution. They are also economically advantageous for real estate developers, making this approach a nature-positive development that can be scaled with positive returns.

Real economy case study 2: City Developments Limited building modular homes

IPBES drivers addressed:

- Pollution
- Resource exploitation

City Developments Limited (CDL) continuously invests in, innovates and adopts leading-edge technologies such as Prefabricated Prefinished Volumetric Construction (PPVC) to significantly reduce construction waste. CDL first used PPVC when developing The Brownstone, an executive condominium project in Singapore. The application of concrete PPVC for this project is likely the world's largest for a large-scale private residential

[63] Philstar Global, 2020
[64] See Appendix 5 for additional case studies

development. A total of 4,098 building modules, achieving 83% area coverage, were prefabricated off-site and subsequently assembled on-site[65]. The application of concrete PPVC construction helped mitigate the impact on the surrounding area through a construction method that resulted in a cleaner worksite with less waste and a safer construction environment. Through these waste reduction initiatives and various other reuse and recycle programs, CDL targets to cap the waste intensity from construction sites at 40 kg/m2 by 2030, down from 70 kg/m2 of waste intensity in 2016.

Source: CDL

Mining operations frequently generate wastewater that contains harmful contaminants including heavy metals, chemicals and sediments, posing serious environmental risks if not adequately treated[66]. As a result, many countries have implemented regulations on wastewater discharge from mines[67]. Mining companies must therefore invest in wastewater treatment facilities and provision for regular upgrades – both to minimise negative environmental impacts and to keep pace with regulation – creating investible opportunities in the sector.

Protection and restoration of ecosystems

The protection and restoration of biodiversity and ecosystems encompasses a range of practices aimed at improving the health and functionality of nature's ecosystems.

A prime example is the use of regenerative agriculture and precision agricultural practices[68]. These include:

- Crop rotation, which involves alternating crops over seasons, helps manage pests and diseases, improves soil fertility and promotes biodiversity.
- Cover cropping entails off-season planting of crops that protect the soil from erosion, enhance nutrient content, suppress weeds and improve moisture retention.
- Reduced tillage minimises soil disturbance during planting and cultivation, thereby preserving soil structure, enhancing microbial activity and preventing erosion.

These practices contribute to increased agricultural productivity, reduced reliance on chemical inputs and healthier ecosystems. These practices are not new, but neither are they ubiquitous. Extending and scaling these activities can thus have a substantial positive impact on nature.

Financial institution case study 4: Pollination and HSBC's Natural Capital Fund

IPBES drivers addressed:

- Land/sea use change
- Climate change
- Pollution
- Resource exploitation

Climate Asset Management, a joint venture between HSBC Asset Management and Pollination, closed commitments in excess of USD 1 billion across three flagship funds. The Natural Capital Fund targets financial returns alongside improved environmental outcomes from real asset investments in regenerative agriculture, sustainable forestry and environmental assets across developed markets. This strategy has found strong appeal amongst pension funds and insurance companies, including USD 100 million committed by German insurer Gothaer's asset management arm. Climate Asset Management has stated intentions to resume fundraising in 2025.

One key project funded is an 1,800-hectare regenerative agriculture initiative in Queensland, Australia, which seeks to transform a degraded sugar cane farm into a biodiverse macadamia nut orchard. Central to this project is the use of precision

[65] Building and Construction Authority Singapore (BCA), n.d.
[66] Funeka, 2024
[67] Thomashausen, 2017
[68] See Appendix 5 for additional case studies

agriculture techniques, which have led to substantial conservation of water resources and a remarkable reduction of up to 50% in synthetic fertilisers and chemical pesticides. These innovative practices not only enhance farm productivity but also have a positive ripple effect on the Great Barrier Reef Marine Park by significantly reducing chemical runoff and sedimentation.

Source: Pollination Group, HSBC

Financial institution case study 5: Standard Chartered Bank's debt conversion project

IPBES drivers addressed:

- Land/sea use change
- Climate change
- Resource exploitation

The Bahamas Debt Conversion Project for Marine Conservation is a financial restructuring initiative aimed at enhancing marine conservation. This 15-year, USD 300 million debt conversion was orchestrated by Standard Chartered Bank, with significant credit enhancements from the Inter-American Development Bank, Builders Vision and AXA XL. The project generated USD 124 million in savings, representing 41% of the facility, through a strategically executed public tender offer, and resulted in 2.1 times oversubscription.

These savings will be allocated by the Government of Bahamas in pre-defined schedules to the Conservation Trust Fund and the Bahamas Protected Areas Fund to support marine conservation efforts. The government also commits to conservation deliverables (Marine Protected Area commitments), including protection of extensive coral reefs, seagrass meadows and mangrove forests.

To ensure accountability, as per a Conservation Agreement that the government enters with The Nature Conservancy, there will be acceleration implications for the Facility in the event of underperformance.

Source: Standard Chartered Bank

Sustainable supply chains

Supply chain sustainability involves the integration of environmentally responsible practices across the supply chain[69]. Large and multinational companies can shape practices by requiring suppliers to embrace sustainable sourcing, production and distribution methods. This typically involves implementing policies to procure only from companies certified by internationally recognised standards, incentivising suppliers to obtain certification and ensuring that products meet specific environmental criteria.

Examples of these include:

- The European Union Deforestation Regulation (EUDR) requires companies to ensure that products sold in the EU do not contribute to deforestation or forest degradation.
- The Better Cotton Initiative has brought together global fashion brands to ensure cotton traceability; and improve cotton farming practices within their supply chains by promoting water efficiency, reduced pesticide use and better livelihoods for farmers[70].

Financial institutions can provide funding to companies seeking international certification. They can also serve their customers by connecting large multinational companies with certified suppliers.

Financial Institution Case Study 6: Rabobank and AGRI3 Fund Partnership

IPBES Drivers Addressed:

- Land/sea use change
- Climate change
- Pollution

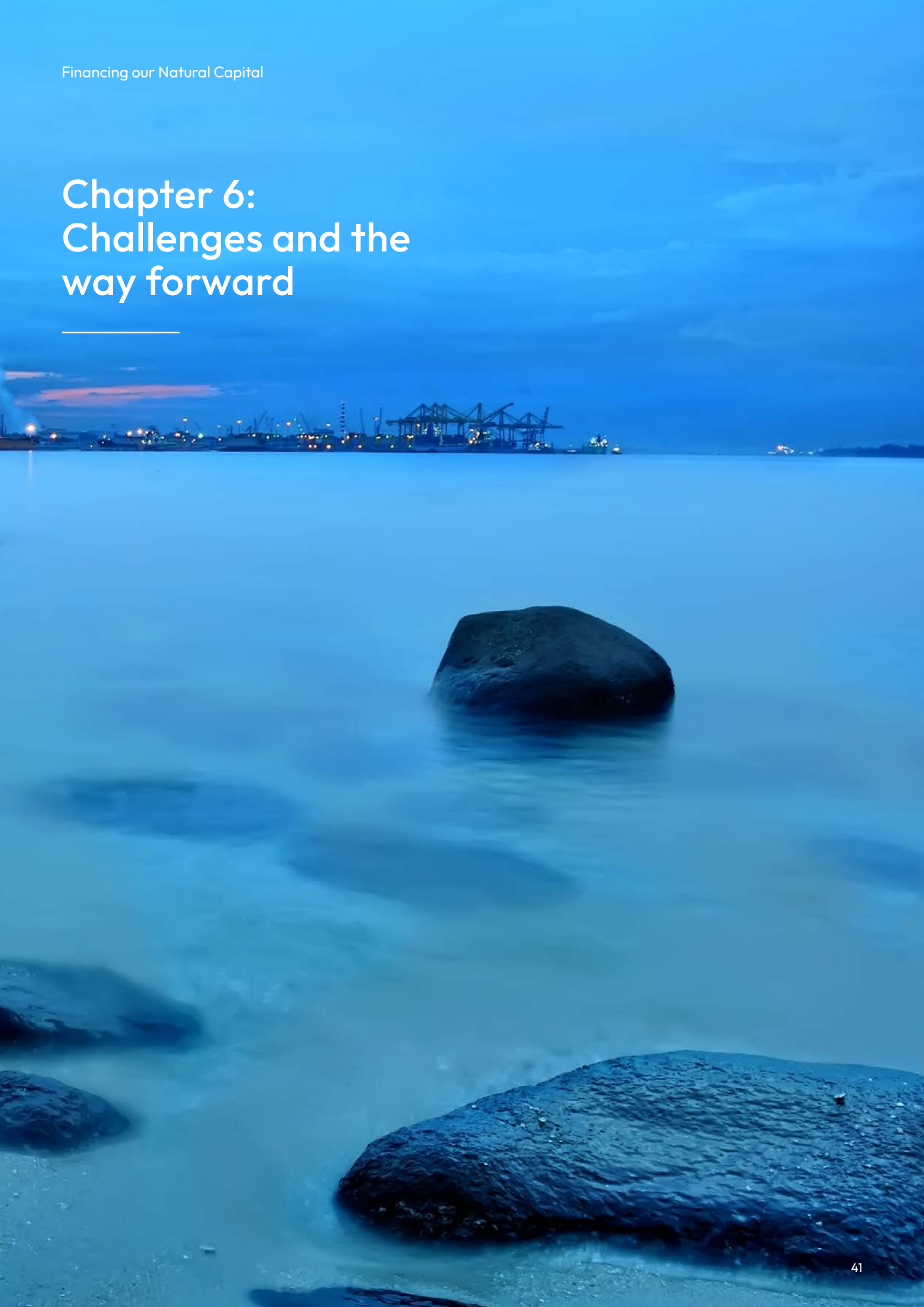
[69] See Appendix 5 for additional case studies
[70] Better Cotton, 2022

In 2020, Rabobank partnered with the AGRI3 Fund, a blended finance initiative, to launch a three-year, USD 10 million bank guarantee programme for Chongqing Agricultural Chain Corporation Ltd (CACC). This programme utilised a pari passu guarantee to facilitate a loan for a chili pepper farming project by CACC aimed at boosting farmer incomes, increasing chili production and promoting sustainable cultivation practices.

Despite rising global demand for chili peppers, many small-scale farmers in China's southwest region have struggled to benefit from this growth. The project aims to address this issue by incorporating guarantees from CACC in the form of offtake agreements with farmers, ensuring that farmers have a market for their produce. To further enhance the project's impact and manage environmental and social risks, the AGRI3 Technical Assistance Facility offers support for risk management and impact monitoring. As a result, the project has achieved a 20% increase in farmers' incomes, cultivated 533 hectares of chili and trained 1,200 farmers in sustainable practices.

Source: CDP Nurturing Nature report

Chapter 6: Challenges and the way forward



This paper lays out the risks to financial institutions from the deterioration of nature, and the opportunities to support real economy players with nature-positive initiatives. The implications for financial institutions are:

1. There is a need to better understand and manage nature risks, and
2. There are opportunities in the pursuit of nature financing.

With enough guidance in place, financial institutions can and should act now.

At the same time, the experience of the financial services sector with climate change suggests that the challenge of nature degradation requires a coordinated government, regulatory, real economy and financial response. This paper, then, is intended also as a call for further action at the following levels:

- **National mandate and policies:** Governments are the ultimate owners of natural capital, and have a fiduciary duty to protect and ensure the provision of ecosystem services to their citizens. National governments can do so through environmental, fiscal and industrial policies. Policy direction will, in turn, determine which economic activities are bankable.

- **Financial regulator guidelines:** Financial regulation and guidance are powerful tools for enlisting sector players. Regulators may consider how existing regulation and guidance on reporting, risk management, governance and planning may be enhanced to increase the focus on nature.

- **Localised scenarios for stress testing:** Existing tools give us a qualitative view of dependencies and impacts, and translate these into physical and transition risks, but they do not facilitate a quantitative assessment. In the case of climate, quantitative risk assessment was possible following the creation of Integrated Assessment Models. These models combined macroeconomic, price, demand and other data for multiple scenarios, which could then be translated into earnings and credit impacts. Something similar may be needed for nature, as highlighted by groups such as NGFS, and further work is needed by regulators, policymakers and scientists. Given the importance of geography in assessing nature risk, scenarios may also need to be local rather than global. Financial regulators will need to decide on the right level at which to design scenarios, and may also wish to focus on severe but plausible risk scenarios rather than pathways to a desired end state.

- **Sectoral pathways for target-setting:** Sectoral pathways developed by scientific and industry bodies have enabled financial institutions to set sector targets for financed emissions. These science-based pathways also help financial institutions decide whether the climate targets set by their portfolio companies are "good enough", which then forms the basis for labelled green and sustainability-linked financing. In the case of nature, there is ongoing work from TNFD and WEF (amongst others)[71] to define similar pathways. More work is needed to ensure widespread adoption, including the definition of appropriate metrics, and will require joint consultation among the government, industrial and financial sectors.

The financial sector is an important stakeholder in these developments, but it will not be the owner of such discussions. Where financial institutions individually or in concert can take a lead are:

- **Industry engagement:** In parallel with policy developments, the financial services industry can engage relevant industry groups in material real economy sectors to understand their nature considerations, challenges and financing requirements. This would raise awareness of nature risks and opportunities, and potentially encourage real economy sectors to think more about nature in their business operations.

[71] TNFD, WEF, and Business for Nature have published various sectoral guidance papers.

- **Standardisation of nature data and metrics:** Nature is multi-faceted and can be measured across different dimensions. A simplification and standardisation of the most relevant nature metrics at the industry-level will therefore be crucial to measure progress and accelerate the target-setting process.

- **Clear definition of nature financing:** In Chapter 5, we made the case that there is a material business opportunity for nature financing provided we apply a sufficiently broad definition. We see an opportunity for the industry to enhance the definitions of nature financing, which could help financial institutions set targets.

Addendum: What can financial institutions act on now?

Figure 19: Proposed practical steps for financial institutions to kickstart their journey towards nature

Step 1. Governance and organisation for nature

Organisational and governance structures to ensure alignment of objectives and promote accountability for nature are the first step in establishing a solid foundation for change. These structures should also be revised consistently throughout the implementation journey, as the insights gained from later steps can shape structures so they align with the specific needs of the organisation.

To begin, financial institutions can consider establishing a **task force** to conduct materiality and risk assessments (Steps 2 and 3). Dedicated resources and capacity can then be determined based on the materiality of identified nature risks. In many cases, financial institutions are likely to integrate nature teams with existing climate and sustainability teams, along with other relevant functional teams – especially risk functions and front office teams. At the same time, to support **capacity building**, financial institutions could develop training curriculums to upskill employees or engage external nature experts or consultants.

Financial institutions could consider incorporating nature governance into their existing sustainability governance structure instead of creating a separate governance structure. Such integration will support the management of client opportunities and business risks in the climate-nature nexus. The TNFD's Discussion Paper on Nature Transition Plans provides additional guidance on the proposed components of an effective governance structure for nature, including board oversight, roles, responsibilities and remuneration, and skills and culture.

Case study 1: Manulife Investment Management's nature governance and organisation

Manulife Investment Management (Manulife IM) believes companies that better manage natural resources and environmental impacts from operations can offer investors a better risk-reward profile over the long term as nature-related risks begin to manifest both physically and financially.

Manulife IM introduced a Timberland and Agriculture Sustainability Team and a Water Resources Team, recognising that these are important aspects of its investment portfolios. These teams help ensure that sustainability and nature considerations are incorporated in important business processes and decisions. For instance, Manulife IM's dedicated team of water resource experts proactively includes water considerations into the investment portfolios they manage and incorporates market-leading irrigation technologies and techniques for conserving water and providing crops with the water they need. Beyond enhancing its organisational structure, Manulife IM also established a governance structure to oversee sustainable investing activities and ongoing stewardship activities, including board oversight of nature and biodiversity-related issues.

Source: Manulife Investment Management

Financial institutions can also consider embedding specific nature exclusion or requirement policies to support their commitment towards nature, which could be a high-impact way to demonstrate their commitment and prevent harm. Many financial institutions already have exclusion policies of this sort and could consider bringing these together into an overall nature approach and/or extending them to address gaps.

Some examples of such policies are summarised in Figure 20.

Figure 20: Examples of nature policies

"Minimum hygiene" policies

More widely expected by consumers to be imposed on material sectors, such as agriculture

"No Deforestation, No Peat, No Exploitation"

"Required ta be RSPO member or have a time-bound plan to become RSPO members"

"Required to conduct HCV/HCS assessments"

"No development of new oil palm plantations on UNESCO sites, Wetlands on the Ramsar list, etc."

"No financing for mining companies using Mountain Top Removal (MTR)"

"Aspirational" policies

Should be implemented depending on the nature focus of the financial institution

"No financing of companies producing or buying beef or soybeans from the Amazon and the Cerrado regions"

"Required to provide a water management plan and disclose water consumption"

"Required to provide information related to waste and strategies regarding land reclamation"

Step 2. Nature materiality assessment

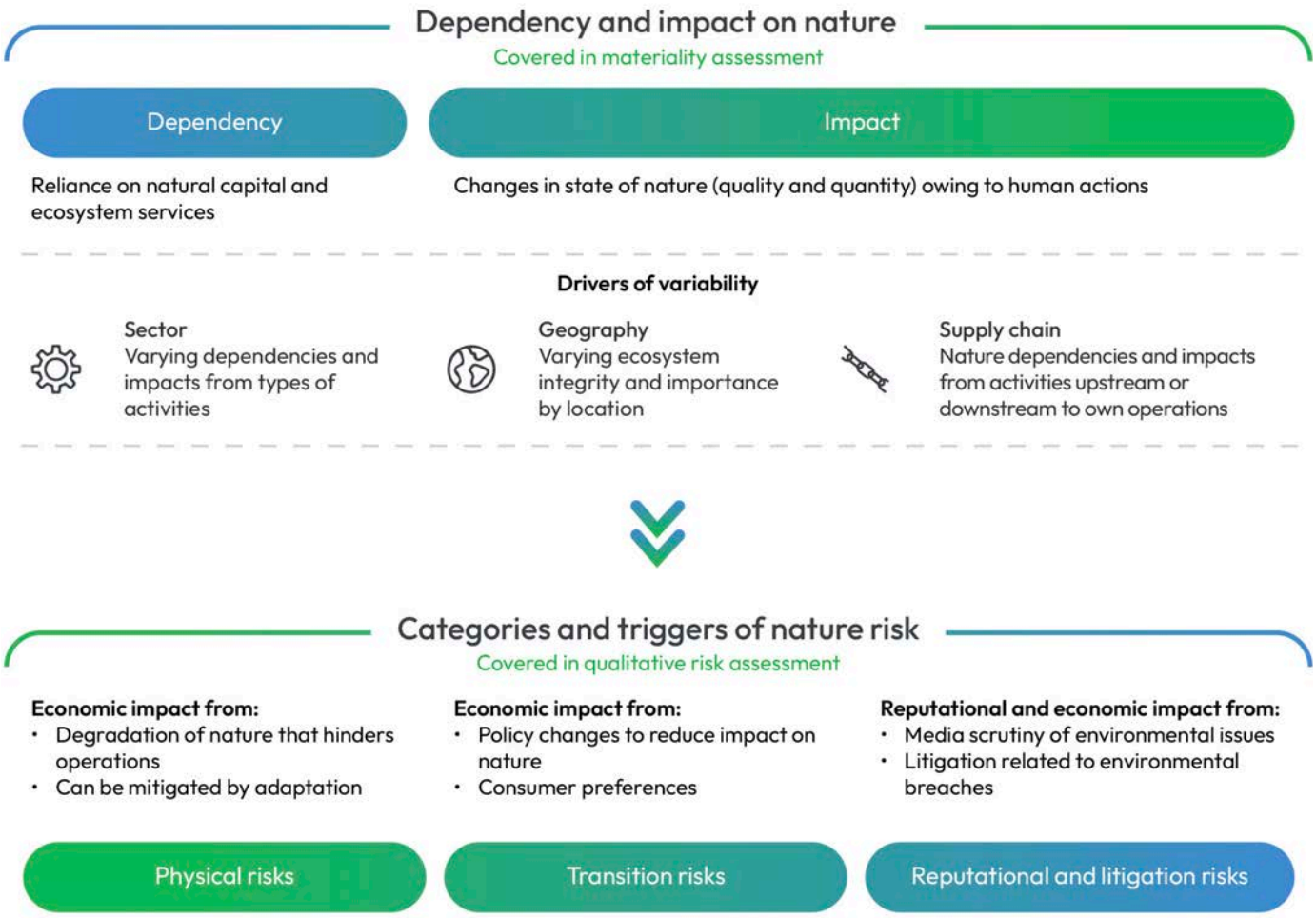
A materiality assessment identifies the impacts and dependencies of portfolios or funds on nature. Results from this assessment help to simplify the complicated problem statement of nature by diagnosing areas where nature risks are material in a financial institution's portfolio, allowing it to narrow the focus for risk analysis and the identification of opportunities (see Figure 21).

Three components can be considered in this assessment (see Figure 22):

1. Impacts and dependencies that their economic activities pose to nature
2. The integrity of natural ecosystems in the locations where they operate
3. The impact of their value chains

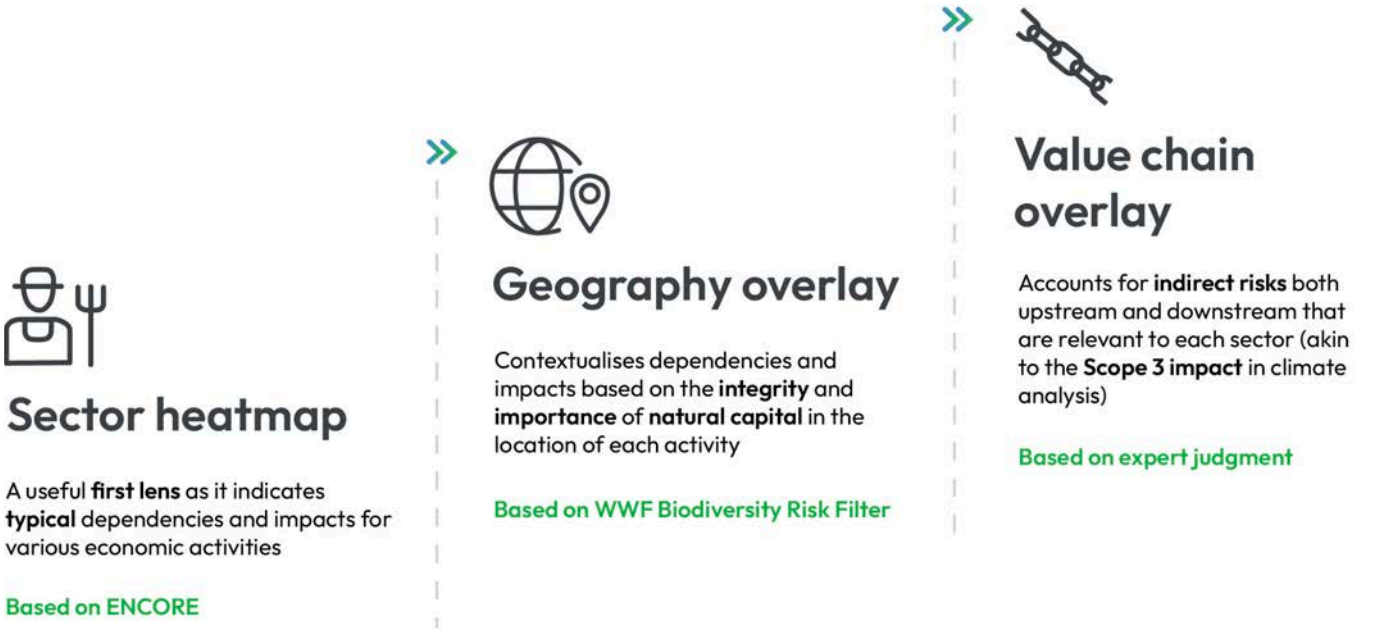
These considerations are also in line with the recommendations by TNFD, under the 'Locate' step of the LEAP (Locate, Evaluate, Assess, Prepare) framework[72].

Figure 21: Linking dependencies and impacts to risks



[72] TNFD, 2023

Figure 22: Steps in a materiality assessment



Notes:
- Order of analysis can be determined based on relevance to financial institutions' portfolio (e.g., geography analysis could be conducted before sector analysis)
- Financial institutions should complete the end-to-end materiality assessment before concluding on the prioritisation of top material sectors and locations

As not all sectors may necessitate an intensive geographical and value chain overlay analysis, these steps could be conducted at the discretion of financial institutions for select sectors where additional insights are required.

To understand nature impacts and dependencies for sectors, TNFD recommends tools[73] such as the ENCORE tool and the Science Based Targets Network's (SBTN) High Impact Commodity List and Materiality Screening Tool. These can be supplemented by other tools for a fuller picture of potential geographical and value chain issues, including the CDP Water Impact Index, the Integrated Biodiversity Assessment Tool, Trase, and the WWF Risk Filter. For this discussion, we will focus on using the ENCORE tool and the WWF Risk Filter to conduct the materiality assessment.

Sector heatmap

One of the most widely recognised tools for creating sector heatmaps is the ENCORE tool, which was co-developed by Global Canopy, UNEP FI and United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC). The tool lists nature impacts and dependencies for more than 400 sectors. Each of the 25 dependency and 13 impact drivers is also scored by sector across five levels: very low, low, medium, high and very high. Sectors are mapped to ISIC codes, which makes it convenient for financial institutions to map to their own portfolios.

The first step of the materiality assessment involves mapping the long list of economic activities in ENCORE[74] to the sector classifications within financial institutions' portfolios. Scores

[73] Relevant tools can be found in the TNFD Tools Catalogue.
[74] ENCORE utilises ISIC codes and provides mapping to GICS codes; hence this mapping step is not required if ISIC or GICS codes are used for internal classifications by financial institution.

across various dependency and impact drivers can then be aggregated to derive the overall impact and dependency scores for each sector.

As there is no pre-defined relativity of importance among nature drivers in ENCORE, each financial institution will need to carefully **select an appropriate aggregation methodology** based on its risk appetite and tolerance. Simply taking an average of the individual driver scores can hide critical spots. For example, an industry may have a very high impact on air pollution and no impact on soil pollution; averaging these scores to yield a medium overall impact would hide the true picture. Financial institutions can employ the "worst of" or percentile-based approaches to aggregate across drivers, which ensures that this important information is not overlooked.

One key ENCORE limitation[75] is that it cannot account for differences across individual companies or geographical locations. A sector could be deemed as having high impact and dependencies on nature using ENCORE, but the risks to the company would differ significantly if it is operating in a highly degraded or ecosystem. ENCORE also does not consider all the value chain links of economic activities. Hence, the usage of ENCORE could be complemented with additional tools.

Geography overlay

The geography overlay can contextualise sector dependency and impact in relation to the integrity of nature at the location of clients' business operations. Impact and dependency scores will be worse if the natural environment is more degraded. The **WWF Risk Filter** is one of many tools that could be useful, as it provides an assessment of the state of ecosystem and biodiversity integrity in geographical locations across 33 risk indicators. These indicators are rated on a scale of 1 to 5 for each geographical location, where a score of 1 signifies low risk (and high ecosystem integrity) while a score of 5 indicates very high risk (and low ecosystem integrity).

As the geolocation data provided by WWF uses **spatial coordinates**, financial institutions can define the granularity of the geography overlay – which could be at a country, state, or geolocation data level – based on data availability.

To conduct a comprehensive materiality assessment that incorporates data from both ENCORE and WWF Risk Filter, it is necessary to map WWF risk indicators to ENCORE drivers and aggregate the scores from both datasets. WWF proposes using a simple average to aggregate WWF risk indicator scores with ENCORE scores for each sector in each location, with the assumption that the natural integrity of an ecosystem could either amplify or diminish impacts and dependencies that a sector has on nature. These scores are then aggregated across countries to calculate the portfolio level impact and dependency score for each sector, after considering the ecosystem integrity of the location in which business activities are conducted.

Value chain overlay

The last step to consider in the materiality assessment is identifying indirect yet material nature risks across the value chain.

To perform this assessment, financial institutions would need to look at a portfolio's upstream and downstream connection with nature, and determine the appropriate methodology for aggregating scores across the value chain. The SBTN has published a computation of ENCORE scores with a value chain overlay, which could serve as a reference point for financial institutions. (Note: These calculations were based on a dated version of the ENCORE dataset at the time of writing.)

Additional considerations

The approach outlined above may be more suited for banks. Investors and asset managers might adopt a slightly different methodology depending on their type, size and asset class focus.

[75] Limitations of ENCORE tool discussed here.

For instance, control-focused asset owners can better understand their overall nature-risk exposures through direct evaluations of their largest holdings. Conversely, passive investors in a thematic fund focused on a specific sector may conduct a top-down assessment based on the geographical composition of the fund.

The materiality assessment is, however, just the first step paving the way for deeper dive through qualitative or quantitative assessments.

Case study 2: BNP Paribas Asset Management's water, deforestation and biodiversity footprint analysis

BNP Paribas Asset Management (BNPP AM) recognises that biodiversity-related risks and opportunities are significant and has been committed to promoting healthy ecosystems, defining healthy Ecosystems as one of the 3 'E's of its Global Sustainability Strategy, a strategic focus area alongside Energy transition and Equality.

BNPP AM published its Biodiversity Roadmap in 2021, which detailed the results of its assessment using Nature Capital Finance Alliance's ENCORE dependency tool. BNPP AM used the ENCORE database to understand its investees' direct dependencies on ecosystem services, finding that water, flood protection and climate regulation are the most important ecosystem services for its portfolios. This pilot assessment covered BNPP AM's aggregate assets under management in listed corporates and bonds.

In 2023, BNPP AM collaborated with Iceberg Data Lab, a fintech firm, to carry out the analysis of its Corporate Biodiversity Footprint (CBF), which covers more than 1,800 companies included in its equity and bond funds, equating to 70% of its corporate assets under management. The CBF methodology translates the drivers of nature loss defined by IPBES – including land use change, air pollution through nitrogen and sulphur deposition, water pollution and climate change – into a quantified impact on biodiversity loss, which is aggregated to compute the CBF of a company.

These quantified impact scores are then aggregated to compute the overall CBF of a given company, which is expressed using km² MSA (Mean Species Abundance). The km² MSA metric measures the potential negative change in MSA due to a company's operational and value chain impacts by translating total degradation of nature into square kilometres, where a footprint of -100 km² MSA means that all the original biodiversity is lost over an area of 100 km² for one year. BNPP AM's financed absolute biodiversity footprint is approximately -0.06 km² MSA per million EUR invested, which means that for each million EUR invested in its funds, six fully degraded hectares are potentially maintained each year.

These assessments provide a high-level compass to identify where deeper analysis of individual issuers is warranted. It complements the suite of tools BNPP AM's ESG analysts may utilise at the sector and issuer level, and helps to inform the investment decisions of portfolio managers. It also guides the identification of key targets and highlights key priorities for direct engagement by BNPP AM's stewardship team.

Source: BNP Paribas Asset Management

Step 3. Nature risks and opportunities assessment

A materiality assessment as described in Step 2 only identifies portfolio impacts and dependencies. Financial institutions may use these to identify nature-related physical and transition risks, as well as potential reputational and litigation risks. This assessment, especially for physical and transition risks, requires geographical context. National policy is typically what creates transition risks; national sentiment and media scrutiny determine the extent of reputational and litigation risks; and national policy can, in some cases, mitigate the level of physical risk.

There is no standard set of tools for translating impacts and dependencies into risks. Some approaches to consider are:

- Expert judgement on the level of risk at a "sector x geography" level, which helps prioritise efforts (some key considerations discussed in subsequent sections; see Figure 23)
- Analysis of individual portfolio companies
- Stress tests for severe but plausible breakdowns in critical natural services (for physical risk) or policy changes (for transition risk)

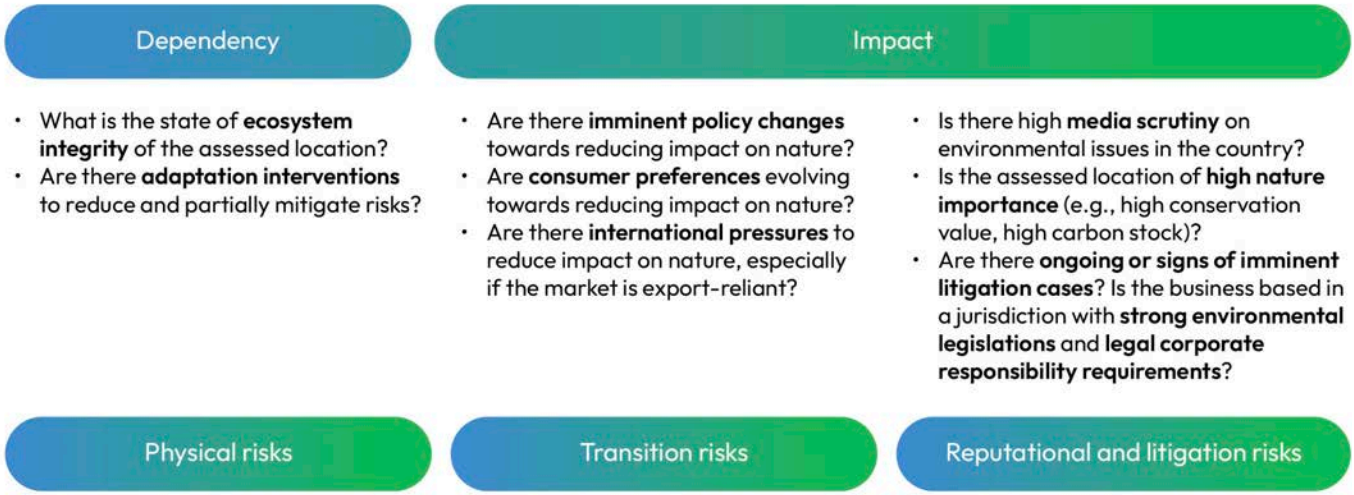
Any approach should be proportionate to materiality, and financial institutions may also use a combination of approaches.

Physical risks assessment

Dependency drivers are the foundation for assessing nature-related physical risks. For each ecosystem service upon which a sector depends, financial institutions could assess the level of physical risk by considering the state of ecosystem integrity in the relevant geographical location and determining whether any local nature adaptation interventions are in place to reduce these risks.

In areas with higher ecosystem integrity, physical risks tend to be lower. Certain national policies may also limit physical risks by facilitating the protection and conservation of natural capital. However, the opposite can also occur – physical risks may be amplified if policies create negative impacts on nature and result in damage to the ecosystems, such as a fertiliser subsidy that prioritises socio-economic advancement at the expense of nature.

Figure 23: Translating impacts and dependencies to risks



Transition risks assessment

While physical risks typically come from dependencies, transition risks are typically driven by impact. By identifying top impact drivers, financial institutions will be better positioned to consider policy changes aimed at restricting negative impacts on nature and evolving consumer preferences that may increase demand for products with better impacts on nature.

Transition risks could be amplified by external pressures or regulations in sectors that are highly export-dependent. The European Union, for example, has put in place the EUDR, which requires European companies to conduct extensive due diligence across their value chains to ensure products on the EU market are not linked to any deforestation. Given that the European Union is ASEAN's second largest trade partner after China[76], the EUDR would inevitably impact sectors and countries in the region.

Reputation and litigation risks assessment

Reputational risk could be determined through the extent of media scrutiny and whether clients' business operations are in key biodiversity areas or areas of high conservation values (See Figure 23). As nature-rich areas are likely to attract heightened vigilance among investigative journalists and environmental activists, economic activities that adversely impact these sensitive areas will face significant criticism. Corporations involved in negative impacts, as well as lenders and investors, could have their reputations tarnished by such activities. The result could be consumer boycotts leading to reduced market share and financial loss, and even challenges in attracting talent.

Large multinational companies tend to face greater media scrutiny due to their outsized influence in the economy. These large companies may not be directly engaged in activities that harm the environment, but they are held responsible for monitoring their supply chains.

Meanwhile, from inadequate corporate sustainability due diligence or violations of environmental legislations could lead to legal action related to environmental damages. Regardless of the litigation outcome, legal costs pose a risk. Litigation risk is also linked to reputation risk, and the threat of legal action may impact stock prices and creditworthiness[77].

Overall risk assessment

A combination of the above assessments would provide a qualitative indication of the overall level of nature-related risks associated with a sector in a defined location. Further quantification of financial risks can be done through a nature scenario analysis, which we will discuss under Step 6.

To comprehensively address risks, financial institutions must take proactive measures, such as by implementing nature considerations in the investment review.

Opportunities assessment

We see a wide range of financing opportunities for nature, provided a sufficiently wide definition is applied. Financial institutions can identify and prioritise opportunities through multiple triangulating approaches, including:

- Analysis and classification of existing sustainable finance, with a view to identify and scale up similar nature financing
- Consideration of the actions required by portfolio companies to manage the physical and transition risks identified in the risk analysis, with financing designed to support mitigation actions
- Engagement with portfolio companies on the actions they intend to take to reduce impact or manage at-risk dependencies

[76] Ministry of Foreign Affairs Singapore, 2020
[77] NGFS, 2024

Step 4. Business development and engagement

Once financial institutions have developed a good understanding of their nature risks and opportunities, they can begin to **commercialise and capitalise on nature-related opportunities while enhancing operational processes to manage nature-related risks** (discussed under Steps 5 to 7). Financial institutions could start commercialising nature through product development, client engagement, and portfolio management.

The development of products and services could involve **banks** creating new nature-specific financing products, **insurers** innovating on protections against nature risks, and **investors and asset managers** offering new fund structures to direct funding towards initiatives that can halt or reverse nature loss. A list of potential financial instruments for nature financing has been summarised in Figure 24,

Figure 24: Examples of potential nature financial instruments

FI type	Product	Description
Asset managers / investors	Nature funds	Active funds thematically linked to nature or biodiversity, with the objective to invest in companies or projects that generate benefits to nature and promote sustainable practices
	Nature-based ETFs	Exchange-traded funds that invest in companies engaged in nature-based solutions and sustainable practices
Banks	Green/blue bonds	Debt instruments to raise capital to finance projects that are beneficial for nature and/or biodiversity Green bonds have primarily financed climate mitigation and adaptation projects, but can also be used for nature projects, while blue bonds are largely to finance marine and ocean-based projects
	Sustainability -linked loans	Loans with financial and/or structural characteristics tied to borrower's sustainability performance, measured against pre-defined sustainability targets / key performance indicators (KPIs) (e.g., interest rates lowered when KPIs are met)
	Sustainable supply chain financing	Financing programmes that offer suppliers financial incentives (e.g., extended payment terms, lower interest rates, financial support) when they meet pre-defined sustainability criteria
	Debt-for-nature transactions	Debt restructuring product to generate savings that will be committed towards sustainability projects
Insurers	Parametric insurance	Insurance that pays out a pre-agreed amount when a pre-defined event (e.g., earthquake) occurs using a predefined index or parameter (e.g., earthquake intensity magnitude), without the need for traditional detailed loss assessments
	Green insurance products	Insurance policies covering risks associated with using sustainable products or the development phase of the sustainability projects (e.g., insurance covering construction and engineering risks throughout the building of wind turbines or rainwater harvesting systems)
Others	Could include blended finance products, nature/ biodiversity credits, sovereign debt, impact investment/equity, public private partnership products, or products focusing on ecosystem restoration and conservation	

focused on private finance instruments. Offsetting products such as carbon credits and nature or biodiversity credits are financial instruments to be considered, although they have yet to be standardised or widely adopted.

Before developing new products, financial institutions could **evaluate their existing sustainable finance offerings** to determine whether these contain nature-related components. They might also consider **modifying established and operational sustainability or climate products** to incorporate nature elements. Financial institutions can thus leverage existing climate infrastructure and streamline their efforts in developing products and services for nature finance, thereby accelerating time to market.

Financial institutions could also actively leverage their influence and engage their clients to raise awareness of nature-related risks and gain insight into the challenges clients face, enabling the design of tailored nature financing products. Where they have direct influence over a company's operations, financial institutions may practice investment stewardship as a tool to steer corporate behaviour towards environmentally conscious practices.

Beyond client engagement, financial institutions could also actively engage with other relevant stakeholders, including governments, regulators, industry counterparts and Indigenous Peoples and Local Communities (IPLC)[78], to support and accelerate the nature transition for the entire economy[79]. More details on potential engagement strategies have been provided by TNFD.

Case study 3: Amundi's corporate engagement campaign

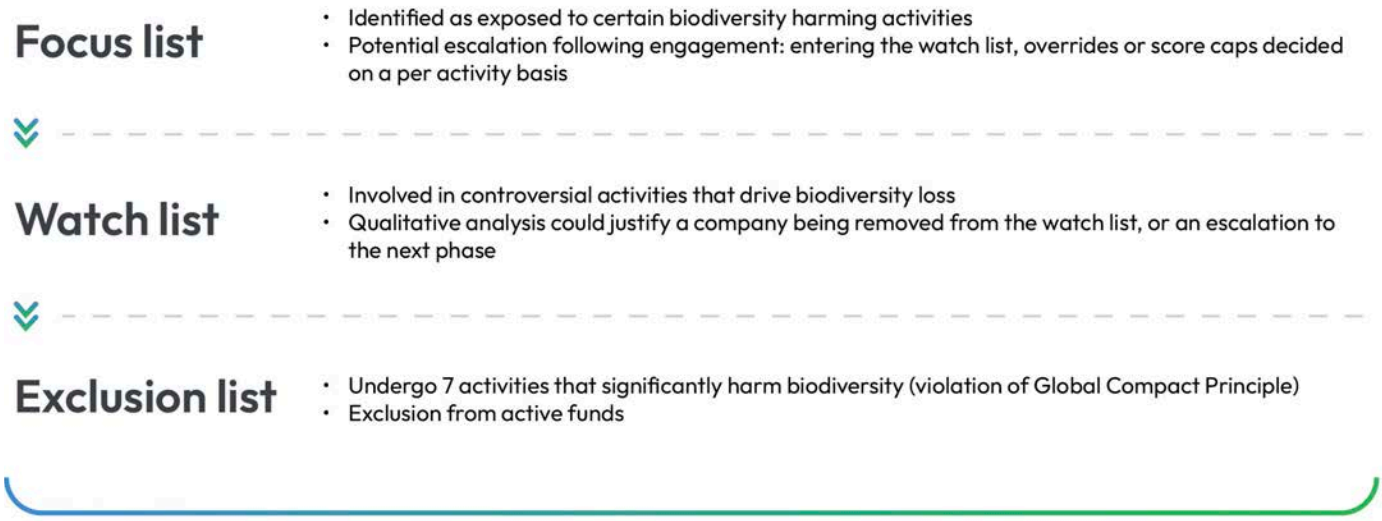
To increase awareness of biodiversity loss and disseminate industry best practices to corporates, Amundi actively engages with companies through its engagement campaigns and classifies them into a focus list, watch list or exclusion list based on their nature and biodiversity risks (see Figure 25).

Its engagement focuses on the management of biodiversity issues and ecosystems risks, not only in direct operations but also in value chains. Amundi began engaging with companies on biodiversity in 2021, growing the engagement pool from 52 companies in 2021 to 294 in 2023 and providing recommendations to improve the integration of this theme within their strategies. Amundi interacts with companies on various nature topics, including the promotion of a circular economy and better management of plastic, prevention of deforestation, pollution control, and the sustainable management of water. In 2023, 618 companies were engaged on nature topics (compared with 344 in 2022). Amundi is also an active participant of collective initiatives for corporate engagements such as Nature Action 100.

Source: Amundi

[78] Indigenous peoples make up less than 5% of world's population, but own, occupy or use land area that is home to 80% of the world's biodiversity. Hence, they play a critical role in halting and reversing nature loss. (World Economic Forum, 2023)
[79] See Appendix 6 for additional case studies.

Figure 25: Corporate stewardship list



Source: Amundi

Step 5: Credit and investment process enhancement

A fundamental enabler for change within an organisation is the enhancement of operational processes. Existing processes in financial institutions may eventually be adjusted to ensure that nature considerations are fully integrated into decision-making and nature-related financial risks are sufficiently managed, especially in relation to credit underwriting or investment due diligence processes. Where applicable, existing climate processes and infrastructure can be leveraged and adapted for nature-related purposes.

Integrating nature assessment into existing credit underwriting or investment due diligence frameworks requires an understanding of the level of nature risks that clients face and the measures they are taking to mitigate these risks. Financial institutions could identify the relevant data and metrics needed from clients to assess nature risks, which are likely to vary by sector and location. Consideration could also be given to data availability, data accuracy and the most effective methods for data collection[80]. Additionally, financial institutions could evaluate the maturity and comprehensiveness of the client or investee's nature strategy, and the extent to which nature is integrated into their operations.

Case study 4: BlackRock's PEXT/NEXT profiler

BlackRock utilises its proprietary PEXT/NEXT profiler (see Figure 26) to screen and quantify positive and negative externalities within its fixed income investment opportunities. Investments categorised as PEXT are highlighted as preferred holdings, while those categorised as NEXT are closely monitored, or avoided for portfolios with sustainable mandates.

As a part of PEXT, BlackRock assesses financing instruments such as Use of Proceeds bonds that are credible, and direct funding mechanisms for investments in nature restoration and conservation.

As a part of NEXT, BlackRock implemented a screen in 2023 focused on identifying companies at risk for deforestation. For example, data from the Farm Animal Investment Risk and Return Initiative is used to screen and identify beef producers with high risk of deforestation from cattle production, while the Sustainability Policy Transparency Toolkit is utilised to screen palm oil producers, traders and processors to identify companies with poor ESG policies and practices. The MSCI's Biodiversity Screening Metrics are also utilised to identify NEXT companies that have production involvement in agro-forestry that may have higher exposure to deforestation risks.

Source: BlackRock

Case study 5: Amundi's biodiversity investment framework

Since 2023, Amundi recognised the vital role of biodiversity and has integrated various nature and biodiversity criteria into its proprietary ESG rating methodology. These include factors such as water management, biodiversity & pollution, and responsible forest management, among others. Building on this ESG rating process, Amundi introduced its bespoke 3-pillar biodiversity investment framework structured around "Avoid, Reduce, Favour", with the aim of minimising biodiversity-related risks in investment portfolios while investing in companies that are leaders on biodiversity-related matters (see Figure 27).

Under **Avoid**, Amundi undertakes a "Do No Significant Harm" assessment on companies and assesses companies' activities based on Principal Adverse Impact (PAI) 7, which requires companies to disclose activities that negatively affect biodiversity sensitive areas. This step helps Amundi in understanding the existence of biodiversity-related controversies, and adequacy of practices and policies related to material drivers of biodiversity loss for the companies reviewed.

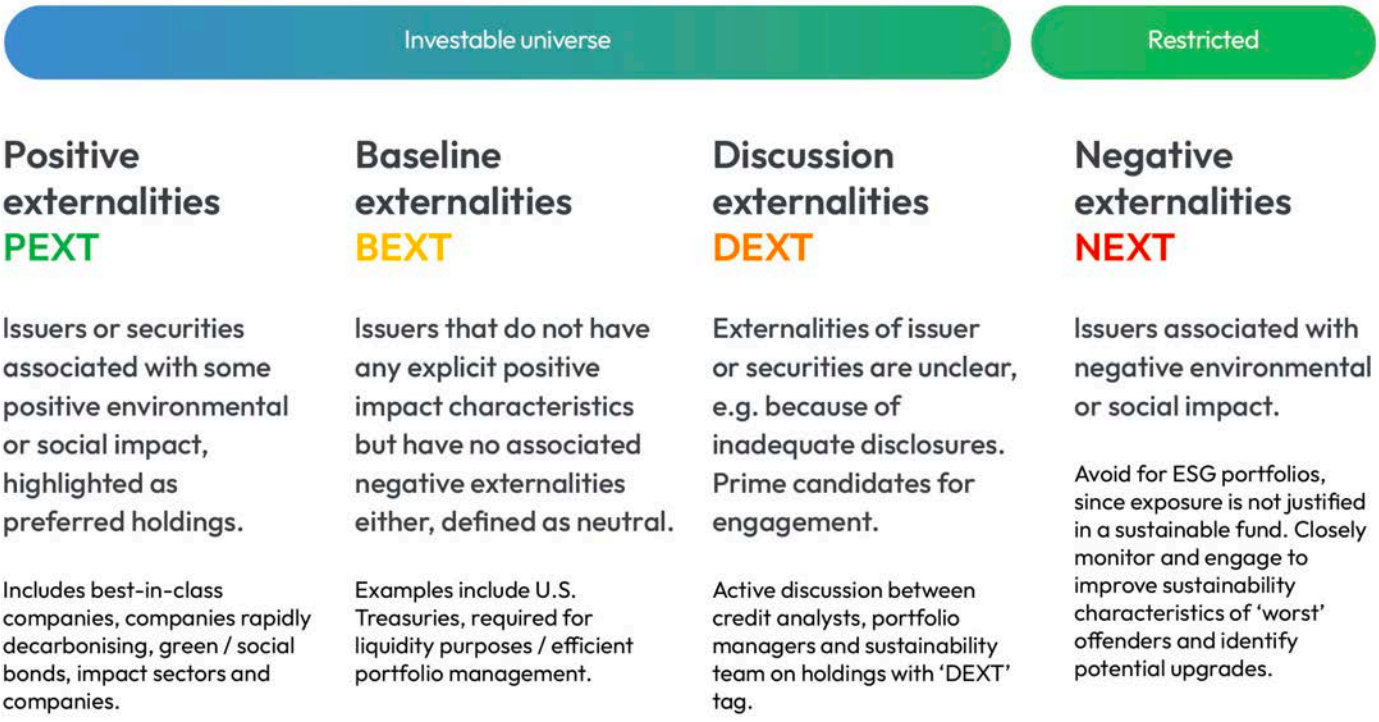
Under **Reduce**, Amundi monitors and manages the overall pressures of its portfolio on biodiversity

[80] Further discussed under Step 8.

through the use of two complementary indicators, one absolute and the other relative. First, the reduction of the biodiversity footprint ensures that the activities of investee companies have a lesser impact on biodiversity. Second, the improvement of our proprietary biodiversity score reflects better practices on biodiversity by investee companies compared to their peers.
Under **Favour**, Amundi focuses its investment on issuers that are leaders in biodiversity-related matters. Eligible companies are identified by screening for those that have more than 20% of their revenues linked to nature themes, or more than 80% aligned to climate change solutions. On the credit side, Use of Proceeds Green or Sustainability bonds that finance projects with a positive biodiversity impact are similarly favoured.

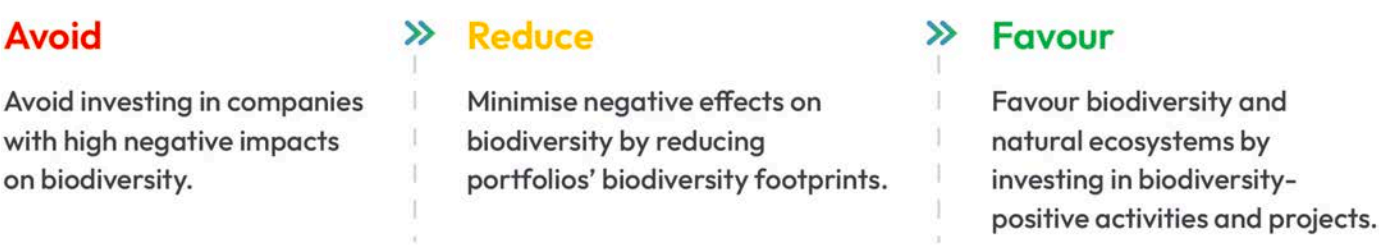
Source: Amundi

Figure 26: BlackRock's PEXT/NEXT profiler



Source: BlackRock

Figure 27: Amundi's biodiversity investment framework



Source: Amundi

Step 6. Nature scenario analysis

Beyond qualitative nature risk management through process enhancements, nature scenario analysis could facilitate a quantitative understanding of nature-related financial risks. Unlike climate, current understanding and development of nature scenarios and their usability is still nascent, with a lack of global guidance. The key challenges in crafting nature-related scenarios and narratives stem from the non-linear relationships between different ecosystem services; and the interconnectivity between climate and nature, which is difficult to define and quantify[81]. For instance, land use changes drive both biodiversity losses and climate change[82]. These two factors can further reinforce each other, as climate change can create unfavourable conditions that lead to additional biodiversity losses. Environmental changes and nature scenarios can also be location-specific even for the same sectors, complicating efforts for standardisation at a global-level (often referred to as the "local-global trade-off")[83].

Nature scenario analysis is thus recognised as an industry-wide challenge. Various industry bodies that are working to make guidance more specific and define the way forward. Meanwhile, these are some existing documents that financial institutions can refer to as a starting point:

- TNFD has published two reports that could be used for nature scenario analysis. The first report, "Guidance on scenario analysis", provides a step-by-step approach for conducting scenarios assessments. The second report, "Discussion paper on conducting advanced scenario analysis", outlines quantitative and advanced methods to perform scenario assessments, including examples of scenario development and application.
- The NGFS has published a technical document outlining its recommendations for developing scenarios to assess nature-related economic and financial risks. This document also discusses challenges and suggestions for nature scenario development, and evaluates several modelling approaches.
- Nature Finance has published a report that describes potential future developments in nature scenario narratives, based on NGFS climate scenarios and recommendations for nature scenarios.

Case study 6: Cambridge Institute for Sustainability Leadership (CISL) nature stress testing scenario

CISL and member financial institutions have generated four use cases and scenarios to assess specific nature-related financial risks, which demonstrate how nature risk scenarios can be potentially developed. One such scenario was created with Robeco, which examines land degradation within the Brazilian agricultural supply chain and its impact on company valuations. The assumptions used in this scenario are grounded in academic literature and historical data from previous significant La Niña events, such as a decline in yields in degraded areas of up to 40% over a three-year period, and a 40% increase in soft commodity and fertiliser prices. This scenario evaluated listed companies across the agricultural supply chain, analysing how the assumptions would affect factors such as price, costs, working capital and volume, which would, in turn, affect valuations.

Findings revealed that farmers on degrading land faced a 13% valuation decline, while those on healthy soils experienced a 6% uplift due to their ability to benefit from rising crop prices after extreme weather. Smaller packaged food companies suffered valuation drops of up to 45% due to increased purchasing costs from supply shortfalls, which they could not pass on to consumers without risking market share. Conversely, global trading companies saw a 4% valuation increase by leveraging their balance sheet strength and logistics capabilities to capitalise on temporary price surges.

Source: Cambridge Institute for Sustainability Leadership

[81] NGFS, 2023
[82] NGFS, 2023
[83] NGFS, 2023

Step 7. Nature target setting

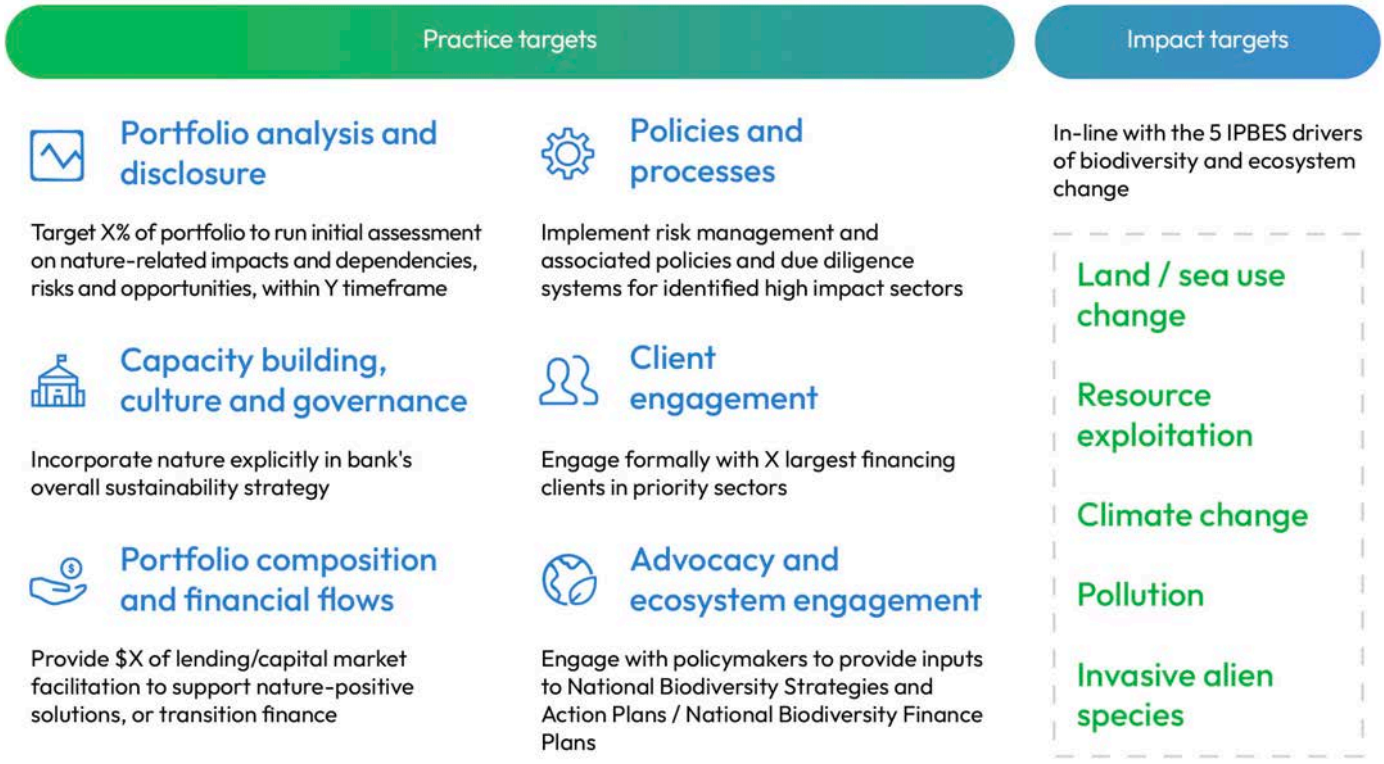
As with climate, another key transition step for financial institutions to advance on nature could be to set portfolio level targets. **Financial institutions could begin with a vision and commitment for nature, as well as nature strategies.** The overall nature vision and ambition can be guided by the GBF vision to halt and reverse biodiversity loss by 2030, and put nature on a path to recovery by 2050.

In the short term, financial institutions may consider setting nature financing targets and operational targets (or nature "practice targets"), such as targets related to client engagement. This approach is in line with the recommendations from UNEP FI's Principles for Responsible Banking Nature Target Setting Guidance, which categorises targets into "impact targets" and "practice targets" (see Figure 28).

- **Impact targets** aim to directly reduce negative impacts and increase positive impacts on nature. These are regarded as medium-term targets, and the development of guidance in this area is still nascent and largely underway.
- **Practice targets** are operational targets that help integrate nature into business processes and serve as a foundation for impact targets. UNEP FI PRB recommends a progressive approach towards target setting, starting with practice targets[84].

An example of a practice target is a nature financing target, which could be established as an extension of existing sustainable financing targets given overlaps between nature and other

Figure 28: Examples of practice and impact targets



Source: United Nations Environment Programme Finance Initiative Principles for Responsible Banking

[84] United Nations Environment Programme Finance Initiative (UNEP FI), 2023

sustainability-related financing. Financial institutions can refer to the UNEP FI PRB Nature Target Setting Guidance for specific examples of potential headline targets and priority actions that align with the 2030 objectives of the GBF.

In the medium to long term, financial institutions could aim to publish quantitative nature impact targets that are specific to sectors and nature pressures or realms. Unlike climate, nature is multi-dimensional and has no single metric of measurement. Various global organisations are still establishing guidance for corporates and financial institutions to set quantitative science-based nature targets.

So far, the TNFD and SBTN have aligned that quantitative targets should be based on nature pressures. These are derived from the five IPBES drivers of nature loss: land/sea use change, climate change, resource exploitation, pollution, and invasive alien species; with some example metrics. The SBTN has also introduced a Corporate Manual to facilitate the establishment of science-based targets for nature[85], outlining a five-step target setting process with technical guidance across four key realms of nature – freshwater, land, ocean and climate – although it is not specifically tailored for financial institutions.

Given the multitude of nature loss drivers and the nascency of global guidance, financial institutions may decide to **focus their efforts on material sectors and key nature loss drivers** that are particularly relevant to their portfolio or fund exposures, leveraging the materiality assessment and risks analysis conducted in steps 2 and 3. Financial institutions can start by establishing suitable targets for one to two measurable metrics under each key nature loss driver and sector. In the absence of science-based pathways, existing targets set by real economy players can serve as reference points for financial institutions to determine the appropriate metrics and range of values for establishing their own targets.

Case study 7: WWF and Aviva's paper on nature-positive sectoral pathways

WWF and Aviva have collaboratively released a paper detailing how sectoral pathways can be developed based on quantitative targets from the GBF. As with climate targets, sectoral pathways are useful in guiding financial institutions to set quantitative nature targets for different sectors. The paper calls for the development of national nature-positive sectoral pathways in the UK to define the transition required in each economic sector to deliver on the UK NBSAP, and by extension the GBF targets. It also provides an illustrative example of what this might look like for the UK agriculture sector (see Figure 29).

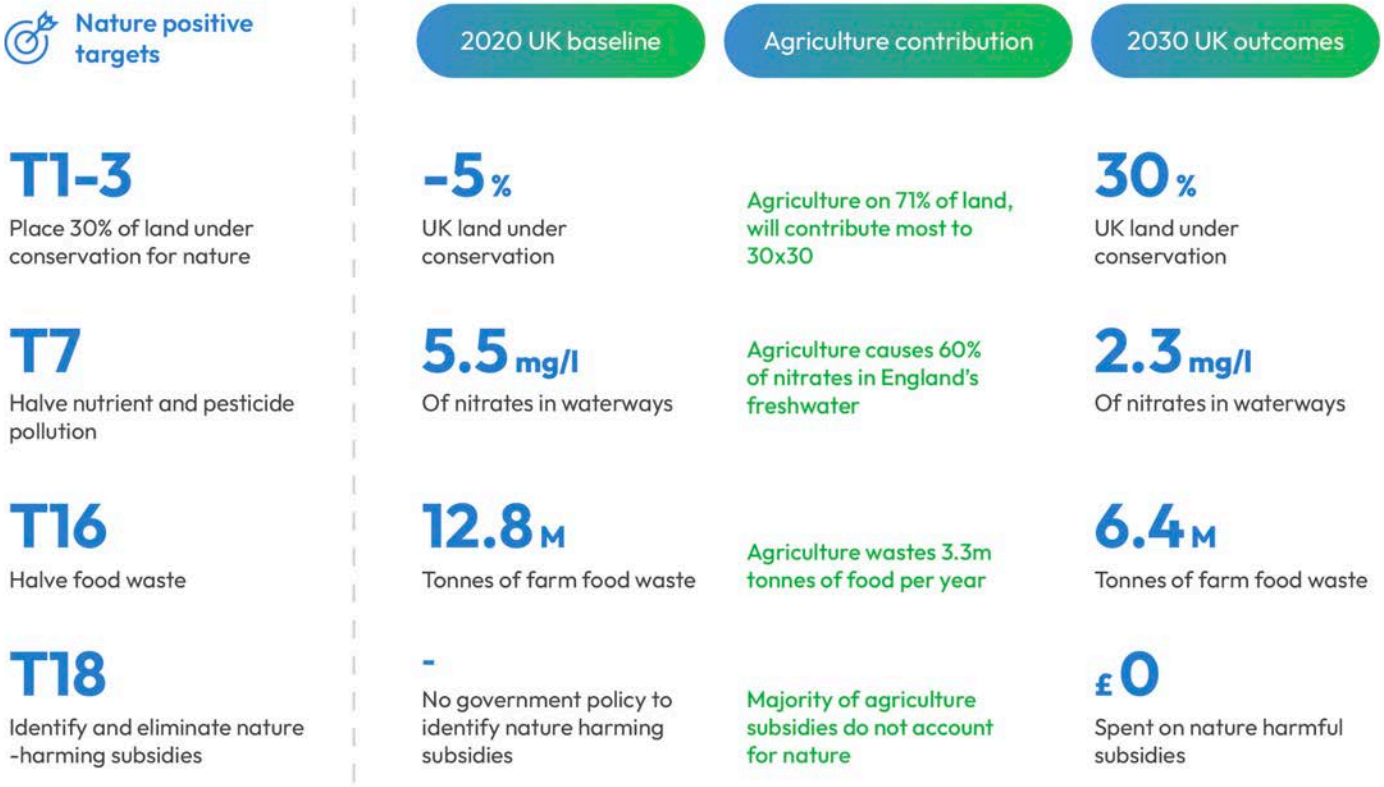
To develop UK sectoral pathways, the paper suggests to first identify the 2030 GBF targets that are most relevant to each sector and establish the respective 2020 UK baseline. Subsequently, sector-specific reduction targets are defined based on the relative nature impact contribution of each sector to each target. Sector-specific targets can then be established using either a balanced approach that assigns equal reduction targets to each sector or a focused approach that applies larger targets to sectors that have a disproportionately large nature impact in that aspect.

In the agriculture example, six of the GBF targets have been identified as relevant, including Target 16, which aims to reduce food waste by half. As the 2020 baseline for food waste in the agriculture sector is 3.3 million tonnes, the 2030 target could be set at 1.6 million tonnes, which is a 50% reduction, using the balanced approach. Alternatively, if a focused approach is utilised for the allocation of targets to sectors, the agriculture sector may be required to reduce its food waste by more than 50%.

Source: WWF & Aviva

[85] Science Based Targets Network, 2024

Figure 29: Illustrative UK agriculture sector pathway for nature



Source: WWF and Aviva

Step 8. Data, tools and reporting

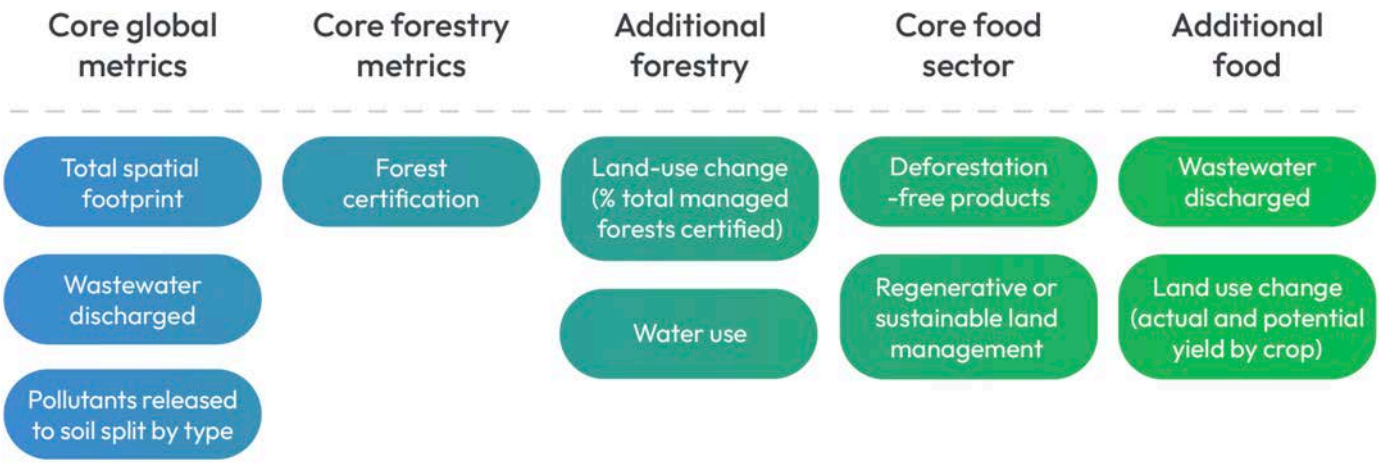
Across the steps mentioned above, data and tools can serve as crucial enablers of effective analysis for decision-making and process enhancements. Data can be collected to track and monitor performance, as well as for reporting purposes. New tools can be developed to utilise this data more effectively and streamline nature-related processes, freeing up capacity to focus on high-value and productive analysis[86].

Understanding and determining the data required for analysis, tracking and regulatory disclosure can help financial institutions start early on data collection and get ahead in their nature journeys. To ensure effective data management, financial institutions could first identify a comprehensive list of data required for new nature-related processes. They can then review their existing databases and data architecture to determine how and where to incorporate these additional requirements. To ensure effective utilisation and meaningful interpretation of data, financial institutions could establish internal reporting requirements, through analytics dashboards and reports, to track and monitor progress related to nature. Such enhancements to reporting should also consider the requirements for external disclosures, such as aligning with the metrics required for disclosure as recommended by the TNFD in Annex 2[87].

Case study 8: Manulife Investment Management's nature metrics

In 2023, Manulife Investment Management (Manulife IM) published its inaugural TNFD-aligned nature disclosure, outlining its approach to nature in the stewardship and management of its directly operated timberland and agricultural assets. As part of the disclosure, Manulife IM reported on five categories of TNFD-aligned nature metrics that are considered relevant to its Timberland and Agriculture business — including core global disclosure metrics; core and additional forestry sector metrics; and core and additional food sector metrics (see Figure 30). Numerical data has been provided wherever possible, and qualitative commentaries are shared where numbers are not

Figure 30: Selected Manulife IM disclosure metrics (non-exhaustive)



Source: Manulife Investment Management

[86] See Appendix 6 for additional case studies.
[87] Additional metrics for financial institutions discussed under the 'Additional guidance for financial institutions' report.

available. Manulife IM is also committed to building on the scope and breadth of these initial metrics in the future.

Source: Manulife IM

Where feasible, integration with existing climate or sustainability data and reporting capabilities could be considered to enhance synergies and provide a more comprehensive view of overall sustainability performance. The TNFD disclosure framework has also been designed to align with the TCFD framework, thereby fostering a cohesive approach to reporting both nature and climate-related risks and opportunities. In addition to the TNFD framework, there are various other disclosure and reporting standards that could be required for future reporting purposes. The relevance and suitability of these disclosures should be assessed beforehand.

- The Global Reporting Initiative specifies a range of metrics that companies should report in their topical disclosure standards, including biodiversity, water and effluents, materials (recycling) and waste
- The Sustainability Accounting Standards Board provides sector-specific recommendations for the disclosure of metrics across 77 industries
- The European Sustainability Reporting Standards (ESRS), which are specific regulatory requirements for European Union countries, has published dedicated ESRS policy for each sustainability area. These are ESRS E1: Climate; ESRS E2: Pollution; ESRS E3: Water and Marine Resources; ESRS E4: Biodiversity & Ecosystems; and ESRS E5: Resource Use & Circular Economy.

Where relevant and appropriate, financial institutions can also leverage external nature disclosure data collected and validated by reputable organisations to enrich their analyses.

Case study 9: External data provider

Financial institutions can consider utilising nature data provided by global disclosure systems and external data providers such as CDP and S&P Global to facilitate their nature analysis and decision making.

CDP's Forests Portfolio Assessment Tool analyses company data on nature-related impacts based on 15 key performance indicators, particularly in sectors linked to deforestation exposure such as agriculture and mining. This tool helps investors identify high-impact portfolio companies and benchmark their performance, which allows investors to identify and mitigate potential financial and reputational risks, as well as to integrate ESG factors into investment decisions.

S&P Global Sustainable1 is another data provider that offers several metrics for quantifying the magnitude of environmental damage an asset or business activity is causing in a particular location. They include the headline metric "ecosystem footprint" and a component metric called "ecosystem integrity footprint". Ecosystem footprint is a composite metric that combines the physical size of the asset's local footprint (land use), the extent of land degradation the asset creates (ecosystem integrity footprint), and the significance of local ecosystems in that area in terms of biodiversity and provision of ecosystem services to humans.

Source: CDP, S&P Global

Appendix

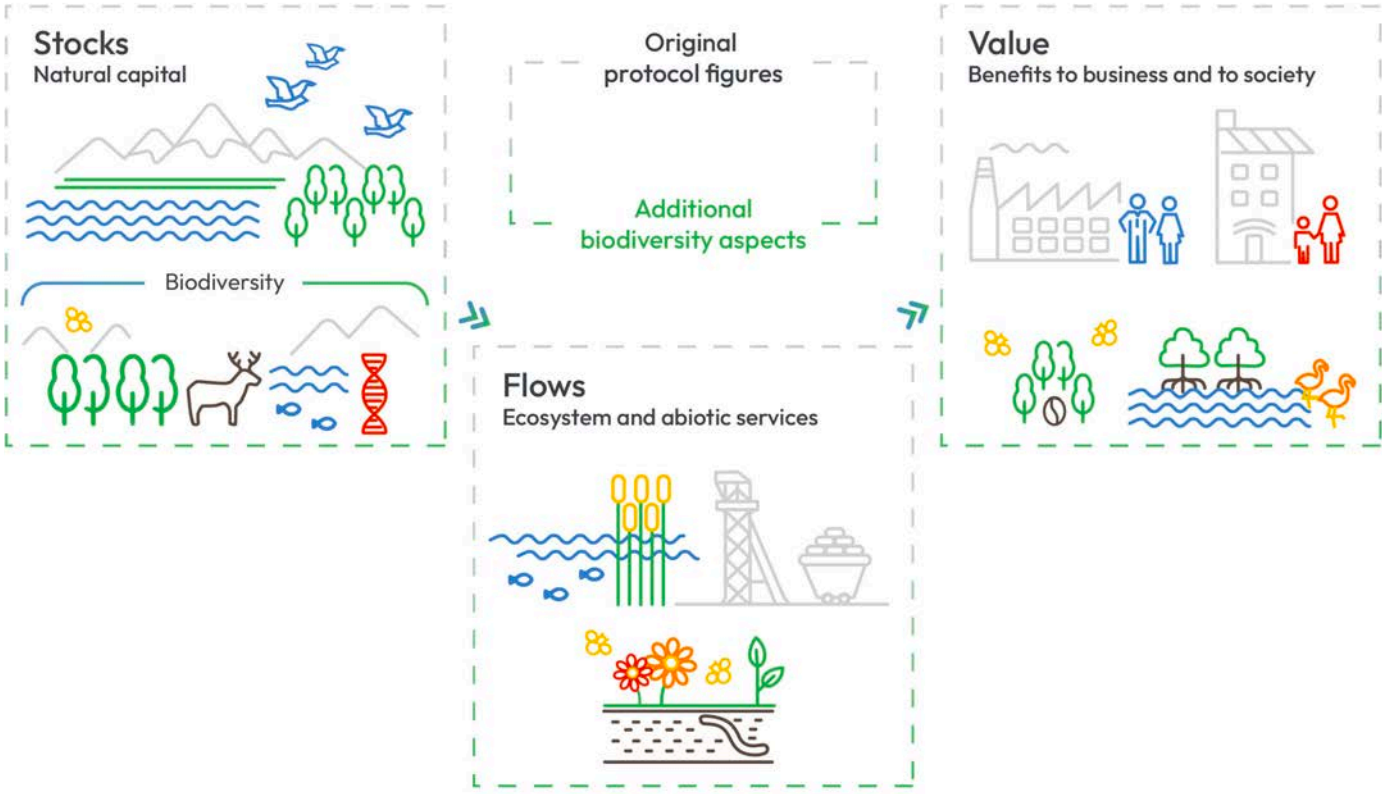
Appendix 1: Key nature concepts

Nature captures both the biotic (living) and abiotic (non-living) elements on our planet, including biodiversity and climate.

Natural capital is an economic concept that refers to the value of the stock of natural assets. These natural assets comprise geology, soil, air, water and all living things (e.g., plant and animal species)[88]. The presence of, and interactions between, natural capital stocks **generates a flow of goods and services that creates value for business and society** (see Figure 31)[89]. The flow of benefits from natural capital can be **ecosystem services** (benefits from ecosystems such as pollination, water and climate regulation) or **abiotic services** (which do not depend on ecological processes but on geological processes, such as metals, oil and gas)[90]. There are four types of ecosystem and abiotic services:

- Provisioning services (e.g., food, water, energy, shelter, medicine, raw materials used in the creation of products)
- Cultural services (e.g., spiritual connection, recreation)

Figure 31: Relationship between biodiversity and natural capital stocks, flows and value



Source: Natural Capitals Coalition and Cambridge Conservation Initiative

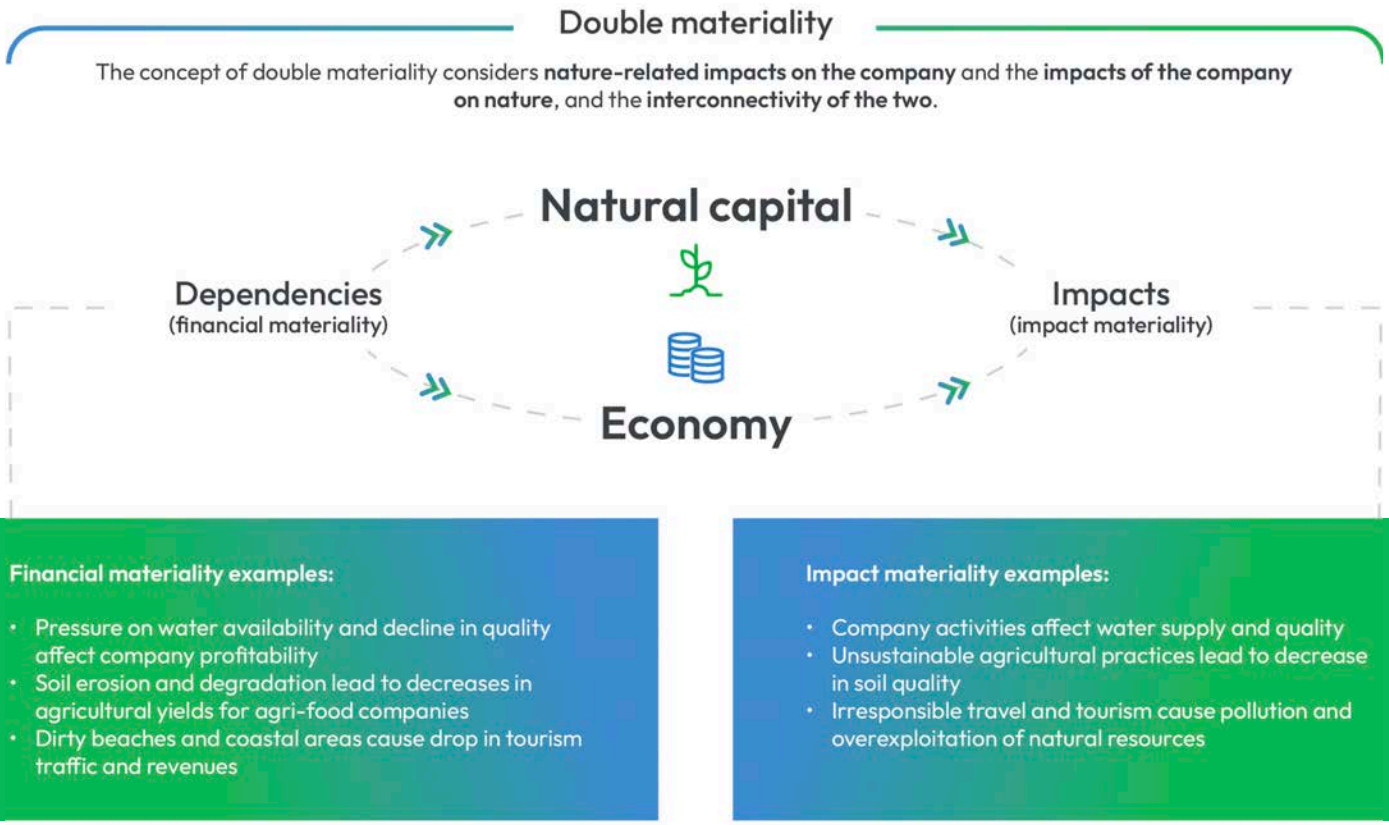
[88] Natural Capital Forum, n.d.
[89] Capitals Coalition, 2021
[90] Capitals Coalition, 2021

- Regulating services (e.g., flood defence, climate regulation, pollination)
- Supporting services (e.g., photosynthesis)

Biodiversity is an integral part of natural capital and underpins the goods and services that nature generates[91]. Biodiversity is the "variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems, and the ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems"[92]. In essence, biodiversity describes the variety of life and can be thought of as the living component of natural capital stocks[93]. There is an **important and complex relationship between biodiversity and the delivery of ecosystem services**[94]**.** Biodiversity affects the quantity, quality and resilience of ecosystem service provision. Less biodiverse natural systems can still yield ecosystem goods and services, but these are generally fewer, of lower quality and more vulnerable to change. Biodiversity is therefore a measure of the quality and resilience of natural capital.

Economic prosperity, human wellbeing and the performance of almost every **business depend on biodiversity and natural capital and often impact**

Figure 32: Impacts and dependencies between economy and natural capital (double materiality)



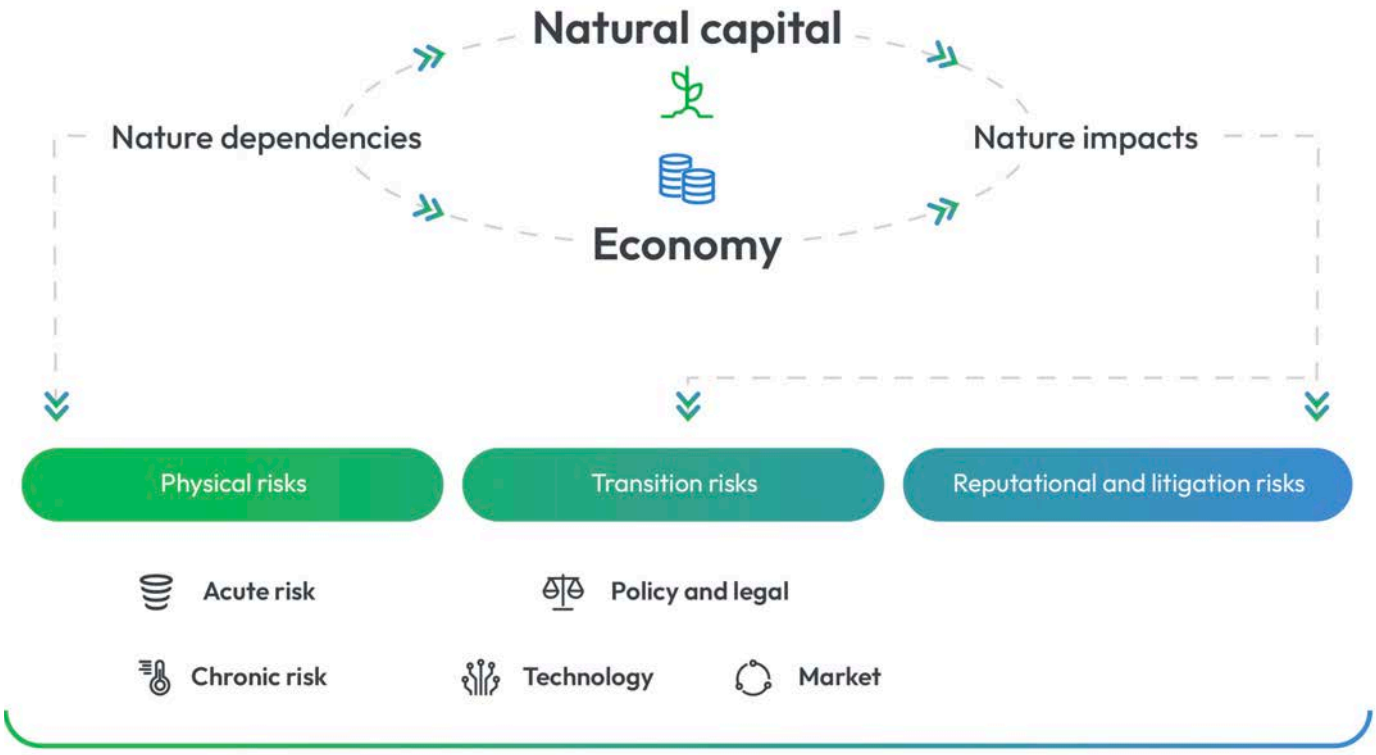
Source: Natural Capital Finance Alliance and UNEP Finance Initiative; Global Reporting Initiative

[91] Capitals Coalition, 2021
[92] Capitals Coalition, 2021
[93] Capitals Coalition, 2021
[94] Capitals Coalition, 2021

it at the same time (negatively or positively)[95]. Within the nature discussion, this simultaneous impact and dependence is often referred to as Double Materiality (see Figure 32).

These impacts and dependencies result in **risks and opportunities**, and thus in costs and benefits for business and society[96]. Nature-related risks can be further subdivided into physical, transition, reputational and litigation risks (see Figure 33).

Figure 33: Risks from impacts and dependencies on natural capital



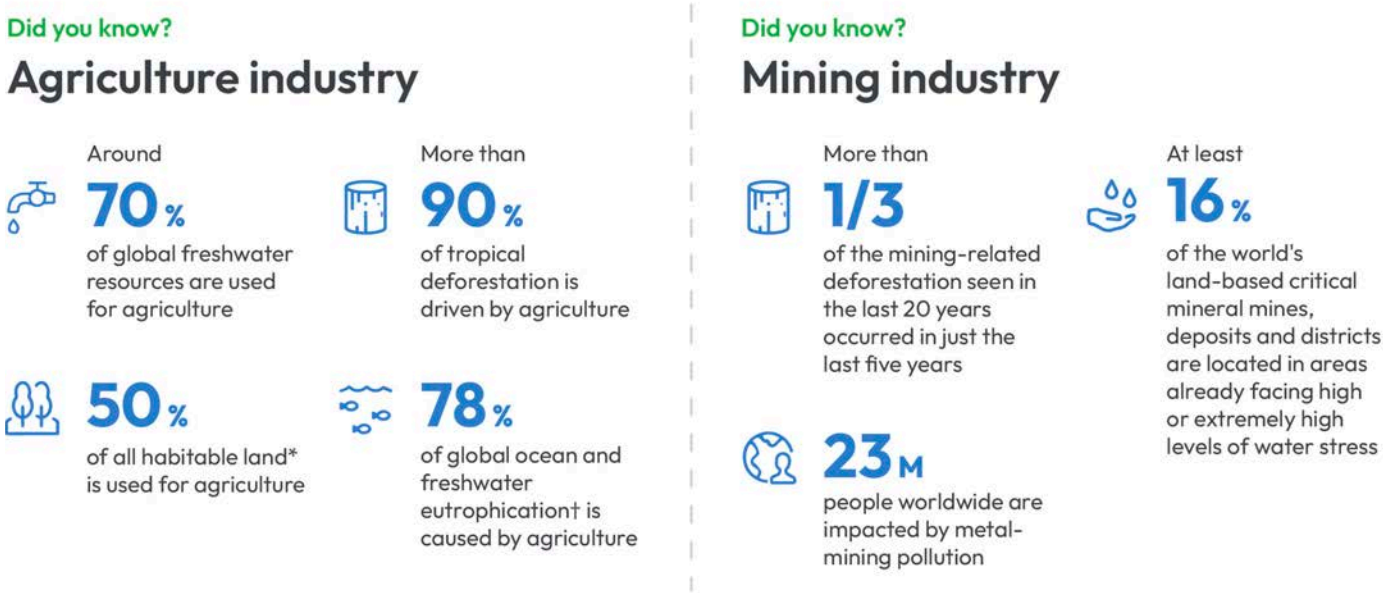
Source: Taskforce on Nature-related Financial Disclosures

[95] Capitals Coalition, 2021
[96] Capitals Coalition, 2021

Appendix 2: Statistics on nature dependencies and impacts for select sectors

Economically, the Southeast Asian region remains heavily reliant on primary sectors (such as agriculture and mining) that are both dependent on natural capital and have a high impact on nature (see Figure 34).

Figure 34: Statistics on nature dependencies and impacts for agriculture and mining industries



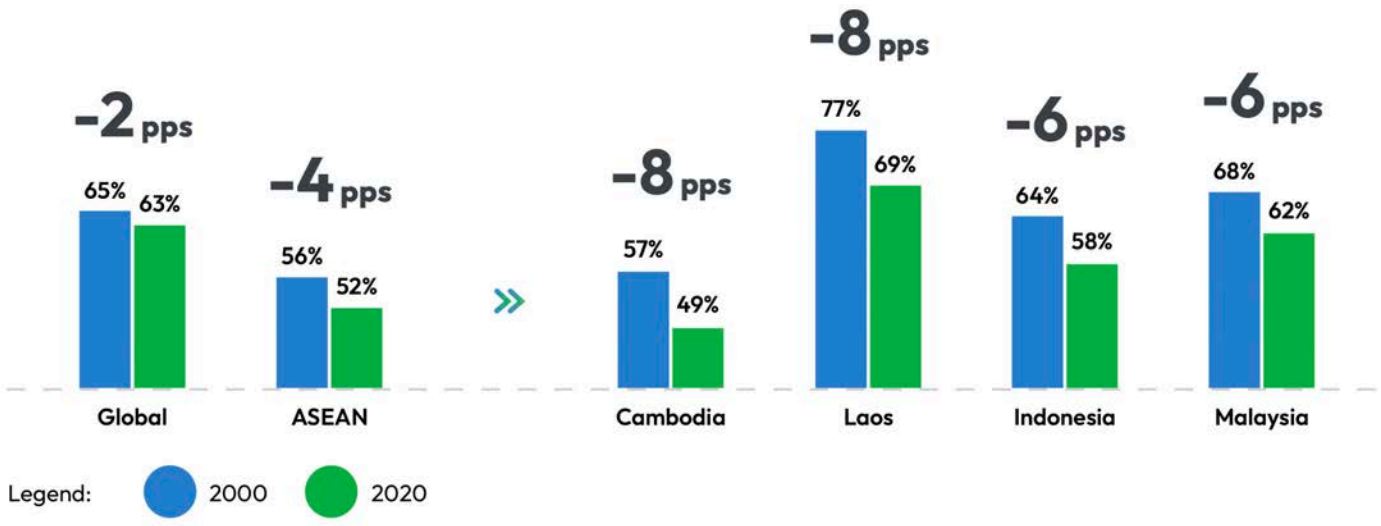
Notes:
*Habitable land is land that is ice- and desert-free
†Eutrophication is the pollution of waterways with nutrient-rich water
Source: UNESCO, World Economic Forum, ScienceAdviser, World Wildlife Fund, BBC, World Resources Institute

Appendix 3: Biodiversity Intactness Index (BII)

The **Biodiversity Intactness Index (BII)**[97], published by London's Natural History Museum, measures an area's remaining natural biodiversity as an estimated percentage of the original number of species[98]. When BII is at 100%, it implies that the area is fully intact and deemed pristine – indicating that species abundance and composition align with expectations for an environment untouched by human influence[99]. The BII allows for comparisons between future and historical data points, revealing the rate of biodiversity decline, future trends and the probability of surpassing critical thresholds. This, in turn, can indicate the level of physical nature risk associated with a specific location.

Our analysis revealed that **Southeast Asia** is experiencing a more rapid decline in natural biodiversity and has lower biodiversity intactness versus the global average (see Figure 35). In 2020, the global average was approximately 63%, while Southeast Asia's average biodiversity intactness was estimated at 52%. Southeast Asia's BII score has decreased by 4 percentage points (pps) since 2000, while the global average has remained relatively stable. Between 2000 and 2020, Cambodia, Laos, Indonesia and Malaysia experienced the most significant declines in biodiversity intactness in the region, although they also have the highest BII scores in the region. The high rate of biodiversity decline in Southeast Asia underscores the urgent need for the region's economies to take proactive measures to preserve its natural resources and to maintain a resilient and functional ecosystem and economy.

Figure 35: Biodiversity Intactness Index from 2000-2020



Source: Natural History Museum London, Bloomberg

[97] Note that BII is a terrestrial indicator and does not cover marine ecosystems.
[98] Natural History Museum, 2021
[99] When BII is less than 90%, the ecosystems may function less well and less reliably. When BII is less or equal to 30%, it implies that the area's biodiversity has been severely depleted, and the ecosystem could be at risk of collapse. When BII equals to 0%, there is severe degradation of the area's biodiversity and indicative of extensive human impact.

Appendix 4: Additional examples for nature risk assessment

Physical risks

Example 3: Physical risk assessment for the rubber industry in Thailand

Rubber production relies heavily on various ecosystem services, such as soil quality, moderate temperatures and the regulation of weather-related factors such as rainfall and flood control. Tropical forests and wetlands play a crucial role in providing these services, but their degradation due to deforestation has diminished their ability to support rubber production. While ecosystem integrity in Thailand is still relatively intact given the abundance of natural capital, there are signs of degradation. Climate phenomena such as El Niño and La Niña are becoming more frequent and intense, which leads to increased droughts or flooding when the self-regulation mechanism of the ecosystem is unable to mitigate the impacts from these phenomena. A 0.5% to 2% output loss in rubber production in Thailand is estimated due to the El Niño drought in 2024 alone[100]. Apart from the regulation systems, the lack of water has decreased the amount of sap produced and made it harder to harvest. These adverse conditions have also contributed to an increase in leaf fall disease in rubber plantations, resulting in lower yields.

To address these risks, the Prime Minister of Thailand has directed relevant agencies to develop a comprehensive three-year water plan and a long-term strategy to tackle the country's water issues, including flooding, drought and poor water quality[101]. Some key initiatives include improving the efficiency of existing water sources and distribution systems, and developing rain-fed agricultural areas.

The Thai government also plans to revive a THB 200 billion water management project to mitigate severe flooding in the Yom River basin[102] and has engaged the Rubber Authority of Thailand (RAOT) to provide flood assistance to rubber plantation farmers affected by disasters. These initiatives demonstrate a commitment to addressing and reducing the physical risks associated with rubber production. However, the need for coordinated action across multiple sectors and levels of government, along with the challenges posed by climate change and population growth, complicates effective long-term planning and implementation of such policies to address water issues. As a result, despite efforts to mitigate physical risks, the overall extent of physical risks for the rubber industry in Thailand could still be relatively significant.

[100] Mangmeechai, 2020
[101] Reliefweb, 2018
[102] Bangkok Post, 2024
[103] Tradelmex, 2024
[104] Innovation in Textiles, 2023
[105] Adidas, n.d.

Transition risks

Example 4: Changing consumer tastes influencing textile manufacturing in Vietnam

In 2022, Vietnam's textile exports amounted to US$49 billion, making it the third-largest exporter of textiles in the world[103]. Vietnam's textile industry is a critical part of the supply chain for major multinational brands such as Nike, H&M and Adidas, all of which have faced increasing pressure from environmentally conscious consumers to incorporate sustainability into their operations.

In recent years, these major brands have been driving textile manufacturers in Vietnam to increase their adoption of sustainable practices. For example, Adidas is urging its suppliers to incorporate waterless dyeing technologies aimed at reducing freshwater consumption, minimising water pollution, and lowering carbon emissions within its supply chain[104]. Adidas has also pledged to use 100% recycled polyester in its apparel by 2024 and 100% sustainable cotton by 2025, promoting the reuse of resources and reducing waste[105].

This commitment places pressure on Vietnamese textile manufacturers. This shift not only presents challenges for manufacturers to adapt but also highlights the transition risks from evolving sustainability standards and consumer demands.

Example 5: Nature-related policies for Singapore's built environment industry

In markets with heightened local awareness of sustainability, governments have proactively enacted policies to address and reduce unsustainable practices. In Singapore, for instance, the Building and Construction Authority (BCA) launched the Singapore Green Mark Scheme in 2005[106]. The scheme promotes sustainability in the built environment industry by evaluating buildings based on criteria such as energy and water efficiency, indoor environmental quality and sustainable site management. Buildings are awarded points and certifications (Certified, Gold, GoldPlus, Platinum) based on their performances.

Examples of qualifying nature-based solutions to address these criteria include rainwater harvesting, urban forestry, and green roofs. Rainwater harvesting captures rainwater for irrigation and non-potable uses, reducing reliance on potable water. Urban forestry involves planting trees and creating green spaces to improve air quality and enhance carbon sequestration. Green roofs incorporate vegetation on rooftops, helping to reduce urban heat, improve air quality and enhance biodiversity by providing habitats for various species. Since its launch, the certification scheme has undergone enhancements to include stricter environmental requirements, with the latest 'Green Mark 2021' taking effect in January 2024. The Singapore government targets to have "at least 80% of buildings (by floor area) in Singapore to be green by 2030".

Another related certification, the BCA-IMDA Green Mark for Data Centres, was introduced in 2019 and updated in 2024 to address the significant power and water consumption of data centres. In terms of water usage, data centres are evaluated based on their cooling tower water consumption, the use of alternative water sources and water-efficient fittings, as well as water usage effectiveness, which measures the amount of water consumption relative to IT energy consumption[107].

The fast-evolving and demanding regulations in Singapore's built environment industry signal potentially significant transition risks for developers and construction companies operating in the region.

[106] BCA, n.d.
[107] BCA, 2024

Appendix 5: Additional case studies of opportunities and financial products

Transition to circular economy

Real economy case study 3: Sime Darby Plantations' biogas plants[108]

IPBES drivers addressed:

- Climate change
- Pollution

Sime Darby Plantations is actively utilising biomass to produce renewable energy from palm oil mill effluent (POME), a by-product of the palm oil extraction process that is rich in organic matter and nutrients. Traditionally, POME has been treated through lagooning, which has significant land-use requirements, pollutes waterways and results in methane emissions. To address this issue, the company has established 16 operational biogas plants to recycle POME for renewable energy production and aims to significantly increase this number to a total of 45 biogas plants by 2030[109]. Five of these biogas power plants are connected to the national grid, boasting a combined capacity of 7.3 MW. In 2022, Sime Darby Plantations was on track to achieve an estimated 28% reduction in carbon emissions; and by 2023, the total carbon emission reduction achieved through its biogas initiatives was equivalent to the impact of planting 27.4 million trees for carbon sequestration. This commitment not only enhances the company's sustainability efforts but also contributes to a greener future by mitigating the environmental impact of palm oil production.

Real economy case study 4: Adidas promoting sustainable fashion in Asia

IPBES drivers addressed:

- Pollution
- Resource exploitation

Adidas is committed to achieving 90% sustainable product offerings by 2025, which underscores its dedication to environmental responsibility and innovation[110]. In 2020 alone, Adidas produced over 30 million pairs of shoes made with recycled ocean plastic – demonstrating its proactive approach to addressing plastic pollution. Additionally, the company recognises the critical importance of sustainable water management practices in its production processes and is actively working to improve these practices. Adidas has launched the "End Plastic Waste" initiative, which focuses on designing products that can be reused or recycled, exemplified by the FUTURECRAFT.LOOP project that aims to create fully recyclable shoes that can be returned to the company for reprocessing at the end of their lifecycles[111]. Furthermore, Adidas has partnered with Parley for the Oceans to raise awareness about ocean conservation and reduce plastic waste. This collaboration has led to the development of a r ange of high-performance athletic gear made from recycled ocean plastic, effectively transforming waste into valuable products while promoting sustainability and environmental stewardship.

Through these initiatives, Adidas not only demonstrates its commitment to sustainability but also drives its supply chain towards greater sustainability. Local manufacturers in countries such as Vietnam and Indonesia are increasingly required to align their production processes with Adidas' sustainability goals, which involve adopting eco-friendly materials and improving waste management practices. By fostering a culture of sustainability, Adidas encourages its suppliers to innovate and invest in sustainable practices, ultimately contributing to a more responsible and ethical fashion industry.

Source: Adidas

[108] Cenergi, 2021
[109] SD Guthrie, 2024
[110] Adidas, n.d.
[111] Rise Fierce, n.d.

Sustainable use and protection of water and marine resources

Real economy case study 5: Swire Properties' sustainable water management practices

IPBES drivers addressed:

- Pollution
- Resource exploitation

Swire Properties has made significant strides in sustainable water management by implementing advanced recycling systems that enhance water conservation across its developments. The company has installed systems to collect and treat both rainwater and wastewater for toilet flushing and plant irrigation, achieving an impressive water savings of 100% in some locations. Processed water from the cooling tower is recycled through a reverse osmosis system, allowing it to be reused. Furthermore, Swire Properties has integrated a greywater treatment system that reuses water from sinks, showers and washing machines for irrigation and other non-potable applications, enabling the treatment of up to 6,500 cubic meters of greywater annually.

Collectively, these three systems have resulted in a substantial reduction in freshwater demand for its office tower. Through these innovative initiatives, Swire Properties not only minimises its environmental impact but also sets a benchmark for sustainable practices in urban development, demonstrating a commitment to responsible resource management and community well-being.

Source: Swire Properties

Real economy case study 6: Jain Irrigation's implementation of drip irrigation technology

IPBES drivers addressed:

- Pollution
- Resource exploitation

Jain Irrigation has advanced the agricultural productivity and sustainability in India through the implementation of drip irrigation systems, particularly for growing sugarcane, cotton and various fruits. These systems deliver water directly to the root zone of plants – minimising evaporation and runoff, which are common issues in traditional irrigation methods. The adoption of drip irrigation can save up to 70% of water compared with conventional flood irrigation, addressing the challenge of water scarcity. This substantial reduction in water usage not only translates to lower costs for farmers – who spend less on water and energy to pump that water – but also leads to higher crop yields, ultimately enhancing profitability. Farmers also experience a remarkable 30% increase in fertiliser use efficiency, allowing them to maximise crop nutrition while reducing waste and pollution. By addressing the challenges faced by farmers, Jain Irrigation's initiatives exemplify how innovative irrigation solutions can drive both economic and environmental benefits in agriculture.

Source: Jain Irrigation Systems

Financial institution case study 7: Sustainability-linked bond for Pernod Ricard

IPBES drivers addressed:

- Climate change
- Resource exploitation

Pernod Ricard, the second largest producer of wines and spirits globally, successfully launched its inaugural EUR 750 million Sustainability-Linked Bond with Natixis in 2024, marking a first for the sector. This bond is tied to two key sustainability performance targets (SPTs): the first is to decrease water consumption per unit at distilleries by 12.5% by 2025 from a fiscal year 2018 baseline, and the second is to reduce the Group's absolute greenhouse gas emissions (Scope 1 and 2) by 26% by 2025 from the same baseline, in alignment with a 1.5°C trajectory. A key product feature of the bond involves increasing the original interest rate by 25 basis points until redemption should Pernod Ricard fail to meet one or more of these SPTs. This product has proven promising and financially viable, as its bond allocation was well-received, achieving a diversified final order book of EUR 3.4 billion, with a robust oversubscription ratio of 4.5 times.

Source: Natixis

Financial institution case study 8: DBS' sustainability-linked Loan for City Developments Limited

- Land/sea use change
- Pollution
- Resource exploitation

In June 2024, City Developments Limited (CDL) successfully secured a landmark sustainability-linked loan of SGD 400 million from DBS Bank. The proceeds from this loan will be utilised for general corporate funding and working capital, including the redevelopment of CDL's existing assets to advance nature conservation and sustainable development in Singapore. Notably, this loan is the first of its kind, with its loan criteria aligned to the sustainability performance targets established by CDL in accordance with its TNFD report. Some specific performance targets incorporated into the loan include biodiversity conservation, waste management and water efficiency.

Source: DBS

[112] Cotton Grower, 2024

Protection and restoration of biodiversity and ecosystems

Real economy case study 7: Olam incorporating regenerative agriculture practices

IPBES drivers addressed:

- Land/sea use change
- Climate change
- Pollution
- Resource exploitation

Olam Agri has made significant advancements in sustainable farming by achieving Regenagri certification for over 35,000 acres of farmland and three ginning facilities in the U.S., which produce 22,000 tons of cotton[II2]. To promote regenerative landscapes, Olam Agri employs various innovative techniques, including zero or minimum tillage to preserve soil health and subsurface irrigation for efficient water use. The company also focuses on crop diversification, improved nutrient management and practices such as cover cropping and composting to enhance soil fertility. Monitoring soil health is crucial to Olam Agri's strategy, with periodic soil tests to assess pH, salinity and nutrient levels. This data-driven approach allows for adjustments in soil management practices, ensuring sustainable crop growth.

These commitments not only benefit current agricultural operations but also ensure the sustainability of future farming endeavours. By fostering a harmonious relationship between agriculture and nature, Olam Agri is paving the way for a resilient and sustainable food system that can thrive for generations to come.

Source: Olam

Sustainable supply chains

Real economy case study 8: Volvo's traceability systems across its supply chain

IPBES drivers addressed:

- Land/sea use change
- Pollution
- Resource exploitation

Volvo has enhanced traceability in its supply chain with the introduction of the "Battery Passport", a tracker that allows customers to identify the sources of key raw materials in electric vehicle batteries[II3]. This initiative aims for complete traceability, assuring customers that the materials in their electrified Volvos are sourced responsibly. To support this effort, Volvo has signed 10-year agreements with leading battery suppliers, Contemporary Amperex Technology (CATL) and LG Chem, both of which will participate in a blockchain programme to monitor cobalt sourcing globally[II4]. Additionally, Volvo has partnered with Circulor to create a traceability network that ensures cobalt recycling and refining companies adhere to sustainable practices. The Battery Passport not only promotes responsible sourcing but also encourages mining companies to adopt more practices that contribute to halting and reversing nature loss. Through these initiatives, Volvo exemplifies the critical role of traceability in supply chains, underscoring its importance in conserving natural resources and promoting sustainable practices within the automotive industry.

Source: Volvo

[II3] Carey, 2024
[II4] Bloomberg NEF, 2019

Real economy case study 9: Wilmar enhancing sustainability within its supply chain

IPBES drivers addressed:

- Land/sea use change
- Climate change
- Pollution
- Resource exploitation

Wilmar International is actively collaborating with Wild Asia to assist independent smallholder suppliers in Sabah to achieve Roundtable on Sustainable Palm Oil (RSPO) certification through its Wilmar Asia Green Supply (WAGS) programme. This initiative not only provides technical support for RSPO certification but also establishes a scheme that allows WAGS members to access fertilisers at wholesale prices, thereby reducing their operational costs and promoting sustainable agricultural practices. Additionally, Wilmar is exploring innovative risk-sharing models in partnership with financial institutions and independent smallholder cooperatives. These models aim to lower the cost of financing for smallholders, making it easier for them to invest in sustainable practices. Furthermore, in 2019, Wilmar launched the Wilmar Supports Sustainable Entrepreneurs programme, which has successfully trained over 1,800 smallholders to become sustainable entrepreneurs. This initiative has also facilitated the certification of approximately 900 smallholders under RSPO and International Sustainability and Carbon Certification standards.

Through these comprehensive efforts, Wilmar demonstrates its commitment to enhancing supply chain sustainability by empowering smallholder farmers, promoting responsible sourcing and fostering a more resilient agricultural ecosystem.

Source: Wilmar

Real economy case study 10: OCBC's sustainability-linked loan for COFCO International

IPBES drivers addressed:

- Land/sea use change
- Climate change
- Resource exploitation

In December 2024, COFCO International and OCBC launched the first financing facility with interest rate incentives tied to the Forest, Land and Agriculture (FLAG) targets for 1.5°C climate alignment. Validated by the Science Based Targets initiatives, FLAG is the world's first framework for companies in land-intensive sectors, including agriculture, to set science-based targets that include land-based emissions reductions and removals.

This USD 600 million loan is a sustainability-linked revolving credit facility incorporating two performance targets aligned with COFCO International's SBTi-validated FLAG soy and corn emissions reduction targets, which are to reduce Scope 3 FLAG emissions by 46% per tonne of soybean and 45% per tonne of corn by 2033. COFCO International will qualify for interest discounts by achieving externally verified annual emissions reductions for purchased soy and corn, which will primarily come from the company's efforts to eliminate deforestation and conversion from its soy and corn supply chains. The interest discounts of this sustainability-linked loan will be used to finance activities including supplier engagement, deforestation monitoring, and encouraging regenerative agriculture and sustainable farm management in the supply chain.

Source: OCBC, COFCO International

Appendix 6: Additional case studies of financial institutions' nature strategy

Business development and engagement

Case study 10: Robeco's corporate and sovereign engagement

Robeco launched its biodiversity engagement theme in 2020, focusing on one of the key drivers of biodiversity loss: deforestation. Its engagements have focused on companies involved in some of the soft commodities that are among the biggest causes of deforestation: cocoa, pulp and paper, natural rubber, beef and soy. Between 2020 and 2023, Robeco engaged with 12 companies and had more than 150 company interactions. Throughout the period of engagement, most companies established and accelerated 'no native vegetation conversion' targets (through which they commit to end the clearing of biodiversity-rich land) to as early as 2025, significantly improved supply-chain monitoring systems, and started the process of scaling up regenerative agriculture models.

In July 2022, Robeco started engaging with the first batch of companies from three high-water-use or water-scarce sectors: chemicals (fertilisers and resource extraction); oil & gas (shale gas); and paper & pulp (operating in South Africa, a water-scarce area). Companies were chosen for their high vulnerability to water and waste risks, and for their operations in water scarce areas. In November 2022, Robeco nearly doubled the companies under engagement by adding cases from the breweries sector, because of its high-water consumption rate; and the UK water utilities sector, because of controversies around wastewater management in the UK. Going forward, Robeco plans to steer its engagement towards hazardous waste and pollution issues.

Beyond corporate engagement, Robeco also plays an active role in sovereign engagement with Indonesia through its participation in the Investor Policy Dialogue on Deforestation (IPDD). Set up in July 2020, the IPDD is an investor-led sovereign engagement initiative that aims to coordinate a public policy dialogue on halting deforestation by engaging with government-related authorities and associations, industry and trade bodies, and other stakeholders.

Source: Robeco

Case study 11: SMBC's sustainability-linked loan for KAO Corporation

In March 2023, Sumitomo Mitsui Banking Corporation (SMBC) and KAO Corporation entered a four-year sustainability-linked loan agreement that tied the loan's interest rate to KAO's achievement of specific sustainability performance targets (SPTs). These SPTS have been established around forests, water security and climate change, which are closely aligned with the company's broader sustainability strategy and focus on environmental impact. Achieving an "A" score in at least two of these three categories would enable KAO to benefit from a preferential loan rate. To ensure credibility and accuracy in measuring KAO's performance against these SPTs, the agreement also specified the use of CDP's external scoring database as the basis for assessment.

Since the inception of the loan, KAO has received a triple-A score from CDP across all three categories in 2023, showcasing its excellent sustainability performance. To further enhance its sustainability performance, KAO has made significant investments in pulp technology that promotes forest conservation and efficient pulp utilisation. As a result, 97% of its products are now FSC-certified, as disclosed to CDP.

Source: SMBC, CDP

Data, tools and reporting

Case study 12: Natixis' geospatial monitoring tool

Natixis CIB has designed geospatial monitoring tools to assess whether mining projects would be located at sites that are biodiversity hotspots, or whether water projects are situated in water-stressed areas. Using publicly available data, Natixis assesses the level of potential land cover degradation through above-ground biomass indicators over time and the criticality of endangered species in the area, which provides an objective evaluation of the condition and richness of the ecosystems and therefore the riskiness of the mining activity to the environment. These assessments can also inform the effectiveness of mitigation measures implemented by the mining companies. If the time evolution of above-ground biomass shows that previously degraded or exploited forests have been restored, it would imply that sufficient nature compensatory and restoration measures are in place.

Source: Natixis

Appendix 7: Glossary of terminologies

Terminology	Description
Adaptation	Adjustment in natural or human systems to a new or changing environment that exploits beneficial opportunities or moderates negative effects. (TNFD)
Biodiversity	The variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems, and the ecological complexes of which they are part; This includes diversity within species, between species and of ecosystems. (Convention on Biological Diversity)
Biodiversity hotspots	Refer to Earth's most biologically rich – yet threatened – terrestrial regions. (Conservation International)
Biodiversity loss	The reduction of any aspect of biological diversity (i.e., diversity at the genetic, species, and ecosystem levels) that is lost in a particular area through death (including extinction), destruction or manual removal; It can refer to many scales, from global extinctions to population extinctions, resulting in decreased total diversity at the same scale. (IPBES)
Biogeochemical flows	Pathways by which elements such as carbon, phosphorus, nitrogen and sulphur, or compounds such as water, flow between living organisms and the environment. (Planetary Health Alliance)
Biosphere	The sum of all the ecosystems of the world. It is both the collection of organisms living on the Earth and the space that they occupy on part of the Earth's crust (the lithosphere), in the oceans (the hydrosphere) and in the atmosphere. The biosphere is all the planet's ecosystems. (IPBES)
Biosphere integrity	The ability of ecosystems to continue to provide goods and services to human society. (Rockström et al., 2009; Mace et al., 2014; Steffen et al., 2015)
Blended finance	The use of catalytic capital from public or philanthropic sources to increase private sector investment in sustainable development. (Convergence) More specifically, it is the use of concessional donor funds to mitigate specific investment risks and help rebalance risk-reward profiles of pioneering, high-impact investments so that they have the potential to become commercially viable over time. (International Finance Corporation)
Carbon sequestration	The long-term storage of carbon in plants, soils, geologic formations and the ocean. Carbon sequestration occurs both naturally and because of anthropogenic activities, and typically refers to the storage of carbon that has the immediate potential to become carbon dioxide. (IPBES)
Climate change	Change of climate, attributed directly or indirectly to human activity, that alters the composition of the global atmosphere and that is, in addition to natural climate variability, observed over comparable time periods. (UNFCCC)

Climate-nature nexus	Where climate- and nature-related risks and opportunities overlap. (NatureFinance)
Double materiality	A two-dimensional perspective on materiality (see below) adopted by the Non-Financial Reporting Directive of the European Commission in the context of climate change. It involves: (i) The reference to the company's "development, performance [and] position" indicates financial materiality, in the broad sense of affecting the value of the company. Climate-related information should be reported if it is necessary for an understanding of the development, performance and position of the company. This perspective is typically of most interest to investors; and (ii) The reference to "impact of [the company's] activities" indicates environmental and social materiality. Climate-related information should be reported if it is necessary for an understanding of the external impacts of the company. This perspective is typically of most interest to citizens, consumers, employees, business partners, communities and civil society organisations. However, an increasing number of investors also need to know about the climate impacts of investee companies to better understand and measure the climate impacts of their investment portfolios. (European Commission)
Ecosystem	A dynamic complex of plant, animal, and micro-organism communities and their non-living environment interacting as a functional unit. (IPBES)
Ecosystem integrity	The ability of an ecosystem to support and maintain ecological processes and a diverse community of organisms. It is measured as the degree to which a diverse community of native organisms is maintained, and is used as a proxy for ecological resilience, intended as the capacity of an ecosystem to adapt in the face of stressors while maintaining the functions of interest. (IPBES)
Ecosystem services	The benefits to humans provided by the natural environment and ecosystems. They can be divided into provisioning ecosystem services, providing materials and energy for products that humans derive from the environment (e.g. food, medicine, fresh water, fuel); regulating ecosystem services, which regulate and maintain ecosystem services such as climate, pollination, water and air quality, and disease control; and cultural ecosystem services, providing non-material benefits that support mental and physical health, spiritual and religious values, and recreational activities. (NGFS)
ENCORE drivers	Refers to variables used within the ENCORE tool, consisting of 25 dependency (ecosystem services) and 13 impact (pressures) drivers. (ENCORE)
Geology	The science that deals with the earth's physical structure and substance, its history and the processes that act on it. (Oxford Languages)
Litigation risks	The risks of negative effects on economies, individual financial institutions and financial systems that result from: (i) the degradation of nature, including its biodiversity, and the loss of ecosystem services that flow from it (i.e. physical risks), or (ii) the misalignment of economic actors (e.g. their business model and strategy) with actions aimed at protecting, restoring and/or reducing negative impacts on nature (e.g. changes in policy, legislation, and in consumer and (cont.) investor sentiment) (i.e. transition risks); with litigation risks considered as a subset of both physical and transition risks. (NGFS)

Materiality	Refers to the significance of a matter in relation to a set of financial or performance information. If a matter is material to the set of information, then it is likely to be of significance to a user of that information. (OECD) Materiality is rarely determinable by a bare quantitative equation; Rather, it requires an assessment of whether a reasonable investor would consider the information relevant to its decision of whether to invest in a company. That assessment may require consideration of both quantitative and qualitative factors. (Commonwealth Climate and Law Initiative)
Megadiverse countries	Countries (17) that have been identified as the most biodiversity-rich countries of the world, with a particular focus on endemic biodiversity. (UNEP-WCMC)
National Biodiversity Strategy and Action Plan (NBSAP)	A policy document, developed and adopted by Parties to the Convention on Biological Diversity, in line with the requirements of the Aichi Biodiversity Target 17. (Convention on Biological Diversity)
Natural capital	The world's stocks of natural assets, which include geology, soil, air, water and all living things. (IPBES)
Nature	The natural world, with an emphasis on the diversity of living organisms (including people) and their interactions among themselves and with their environment. (TNFD)
Nature degradation	Changes within a natural ecosystem that significantly and negatively affect its species composition, structure and/or function, and reduce the ecosystem's capacity to supply products, support biodiversity and/or deliver ecosystem services. (TNFD)
Nature dependencies	The reliance of human societies and economies on natural capital and the essential services that nature provides. (TNFD)
Nature financing	Includes nature recovery finance for activities that avoid and minimise pressures on nature, and nature conservation finance for activities that help to restore and conserve the natural ecosystems; also includes offsetting activities by corporates. (CISL)
Nature impacts	The effects that human activities have on natural capital and their ability to provide these services. (TNFD)
Nature loss	The loss and/or decline of the state of nature. This includes, but is not limited to, the reduction of any aspect of biological diversity e.g., diversity at the genetic, species and ecosystem levels in a particular area through death (including extinction), destruction or manual removal. (IPBES)
Nature-based solutions (NBS)	Actions to protect, sustainably manage and restore natural or modified ecosystems that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits. (IUCN)

Nature-related scenario analysis	Allows organisations to explore the possible consequences of nature loss and climate change, the ways in which governments, markets and society might respond, and the implications of these uncertainties for business strategy and financial planning. (TNFD)
Novel entities	Entities that are novel in a geological sense and that could have large-scale impacts that threaten the integrity of Earth system processes. Examples include synthetic chemicals and substances (e.g. microplastics, endocrine disruptors, organic pollutants), anthropogenically mobilised radioactive materials (e.g. nuclear waste, nuclear weapons), and human interventions in evolutionary processes, such as genetically modified organisms (GMOs) and other direct modifications of evolution. (Stockholm Environment Institute)
Paris Agreement	The Paris Agreement, under the United Nations Framework Convention on Climate Change (UNFCCC), was adopted on December 2015 in Paris, France, at the 21st session of the Conference of Parties (COP) to the UNFCCC. One of the goals of the Paris Agreement is ”holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels”, recognising that this would significantly reduce the risks and impacts of climate change. Additionally, the Agreement aims to strengthen the ability of countries to deal with the impacts of climate change. (Adapted from IPCC)
Physical risks	Nature-related physical risks are risks resulting from the degradation of nature (such as changes in ecosystem equilibria, including soil quality and species composition) and consequential loss of ecosystem services upon which economic activity depends. These risks can be chronic (e.g. a gradual decline of species diversity of pollinators resulting in reduced crop yields) or acute (e.g. natural disasters or forest spills). Nature-related physical risks arise because of changes in the biotic (living) and abiotic (non-living) conditions that support healthy, functioning ecosystems. These risks are usually location-specific. (TNFD)
Planetary boundaries	The safe limits for human pressure on the nine critical processes that together maintain a stable and resilient Earth. (Stockholm Resilience Centre)
Real economy / sector	Refers to the part of the economy that produces goods and services, rather than the part that consists of financial institutions and services. (World Bank Group)
Reputational risks	The risk arising from changes in sentiment towards the organisation/brand due to impacts on nature. (TNFD)
Risk assessment	Nature-related risk assessment can be conducted through both qualitative (e.g., heatmap) and quantitative (e.g., scenario-based risk method) approaches. Nature-related risk assessments can help financial institutions and corporates inform their strategies and decision-making. For asset owners in particular, risk assessments feed into decisions about portfolio allocation, risk management and investment strategies, from due diligence to value creation and exit (cont.) strategy. Risk assessments can also help corporates stress test their business strategies, identify options for risk mitigation and inform peer engagement to create industry-wide initiatives with positive impacts on nature. Understanding how to apply best practice risk assessment approaches effectively is essential for integrating nature into strategic thinking and decision making as well as risk management. (TNFD)

Risk management	The process of identifying potential threats, assessing organisational vulnerabilities, determining risks and implementing appropriate risk management techniques to minimise the negative impact they may have on an organisation. The most common types of risk management techniques include avoidance, mitigation, transfer and acceptance. (TNFD)
State of nature	The condition and extent of ecosystems, and species population size and extinction risk, including positive or negative changes. (TNFD)
Stress tests	Stress tests represent difficult edge cases that are developed by putting extreme values of a relevant variable or small number of variables into existing planning models. The objective of stress testing is to assess how the results of those models change in response. (TNFD)
Sustainable finance	The process of taking environmental, social and governance (ESG) considerations into account when making investment decisions in the financial sector. (EU)
Taxonomy	Refers to a classification system for investments, particularly as they relate to a government's environmental goals. (World Bank Group)
Tipping point	A set of conditions of an ecological or social system at which further perturbation will cause rapid change and prevent the system from returning to its former state. (IPBES)
Transition risks	Nature-related transition risks are risks to an organisation that stem from a misalignment of economic actors with actions aimed at protecting, restoring, and/or reducing negative impacts on nature. These risks can be prompted, for example, by changes in regulation and policy, legal precedent, technology, or investor sentiment and consumer preferences. They can also arise from activities aimed at restoring nature that no longer align with, for example, revised policies. (TNFD)
Upstream / downstream sectors	Upstream: All activities associated with suppliers, such as production or cultivation, sourcing of commodities or goods, and the transportation of commodities to manufacturing facilities. (SBTN) Downstream: All activities that are linked to the sale of products and services produced by the company. This includes the use and re-use of the product at its end of life, including recovery, recycling and final disposal. (SBTN)
Value chain	The full range of interactions, resources and relationships related to a reporting entity's business model and the external environment in which it operates. (IFRS)
WWF Risk Indicator	Refers to the 33 variables used in the WWF Risk Filter tool, which enable companies and financial institutions to inform, explore, assess and act on biodiversity risks. (WWF)

Appendix 8: Acronyms

Acronym	Description
ASEAN	Association of Southeast Asian Nations
BII	Biodiversity Intactness Index
CBD	Convention on Biological Diversity
CISL	Cambridge Institute for Sustainability Leadership
COP	Conference of the Parties
ENCORE	Exploring Natural Capital Opportunities, Risks, and Exposure
ESG	Environmental, Social and Governance
ESRS	European Sustainability Reporting Standards
ETF	Exchange Traded Fund
EU	European Union
EUDR	European Union Deforestation Regulation
GBF	Global Biodiversity Framework
GDP	Gross Domestic Product
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
IPCC	Intergovernmental Panel on Climate Change
ISPO	Indonesian Sustainable Palm Oil
IUCN	International Union for the Conservation of Nature
LEAP	Locate, Evaluate, Assess, Prepare
MPSO	Malaysian Sustainable Palm Oil
MSA	Mean Species Abundance

NBS	Nature-Based Solutions
NBSAPs	National Biodiversity Strategies and Action Plans
NGFS	Network for Greening the Financial System
PAI	Principal Adverse Impact
PPVC	Prefabricated Prefinished Volumetric Construction
RSPO	Roundtable on Sustainable Palm Oil
SBTN	Science Based Targets Network
TCFD	Task Force on Climate-related Financial Disclosures
TNC	The Nature Conservancy
TNFD	Taskforce on Nature-related Financial Disclosures
UK	United Kingdom
UN	United Nations
UNEP FI	United Nations Environment Programme Finance Initiative
UNEP FI PRB	United Nations Environment Programme Finance Initiative Principles for Responsible Banking
US	United States
WEF	World Economic Forum
WWF	World Wildlife Fund

References

Adidas. (n.d.). More sustainable materials. Retrieved October 2024, from https://www.adidas-group.com/en/sustainability/environmental-impacts/more-sustainable-materials-and-circular-services

Adidas. (n.d.). Adidas sustainability – Our targets. Retrieved October 2024, from https://www.adidas-group.com/en/sustainability/focus-on-sustainability/our-targets

Adidas. (n.d.). The time for change is now. Retrieved October 2024, from https://www.adidas.com.my/en/sustainability/timeline

Amundi. (2023, December). Integrating biodiversity into portfolios: a bespoke framework. Retrieved November 2024, from https://research-center.amundi.com/article/integrating-biodiversity-portfolios-bespoke-framework

ASEAN. (2020, November). ASEAN, UNESCAP launch Building Resilience to Drought in South-East Asia report. Retrieved November 2024, from https://asean.org/asean-unescap-launch-building-resilience-to-drought-in-south-east-asia-report/

ASEAN. (n.d.). Nature conservation and biodiversity. Retrieved September 2024, from https://environment.asean.org/nature-conservation-and-biodiversity/about

ASEAN Centre for Biodiversity. (2023, June). Beating plastic pollution to protect ASEAN's web of life. Retrieved 2025 January, from https://asean.chm-cbd.net/news/beating-plastic-pollution-protect-aseans-web-life

ASEAN Centre for Biodiversity. (n.d.). Southeast Asia's biodivesity challenges. Retrieved October 2024, from https://www.ajne.org/sites/default/files/event/2051/session-materials/ppt-14-session-3.asean-biodiversity-challenges-clarissa-c.-arida.pdf

ASEAN Taxonomy Board. (2024). ASEAN Taxonomy v3. Retrieved December 2024, from https://www.theacmf.org/images/downloads/pdf/ASEAN-Taxonomy-Version-3.pdf

Asia Investor Group on Climate Change. (2024). Nature at a Tipping Point. Retrieved January 2025, from https://aigcc.net/wp-content/uploads/2024/05/AIGCC-PwC-Nature-at-A-Tipping-Point_14-5-24.pdf

Asian Development Bank. (2024, June). Innovative finance approaches for addressing river basin pollution. Retrieved January 2025, from https://www.adb.org/sites/default/files/publication/977796/innovative-finance-river-basin-solution.pdf

Bangkok Post. (2024, September). Govt revives B200bn flood plan for northern Thailand. Retrieved October 2024, from https://www.bangkokpost.com/thailand/general/2857183/govt-revives-b200bn-flood-plan-for-northern-thailand

Better Cotton. (2022, April 27). Better Cotton brings together global fashion brands to ensure cotton traceability. Retrieved December 2024, from https://bettercotton.org/better-cotton-brings-together-global-fashion-brands-to-ensure-cotton-traceability/

BHP. (2019, September). Water stewardship at Olympic Dam. Retrieved November 2024, from https://www.bhp.com/news/case-studies/2019/09/water-stewardship-at-olympic-dam

BHP. (2022). 2022 US annual report. Retrieved November 2024, from https://www.bhp.com/-/media/documents/investors/annual-reports/2022/220906_bhpannualreport2022.pdf

BHP. (2023, August). New use for wastewater in the desert. Retrieved November 2024, from https://www.bhp.com/news/case-studies/2023/08/new-use-for-wastewater-in-the-desert

BHP. (n.d.). Olympic Dam, South Australia. Retrieved November 2024, from https://www.bhp.com/what-we-do/global-locations/australia/south-australia/south-australia-olympic-dam

BlackRock (2024, August). Capital at risk: nature through and investment lens. Retrieved April 2025, from https://www.blackrock.com/institutions/en-us/insights/portfolio-design/nature-through-an-investment-lens

BlackRock (2023) Sustainable investing in fixed income. Retrieved April 2025, from https://www.blackrock.com/uk/literature/whitepaper/sustainable-investing-fixed-income-pext-next.pdf

BlackRock (2025, January). Our approach to engagement on natural capital. Retrieved April 2025, from https://www.blackrock.com/corporate/literature/publication/blk-commentary-engagement-on-natural-capital.pdf

Bloomberg NEF. (2019, November). Volvo to use blockchain to efficiently source its cobalt. Retrieved November 2024, from https://about.bnef.com/blog/volvo-to-use-blockchain-to-ethically-source-its-cobalt/

BNP Paribas Asset Management. (2022). Sustainability by nature sequel: Our portfolio biodiversity footprint. Retrieved January 2025, from https://docfinder.bnpparibas-am.com/api/files/60B8656F-6A6F-4A35-9244-A997DCCB59FD

Botterill-James, T., Yates, L. A., Buettel, J. C., & Brook, B. W. (2024, August). The future of Southeast Asia's biodiversity: A crisis with a hopeful alternative. Biological Conservation. Retrieved September 2024, from https://www.sciencedirect.com/science/article/pii/S0006320724002039

Building and Construction Authority Singapore. (2024, October 18). BCA-IMDA Green Mark for data centres 2024. Retrieved November 2024, from https://www1.bca.gov.sg/docs/default-source/docs-corp-buildsg/sustainability/20241008_gmdc2024_ver1.pdf?sfvrsn=407a219c_0

Building and Construction Authority Singapore. (n.d.). Green Mark 2021. Retrieved November 2024, from https://www1.bca.gov.sg/buildsg/sustainability/green-mark-certification-scheme/green-mark-2021

Building and Construction Authority Singapore. (n.d.). Green Mark certification scheme. Retrieved November 2024, from https://www1.bca.gov.sg/buildsg/sustainability/green-mark-certification-scheme

Building and Construction Authority Singapore. (n.d.). Green building masterplans. Retrieved November 2024, from https://www1.bca.gov.sg/buildsg/sustainability/green-building-masterplans

Building and Construction Authority Singapore. (n.d.). Case study – The Brownstone. Retrieved November 2024, from https://www1.bca.gov.sg/buildsg/productivity/design-for-manufacturing-and-assembly-dfma/prefabricated-prefinished-volumetric-construction-ppvc/prefabricated-prefinished-volumetric-construction-case-study-the-brownstone

Cambridge Institute for Sustainability Leadership. (2022). Nature-related financial risk: Use case. Retrieved January 2025, from https://www.cisl.cam.ac.uk/files/robeco-cisl_nature-related_financial_risk_use_case_-_land_degradation_vfinal2.pdf

Cambridge Institute for Sustainability Leadership. (2024, October 15). Scaling finance for nature: Barrier breakdown. Retrieved October 2024, from https://www.cisl.cam.ac.uk/files/cisl_atrack_scaling_finance_for_nature.pdf

Capitals Coalition. (2021, April). Natural capital for biodiversity policy: What, why and how. Retrieved January 2025, from https://capitalscoalition.org/wp-content/uploads/2021/04/Natural-capital-for-biodiversity-policy-%E2%80%94-FINAL-1.pdf

Capitals Coalition. (n.d.). Biodiversity guidance. Retrieved January 2025, from https://capitalscoalition.org/guide_supplement/biodiversity-4/

Carey, R. N. (2024, June). Volvo to issue the world's first battery passport ahead of EU rules. Reuters. Retrieved November 2024, from https://www.reuters.com/business/autos-transportation/volvo-issue-worlds-first-ev-battery-passport-ahead-eu-rules-2024-06-04/

CDL. (2017). CDL Sustainability Report 2017. Retrieved November 2024, from https://ir.cdl.com.sg/static-files/bc46c60d-1437-4d84-be15-a63300f16dc8

CDP. (2023, September 5). Majority of G20 countries lack policies on nature-related disclosure, despite COP15 commitments. Retrieved September 2024, from https://www.cdp.net/en/articles/governments/majority-of-g20-countries-lack-policies-on-nature-related-disclosure-despite-cop15-commitments

CDP. (2024). Nurturing nature: De-risking nature-based finance in Asia. Retrieved December 2024, from https://www.greenfinanceplatform.org/sites/default/files/downloads/resource/CDP_Nurturing_Nature.pdf

CDP. (n.d.). Understanding CDP's 15 forest-related key performance indicators. Retrieved January 2025, from https://cdn.cdp.net/cdp-production/comfy/cms/files/files/000/007/008/original/KPI_Forest_FactSheet.pdf

Cenergi. (2021, October). Sime Darby Plantation Berhad : On track to 40% carbon emission reduction by 2030 with biogas plants initiative. Retrieved October 2024, from https://www.cenergi-sea.com/sime-darby-plantation-berhad-on-track-to-40-carbon-emission-reduction-by-2030-with-biogas-plants-initiative/

Channel News Asia. (2021, July 12). Commentary: Mangroves, a crown jewel of Singapore's coastline. Retrieved December 2024, from https://www.channelnewsasia.com/commentary/mangrove-sungei-buloh-park-climate-change-carbon-sea-rise-coast-2052221

COFCO International. (2024, December 20). COFCO and OCBC partner on first financing linked to SBTi FLAG emission reduction targets. Retrieved February 17, 2025, from https://www.cofcointernational.com/newsroom/cofco-and-ocbc-partner-on-first-financing-linked-to-sbti-flag-emission-reduction-targets/

COFCO International. (2024, December 20). Making progress towards our emissions reductions targets. Retrieved February 17, 2025, from https://www.cofcointernational.com/newsroom/making-progress-towards-our-emissions-reductions-targets/

Convention on Biological Diversity. (2024). National biodiversity strategies and action plans (NBSAPs). Retrieved October 2024, from https://www.cbd.int/nbsap

Cotton Grower. (2024, February). Olam Agri launches global regenerative ag program for U.S. Cotton. Retrieved November 2024, from https://www.cottongrower.com/cotton-news/olam-agri-launches-global-regenerative-ag-program-for-u-s-cotton/

DBS. (2024, June). DBS partners CDL on first-of-its-kind TNFD targets-aligned sustainability-linked loan. Retrieved November 2024, from https://www.dbs.com/newsroom/DBS_partners_CDL_on_first_of_its_kind_TNFD_targets_aligned_sustainability_linked_loan

Development Asia. (2018, October 25). Declining natural capital: High stakes for Asia and the Pacific. Retrieved September 2024, from https://development.asia/explainer/declining-natural-capital-high-stakes-asia-and-pacific

Eco-Business. (2024, March 25). Singapore's race to self-sufficiency in Malaysia water stoush. Retrieved January 2025, from https://www.eco-business.com/opinion/singapores-race-to-self-sufficiency-in-malaysia-water-stoush/

Elisha, O. D. (2020, June). ResearchGate – Moving beyond take-make-dispose to take-make-use for sustainable economy. Retrieved November 2024, from https://www.researchgate.net/publication/349964391_Moving_Beyond_Take-Make-Dispose_to_Take-Make-Use_for_Sustainable_Economy

European Commission – EUDR. (2024, Oct). Commission strengthens support for EU Deforestation Regulation implementation and proposes extra 12 months of phasing-in time, responding to calls by global partners. Retrieved October 2024, from https://ec.europa.eu/commission/presscorner/detail/en/ip_24_5009

Financial Stability Board. (2024, July). Stocktake on nature-related risks. Retrieved January 2025, from https://www.fsb.org/uploads/P180724.pdf

Funeka M., Mosai, A. K., Tutu, H., & Tshentu, Z. R. (2024, February). Mining wastewater treatment technologies and resource recovery techniques: A review. Retrieved November 2024, from https://www.sciencedirect.com/science/article/pii/S2405844024007618

Global Mangrove Alliance. (2021, July). The Mangrove Alliance. Retrieved December 2024, from https://www.mangrovealliance.org/wp-content/uploads/2021/07/The-State-of-the-Worlds-Mangroves-2021-FINAL-1.pdf

Global Reporting Initiative. (2021, May). The double-materiality concept application and issues. Retrieved January 2025, from https://www.globalreporting.org/media/jrbntbyv/griwhitepaper-publications.pdf

Green Central Banking. (2024, May 2). Ecosystem tipping points: Rhe role financial authorities should play in preventing them. Retrieved September 2024, from https://greencentralbanking.com/2024/05/02/ecosystem-tipping-points-financial-authorities/

Hasnah, H., Hariance, R., & Hendri, M. (2021). Analysis of the implementation of Indonesian Sustainable Palm Oil-ISPO Certification at farmer level in West Pasaman Regency. IOP Publishing. Retrieved November 2024, from https://iopscience.iop.org/article/10.1088/1755-1315/741/1/012072

He, C. L. (2021, August). Future global urban water scarcity and potential solutions. Retrieved November 2024, from https://www.nature.com/articles/s41467-021-25026-3

HSBC Asset Management. (2020, August). HSBC Pollination: Nature is capital. Retrieved November 2024, from https://www.assetmanagement.hsbc.com.au/en/institutional-investor/news-and-insights/climateassetmanagement-au

Innovation in Textiles. (2023, October). Adidas endorses supercritical CO2 dyeing. Retrieved October 2024, from https://www.innovationintextiles.com/adidas-endorses-supercritical-co2-dyeing/

Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. (2024, December 16). Media Release: IPBES Nexus Assessment. Retrieved January 2025, from https://www.ipbes.net/nexus/media-release

Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. (n.d.). Models of drivers of biodiversity and ecosystem change. Retrieved January 2025, from https://www.ipbes.net/models-drivers-biodiversity-ecosystem-change

Jain Irrigation Systems. (n.d.). Drip irrigation systems. Retrieved October 2024, from https://www.jains.com/irrigation/drip%20irrigation%20system.htm

Just ETF. (n.d.). BNP Paribas Easy ECPI Circular Economy Leaders UCITS ETF EUR. Retrieved October 2024, from https://www.justetf.com/en/etf-profile.html?isin=LU1953136527

Kao. (2023, March). Kao and the Sumitomo Mitsui Banking Corporation sign sustainability linked loan agreement for a sustainable future. Retrieved November 2024, from https://www.kao.com/global/en/newsroom/news/release/2023/20230329-001/

Mangmeechai, A. (2020). Effects of rubber plantation policy on water resources and landuse change in the northeastern region of Thailand,". Retrieved October 2024, from https://www.researchgate.net/publication/342430665_Effects_Of_Rubber_Plantation_Policy_On_Water_Resources_And_Landuse_Change_In_The_Northeastern_Region_Of_Thailand

Manulife Investment Management. (2023). Nature disclosure – Timberland and agriculture. Retrieved December 2024, from https://www.manulifeim.com/content/dam/mim-institutional/global/documents/resources/taskforce-on-nature-related-financial-disclosures-en.pdf

Manulife Investment Management. (2024). Expanding the efficient frontier with natural capital investments. Retrieved December 2024, from https://www.manulifeim.com/institutional/global/en/viewpoints/private-markets/expanding-the-efficient-frontier-with-natural-capital-investment

Manulife Investment Management. (2024). MIM water statement brochure. Retrieved December 2024, from https://www.manulifeim.com/content/dam/mim-institutional/global/documents/resources/MIM-Water-Statement-Brochure-EN.pdf

Ministry of Foreign Affairs Singapore. (2020, October 16). ASEAN and EU: The untold story. Retrieved November 2024, from https://www.mfa.gov.sg/Overseas-Mission/Ministry-of-Foreign-Affairs---Permanent-Mission-of-the-Republic-of-Singapore/Recent-Highlights/2020/10/ASEAN-and-EU-The-untold-story

Ministry of Plantation and Commodities Malaysia. (2024, May). SAWIT : MSPO certification achieves 87.4% coverage of Malaysian palm oil plantations. Retrieved October 2024, from https://www.kpk.gov.my/kpk/en/palm-oil-news/sawit-mspo-certification-achieves-87-4-coverage-of-malaysian-palm-oil-plantations

Ministry of Sustainability and the Environment Singapore. (2024). Water policies. Retrieved January 2025, from https://www.mse.gov.sg/policies/water#87618d0080fdec75d90160a8ce9e1599

Mordor Intelligence. (2021). Study of data center water consumption in Singapore market size. Retrieved January 2025, from https://www.mordorintelligence.com/industry-reports/study-of-data-center-water-consumption-in-singapore

National Library Board Singapore. (2020, February). Water shortages and rationing in Singapore. Retrieved January 2025, from https://www.nlb.gov.sg/main/article-detail?cmsuuid=934137ac-f437-4120-93e0-689ec0283f97

Natixis. (2022, June). Pernod Ricard successfully issued its €750m inaugural sustainability-linked bond issuance. Retrieved November 2024, from https://gsh.cib.natixis.com/our-center-of-expertise/articles/pernod-ricard-successfully-issued-its-750m-inaugural-sustainability-linked-bond-issuance

Natural Capital Forum. (n.d.). What is natural capital? Retrieved September 2024, from https://naturalcapitalforum.com/about/

Natural History Museum. (2021). Biodiversity Intactness Index. Retrieved November 2024, from https://www.nhm.ac.uk/our-science/services/data/biodiversity-intactness-index.html

Network for Greening the Financial System. (2023, September). Nature-related Financial Risks: A conceptual framework to guide action by central banks and supervisors. Retrieved January 2025, from https://www.ngfs.net/system/files/import/ngfs/medias/documents/ngfs_conceptual-framework-on-nature-related-risks.pdf

Network for Greening the Financial System. (2023, December). Recommendations toward the development of scenarios for assessing nature-related economic and financial risks. Retrieved September 2024, from https://www.ngfs.net/sites/default/files/medias/documents/ngfs_nature_scenarios_recommendations.pdf

Network for Greening the Financial System. (2024, July). Nature-related financial risks: A conceptual framework. Retrieved September 2024, from https://www.ngfs.net/sites/default/files/medias/documents/ngfs-conceptual-framework-nature-risks.pdf

Network for Greening the Financial System. (2024, July). Nature-related litigation: Emerging trends and lessons learned from climate-related litigation. Retrieved November 2024, from https://www.ngfs.net/sites/default/files/medias/documents/report-nature-related-litigation-emerging-trends-lessons-climate.pdf

Nikkei Asia. (2024, May 30). Singapore aims to boost data center capacity 35%. Retrieved January 2025, from https://asia.nikkei.com/Business/Technology/Singapore-aims-to-boost-data-center-capacity-35

Olam. (2023). Olam annual report. Retrieved November 2024, from https://www.olamgroup.com/content/dam/olamgroup/investor-relations/ir-library/annual-reports/annual-reports-pdfs/2023/olam_annual_report_2023.pdf

Philstar Global. (2020, July). Manila Water debuts sustainability bonds. Retrieved November 2024, from https://www.philstar.com/business/2020/07/25/2030357/manila-water-debuts-sustainability-bonds

Reliefweb. (2018). PM emphasizes Govt's progresses and plans for national water management. Retrieved October 2024, from https://reliefweb.int/report/thailand/pm-emphasizes-govt-s-progresses-and-plans-national-water-management

Rise Fierce. (n.d.). The end of waste? Adidas Futurecraft loop. Retrieved October 2024, from https://risefierce.com/blog/the-end-of-waste-adidas-futurecraft-loop

Robeco. (2023). Robeco stewardship report. Retrieved January 2025, from https://www.robeco.com/files/docm/docu-202404-robeco-stewardship-report-2023.pdf

S&P Global Sustainable 1. (2024, September). Rocks and hard places: The ecosystem risks of mining for energy transition minerals. Retrieved January 2025, from https://www.spglobal.com/esg/insights/featured/special-editorial/rocks-and-hard-places-the-ecosystem-risks-of-mining-for-energy-transition-minerals

Science Based Targets Network. (2024, July). Corporate manual for setting science-based targets for nature. Retrieved September 2024, from https://sciencebasedtargetsnetwork.org/wp-content/uploads/2024/07/Corporate-manual-for-setting-SBT-for-Nature.pdf

SD Guthrie. (2024, March). Q&A: Why Sime Darby Plantation had its climate targets validated. Retrieved October 2024, from https://www.sdguthrie.com/qa-why-sime-darby-plantation-had-its-climate-targets-validated/

Standard Chartered Bank. (2024). Supporting The Bahamas' conservation ambitions. Retrieved January 2024, from https://www.sc.com/en/campaigns/bahamas-debt-for-nature/

Stockholm Resilience Centre. (2023, September 13). All planetary boundaries mapped out for the first time, six of nine crossed. Retrieved September 2024, from https://www.stockholmresilience.org/research/research-news/2023-09-13-all-planetary-boundaries-mapped-out-for-the-first-time-six-of-nine-crossed.html

Storymaps. (2024, February). Deforestation in Southeast Asia. Retrieved October 2024, from https://storymaps.arcgis.com/stories/1b59556e3ced4bef8f64f0fcfdc3e937

Swire Properties. (2023). Swire Properties sustainability report. Retrieved November 2024, from https://www.swirepacific.com/storage/media/64744/2023-sustainability-report-eng.pdf

Taskforce on Nature-related Financial Disclosures. (2023, September). Guidance on the identification and assessment of nature-related issues: The LEAP approach. Retrieved September 2024, from https://tnfd.global/wp-content/uploads/2023/08/Guidance_on_the_identification_and_assessment_of_nature-related_Issues_The_TNFD_LEAP_approach_V1.1_October2023.pdf?v=1698403116

Taskforce on Nature-related Financial Disclosures. (2022, March). TNFD nature-related risk & opportunity management and disclosure framework: Beta v0.1 release. Retrieved January 2025, from https://tnfd.global/wp-content/uploads/2022/03/220321-TNFD-framework-beta-v0.1-FINAL.pdf

Taskforce on Nature-related Financial Disclosures. (n.d.). Why nature matters. Retrieved January 2025, from https://tnfd.global/about/why-nature-matters/#understanding

Temasek. (2021, September). New nature economy: Asia's next wave. Retrieved September 2024, from https://www.ecosperity.sg/content/dam/ecosperity-aem/en/reports/new-nature-economy-asia-low-res-pages.pdf

The Coalition of Finance Ministers for Climate Action. (2022, June). An overview of nature-related risks and potential policy actions for ministries of finance: Bending the curve on nature loss. Retrieved December 2024, from https://www.financeministersforclimate.org/sites/cape/files/inline-files/Bending%20the%20Curve%20of%20Nature%20Loss%20-%20Nature-Related%20Risks%20for%20MoFs_2.pdf

The London School of Economics and Political Science. (2022, March 24). Nature loss threatens financial stability and central banks should act: New report. Retrieved September 2024, from https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2022/03/Central-banking-and-supervision-in-the-biosphere_NGFS-INSPIRE-Final-Report.pdf

The Straits Times. (2024, September 30). Saving South-east Asia's trees requires action to address climate change and deforestation: Study. Retrieved January 2025, from https://www.straitstimes.com/singapore/saving-south-east-asia-s-trees-requires-action-to-address-climate-change-and-deforestation-study

Thomashausen, S., Maennling, N., & Mebratu-Tsegaye, T. (2017, July). A comparative overview of legal frameworks governing water use and waste water discharge in the mining sector. Retrieved November 2024, from https://www.sciencedirect.com/science/article/pii/S0301420717302933

Tradeimex. (2024, May). Biggest textile exporter countries statistics. Retrieved October 2024, from https://www.tradeimex.in/blogs/biggest-textile-exporter

UNEP FI. (2018, December). Exploring natural capital opportunities, risks and exposure: A practical guide for financial institutions. Retrieved January 2025, from https://www.unepfi.org/wordpress/wp-content/uploads/2018/11/NCFA_Exploring-Natural-Capital-Opportunities-Risks-and-Exposure_Nov-2018.pdf

UNESCO. (2024, February 26). Facts and figures on the state of the world's freshwater resources from the 2024 UN world water development report: Water for prosperity and peace. Retrieved January 2025, from https://www.unesco.org/reports/wwdr/en/2024/s

United Nations Environment Programme Finance Initiative. (2023, November). PRB nature target setting guidance executive summary. Retrieved September 2024, from https://www.unepfi.org/industries/banking/nature-target-setting-guidance/

Volvo. (2020, July). Volvo Cars Tech Fund invests in blockchain technology firm Circulor. Retrieved November 2024, from https://www.media.volvocars.com/global/en-gb/media/pressreleases/269598/volvo-cars-tech-fund-invests-in-blockchain-technology-firm-circulor

Wilmar. (n.d.). Smallholder empowerment initiatives. Retrieved November 2024, from https://www.wilmar-international.com/sustainability/smallholder-programmes/smallholder-empowerment-initiatives

World Bank Group. (2021, July). Protecting nature could avert global economic losses of $2.7 trillion per year. Retrieved September 2024, from https://www.worldbank.org/en/news/press-release/2021/07/01/protecting-nature-could-avert-global-economic-losses-of-usd2-7-trillion-per-year

World Bank Group. (2021). The economic case for nature. Retrieved September 2024, from https://openknowledge.worldbank.org/server/api/core/bitstreams/9f0d9a3a-83ca-5c96-bd59-9b16f4e936d8/content

World Economic Forum. (2019, December 11). 50% of all land in the world is used to produce food. Retrieved January 2025, from https://www.weforum.org/stories/2019/12/agriculture-habitable-land/

World Economic Forum. (2020, July 14). The future of nature and business. Retrieved September 2024, from https://www3.weforum.org/docs/WEF_The_Future_Of_Nature_And_Business_2020.pdf

World Economic Forum. (2021, September 29). How to address Asia Pacific's biodiversity crisis and encourage nature-positive growth. Retrieved January 2025, from https://www.weforum.org/stories/2021/09/how-to-address-asia-pacific-s-biodiversity-crisis-and-encourage-nature-positive-growth/

World Economic Forum. (2023, August 7). 5 ways Indigenous people are protecting the planet. Retrieved January 2025, from https://www.weforum.org/stories/2023/08/indigenous-people-protecting-planet/

World Resources Institute. (2024, January 10). More critical minerals mining could strain water supplies in stressed regions. Retrieved January 2025, from https://www.wri.org/insights/critical-minerals-mining-water-impacts

WWF, Aviva. (2024, September). National nature-positive pathways to guide policy and private sector action. Retrieved December 2024, from https://www.wwf.org.uk/sites/default/files/2024-09/WWF-Aviva-Nature-Positive-Pathways.pdf

WWF. (2023, April 18). Mining impacts affect up to 1/3 of global forest ecosystems, and tipped to rise with increased demand for metals. Retrieved January 2025, from https://wwf.panda.org/wwf_news/?8455466/Mining-impacts-affect-up-to-13-of-global-forest-ecosystems-and-tipped-to-rise-with-increased-demand-for-metals

WWF. (n.d.). WWF risk filter maps. Retrieved January 2025, from https://riskfilter.org/biodiversity/explore/map

About SSFA

The Singapore Sustainable Finance Association (SSFA) is an industry body established by the Monetary Authority of Singapore (MAS) along with the financial industry in January 2024. Building on the successful work of the Green Finance Industry Taskforce (GFIT), SSFA is established to collaborate across the financial and real economy sectors to support the growth of Singapore as a trusted, vibrant, and inclusive sustainable finance centre. SSFA welcomes participation from financial services, non-financial sector corporates, academia, non-governmental organisations, policymakers and other industry bodies.

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