



# Towards an **Integrated Transition Framework**



Managing Risks  
and Opportunities at  
the Nature-Climate Nexus

**February 2022**



FINANCE FOR  
BIODIVERSITY  
Initiative

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# About FINANCE FOR BIODIVERSITY Initiative

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

Our work on market efficiency and innovation draws from the entirety of our portfolio, which is organised across five workstreams:



**Market efficiency and innovation:** including a leadership role in the Taskforce on Nature-related Financial Disclosures (TNFD), and support to several data- and fintech-linked initiatives.



**Enhanced liability:** extending the legal liabilities of financial institutions for biodiversity outcomes, including innovations such as legal personhood for nature.



**Citizen engagement:** public advocacy, campaigning and advancing digital approaches to catalysing shifts in citizens' financing behaviour.



**Public finance:** advancing measures and advocacy linked to stimulus and recovery spending, and the place of nature in sovereign debt markets.



**Nature markets:** catalysing nature markets by developing new revenue streams and robust governance innovations.

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

**For more information and publications, visit [www.F4B-initiative.net](http://www.F4B-initiative.net)**



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# Executive Summary

**The Integrated Risk and Opportunity Framework (the 'framework') is a tool which financial institutions (FIs) can use to structure their approach to transition to a net-zero and nature positive world, encompassing both risks and opportunities.** The tool enables financial institutions to bring together existing approaches to assessing, reporting and acting on climate- and nature-related risks and opportunities in an integrated way. In doing so, financial institutions can account for the material interactions between climate and nature, ensure their approaches to both transitions are aligned and accurate, and better manage their portfolios. Even though FIs are the target user group, corporates can also use the framework as a starting point to build out strategies and risk management processes congruent with a more accurate accounting of revenues and costs inclusive of both climate and nature.

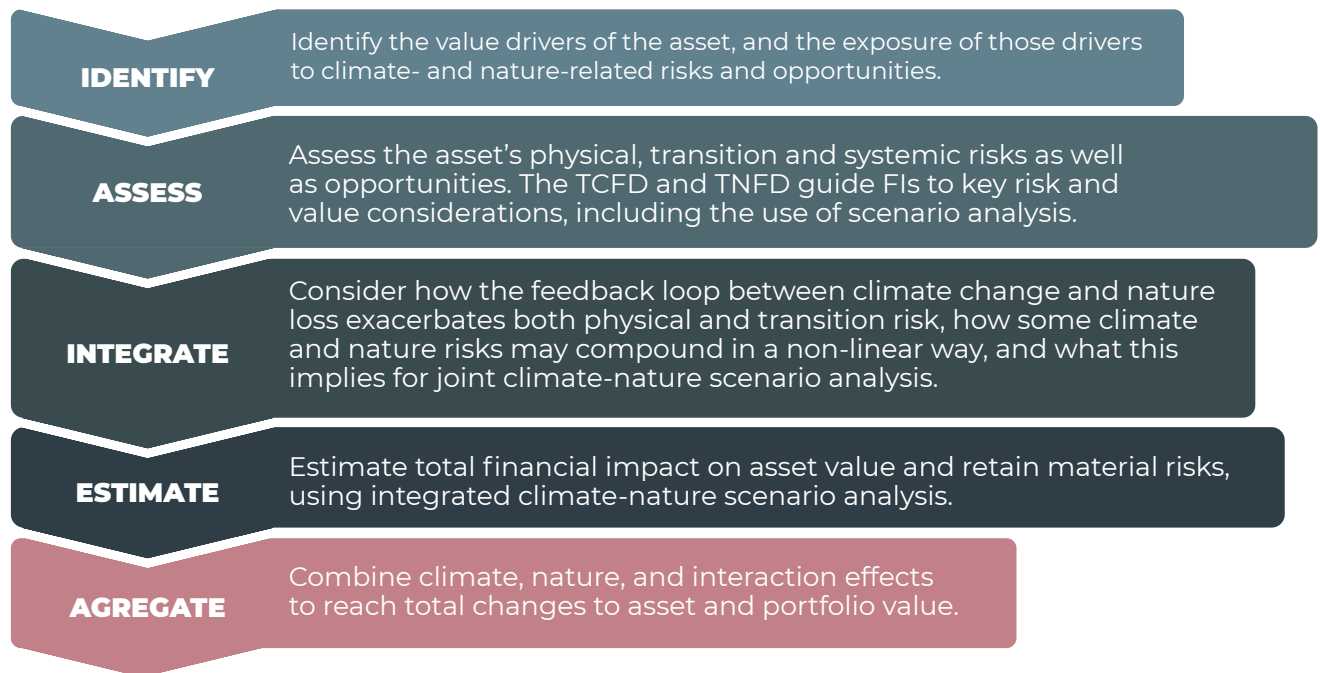
**Using this framework positions FIs to align with emerging policies, disclosure frameworks and standards which increasingly consider climate and nature together.** In particular, the Taskforce for Nature-related Financial Disclosures (TNFD) seeks to "employ an integrated approach to climate- and nature-related risks" and the IFRS International Sustainability Standards Board (ISSB) is producing guidelines to improve standardization across all sustainability disclosures including climate and nature. Integrated scenarios that consider society's transition to both a net-zero and nature positive world are at the core of this approach. Unpacking what this means is becoming increasingly important as key actors in the scenario space such as the Network of Central Banks and Supervisors for Greening the Financial System (NGFS) begins to consider biodiversity and nature within their work on forward-looking scenarios.

**The framework builds on established climate frameworks to allow financial institutions to:**

- Align strategies** to seize opportunities and manage longer-term risks from both a net-zero and nature-positive transition;
- Address interactions**, such as the compounding and feedback effects between climate change and nature loss; and,
- Aggregate impacts** by combining nature- and climate-related effects to assess financial impact.

**Figure 1 summarises the process to align strategies, address interactions and aggregate impacts.**

**Figure 1** | Five-step process to assess climate-nature opportunities and risks



**Source:** Adapted from Accounting for Sustainability (A4S, 2021). Essential Guide to Valuations and Climate Change, and NGFS (2021) Biodiversity and Financial Stability: Building the Case for Action

**The framework is a tool for creating value in three areas of business decision-making related to climate and nature: governance, strategy, and risk management.**

In governance: Visibility of climate- and nature-related risks and opportunities are required at the board and management level to guide strategy and risk management; to comply with public and internal financial and regulatory reporting processes; and to monitor compliance with corporate policy.

In strategy: Insights into how climate and nature drive value creation and value-at-risk help with optimising capital allocation, financial planning, and corporate strategy, including product development, research and acquisitions.

In risk management: The use of metrics and data related to climate and nature impacts and risks supports risk assessment, risk mitigation policies and processes, adaptation, and communication including financial, legal, reputational and broader risk.

The framework is flexible and adaptable. It can serve both private and public financial institutions including public development banks and those that deal with sovereign finance, though public institutions may need to expand the approach. It can scale to institutions of varying sizes and complexities. FIs can use this framework to adapt and expand existing climate frameworks into an integrated climate-nature assessment framework, with enough flexibility to make the analysis as simple or comprehensive as needed. It can also be adapted over time as best

practice evolves. In this way, it can support FIs to expand the scope of their assessments and disclosures over time, as capacity, data availability, and understanding develops.

The report also contains a typology for nature-related risks, to support forthcoming frameworks and standards in the space. This typology mirrors and complements climate-related typologies developed by the Task Force on Climate-related Financial Disclosures (TCFD) and Accountants for Sustainability.

## 1

# Introduction

## 1.1 Why climate- and nature-related risks and opportunities matter

**Both climate change and nature loss create significant opportunities and risks for the financial sector.** The global economy is intertwined with the planet's climate and nature systems, meaning the stability of these systems is crucial for achieving economic growth and well-being. These systems are currently in a state of crisis, however, with the climate changing<sup>1</sup> and nature degrading<sup>2</sup> at rates outside human experience. With over half of global GDP moderately or highly dependent on nature,<sup>3</sup> without action people and businesses will suffer some losses of community, family, livelihood and property; with action, some losses can be avoided.<sup>4</sup>

**Financial sector action on climate change continues to mature and expand rapidly, and the sector's action on nature is now beginning to take shape.** Driven by the demands of citizens, governments, executives and shareholders, initiatives such as the Task Force on Climate-related Financial Disclosures (TCFD) and the Network of Central Banks and Supervisors for Greening the Financial System (NGFS) have accelerated financial sector action on climate change over the last five years. These initiatives have led to an improved understanding of climate risk, and have enabled financial institutions (FIs) to begin aligning their portfolios with climate goals. This has been coupled with an increasing sense of urgency among FIs to tackle nature-related risks and opportunities, particularly over the past two or three years.

**Much of this urgency has been driven by**

**scientific evidence**, such as that from the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)

**economic analysis**, such as that by the World Economic Forum referred to above

**growing demands** from governments and citizens for both FIs and the corporates that they fund to reorient their investment portfolios and activities away from nature-negative towards nature-positive outcomes.

This is manifested in initiatives such as the Taskforce on Nature-related Financial Disclosures (TNFD), the Finance for Biodiversity Pledge, the emphasis on biodiversity in the Finance in Common Summit, and the multi-lateral development banks' Joint Nature Statement launched at COP26 in November 2021. At a policy level, it is clear that governments are ready to start to put in place the regulatory and incentive frameworks needed to facilitate a nature-positive transition. The expression of strong ambition by governments to protect and restore nature contained in the 2021 Leaders Summit statements of the G7, G20 and at COP26 are evidence of this. Crucially, there is now recognition that the Convention on Biological Diversity (CBD), through the Post-2020 Global Biodiversity Framework (GBF) to be agreed at COP15 in 2022, should give strong signals to the financial sector in the way that the Paris Agreement has done on climate change.

## 1.2 Why consider climate- and nature-related risks and opportunities in an integrated way?

**By approaching climate change and nature loss in an integrated fashion, the financial sector can value assets accurately and avoid valuation bias.**

The climate and nature systems are deeply interconnected. One cannot accurately assess climate-related risks without considering nature. Equally, one cannot accurately assess nature-related risks without considering climate. By recognising these interactions, the financial sector can avoid mispricing risks and opportunities, and can correctly value assets. The integrated framework shows practically how this can be done, leveraging progress already made in the climate space. In addition, considering climate and nature jointly will ensure decisions made regarding each are consistent and ultimately drive better financial performance. To demonstrate the need for this consistency, Box 1 and Box 2 provide case studies that illustrate how policy and consumer-driven events can generate interconnected climate-nature-related risks for financial institutions (more examples in the Annex).

**The demand for an integrated framework is already clear and will continue to build in the short to medium term.** Emerging policies, disclosure frameworks and standards are increasingly exploring how to consider climate and nature together. The Taskforce for Nature-related Financial Disclosures (TNFD) seeks to “employ an integrated approach to climate- and nature-related risks”, that explicitly accounts for the fact that climate change is a driver of nature loss and vice versa. The integrated framework aims to provide a practical way to action this, helping to bridge approaches to climate and nature. This thinking can then be plugged into increasingly comprehensive standards in the space, such as the general requirements for sustainability disclosures currently being developed by the IFRS International Sustainability Standards Board (ISSB), applicable to both climate and nature.

**Integrated scenarios that consider society’s transition to both a net-zero and nature positive world are at the core of this approach.**

Unpacking what this means is becoming increasingly important as thinking around future transition pathways for nature “catches up” with those for net-zero. The NGFS is currently examining the links between biodiversity and financial stability and is likely to soon consider how the financial sector should be thinking about nature loss and society’s response to it within scenario analysis. As this develops, an integrated framework can act as a platform to bring existing and emerging approaches to climate and nature together, rather than adjust or replace them. As thinking and methodology is refined over time, it can be “docked” within this framework to help ensure consistency.



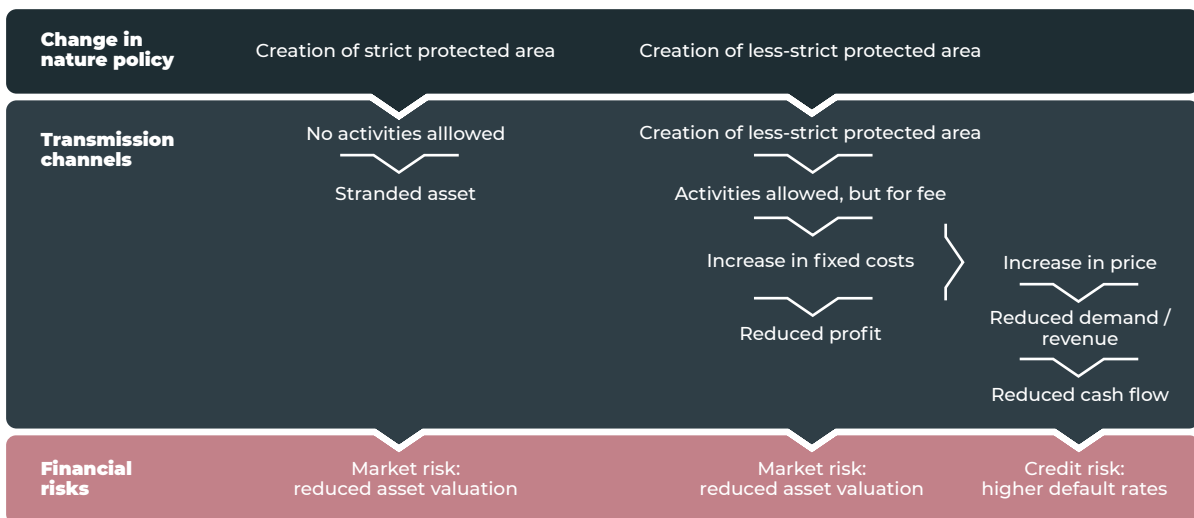
**BOX 1**

**Case study of financial risk from nature policy: protected areas**

**While significant uncertainty remains around the future of nature policy, the use of protected areas has become a focal point within the nature movement over the last several years.** Currently, protected areas cover 17% of Earth’s terrestrial and inland water, and 18% of its oceans.<sup>a</sup> An increasing number of countries have signed onto the ‘30by30’ target – a target which aims to conserve at least 30% of the Earth under protected area status by 2030 – with over 100 countries supporting this goal as of September 2021.<sup>b</sup>

**The implementation of protected areas creates the risk of stranded assets in areas placed under protected status, creating both market risk and credit risk for financial institutions.** The sectors most at risk are those which are disproportionately located in biodiversity rich or sensitive ecosystems, putting them at increased risk of being placed under protected area status. This includes the agriculture, forestry, and mining sectors. As Figure 2 demonstrates, protected areas create market risk from reduced asset valuation and credit risk from increased default rates.

**Figure 2** | Market and credit risk driven by the creation of protected areas



<sup>a</sup> UNEP-WCMC and IUCN (2021) Protected Planet Report 2020

<sup>b</sup> Campaign for Nature (2021) IUCN World Conservation Congress Overwhelmingly Supports Motion to Protect at Least 30% of the Planet by 2030

**BOX 2**

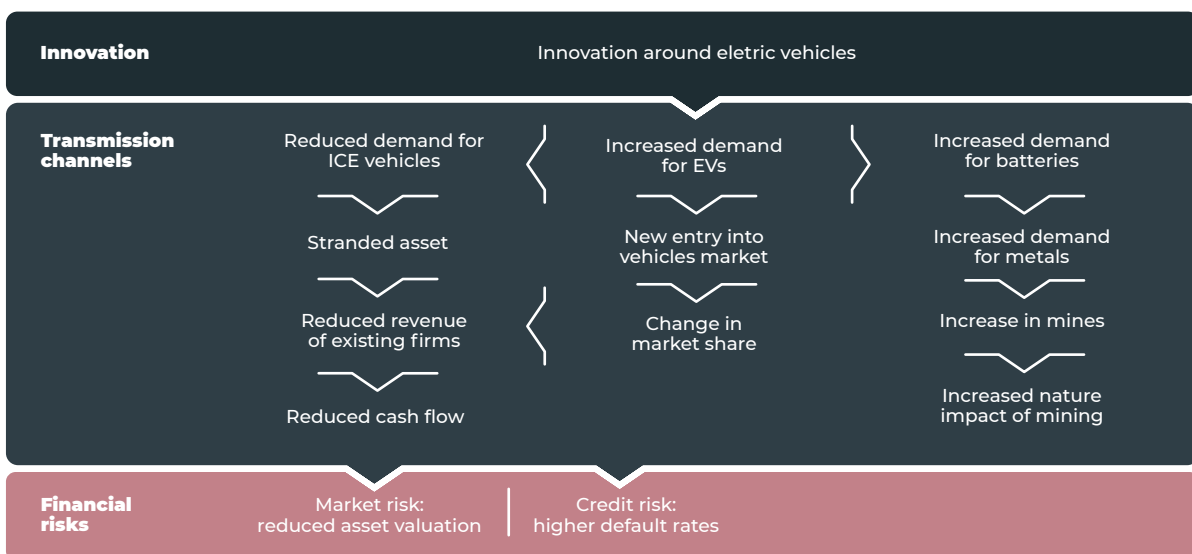
**Case study of financial risk from innovation: electric vehicles**

**Innovation around battery electric vehicles has major implications for global nature loss.** The deployment of electric vehicles (EVs) coupled with a low carbon energy supply is key to reducing carbon emissions. The impact of EVs on nature loss is, however, mixed. While EVs reduce ambient air pollution compared to vehicles with internal combustion engines (ICEs), increased demand for EVs also means increased demand for the metals required to produce EV batteries (i.e. lithium), leading to increased extraction activities and, thus, increased nature impact of mining.<sup>a</sup>

**The roll-out of electric vehicles creates opportunity for expansion into new markets, but also creates risk for FIs invested in ICE vehicle markets.**

For businesses which are quick to pivot, innovation in EVs creates the opportunity to expand into new markets and increase market share. These new technologies also bring forward new business models and therefore increased competition. As Figure 3 demonstrates, this creates market and credit risk for financial institutions invested in firms which continue to produce ICE vehicles.

**Figure 3** | Financial risk driven by innovation of battery-electric vehicle technology



<sup>a</sup> Castelvecchi (2021) Nature. Electric cars and batteries: how will the world produce enough?

## 1.3 What an integrated framework offers

### **The framework helps FIs to look at climate- and nature-related opportunities and risks in an integrated way and through a financial lens.**

Some FIs have begun thinking about nature-related risks within environmental and social risk management frameworks, testing investments for adherence with corporate policies, but these are not typically integrated into core financial processes, such as risk management or asset pricing alongside climate risk.<sup>5</sup> There is now an opportunity to move from a qualitative approach to nature, to a quantitative approach, making use of and contributing to improvements in the available quality of data and scenarios.

### **The similarities between climate- and nature-related risks and opportunities mean that existing climate frameworks lend themselves to integration with nature.**

The classification of risks into physical and transition categories, for example, has direct parallels with nature-related risks. The opportunities map similarly. An integrated approach is possible while leaving intact the integrity of separate climate and nature risk tools.

The implication is that an integrated approach is not only necessary to ensure risks and opportunities are assessed accurately, but also practical, because we can build from the existing infrastructure used for climate-related risks.

### **The framework is primarily intended for private financial institutions but can also be of use for public bodies as well as corporates.**

The principles that underpin the framework are equally applicable to both private and public organizations and to both financial institutions and corporates. Climate and nature must always be considered together to reach an accurate assessment of risks and opportunities. Existing progress on climate can always be leveraged as a practical starting point for integrated thinking. Public development banks in particular, whose mandates often include both climate and nature performance, may find an integrated framework useful for better understanding risk and resilience and structuring an integrated approach to both transitions.

## 1.4 How to use an integrated framework as a tool

The integrated framework has two dimensions: the content that allows FIs to understand how to integrate climate and nature, and the process to do so. Within these two dimensions of content and process, third party methodologies can be adopted to execute each component of the content or step of the process. In short, the framework is a tool for organising these methodologies. This allows the framework to act as a container for the methodologies, and for the methodologies to evolve independently of the framework.

## 1.5 How to navigate this document

The remainder of this report is set out as follows:

**Section 2** lays out the key components of the content underpinning the framework;

**Section 3** details the steps of the process; and

**Section 4** illustrates how FIs can use the framework.

A series of technical appendices contain a definition of key terms and lay out a typology for nature-related risks. For typologies of climate-related risks, please refer to the typologies developed by the TCFD<sup>6</sup> or Accountants for Sustainability.<sup>7</sup>

## 2

# Integrated climate-nature risk content

The content of the integrated framework has five components:

- Concepts and language;
- Transmission channels from risk to value;
- Approach to uncertainty;
- Climate-nature interaction effects; and,
- Aggregation.

This section describes each of these components in turn. They are then embedded in a five-step integrated process, described in Section 3.

## Component 1 Integrated concepts and language

**Financial impacts due to climate and nature lend themselves to similar typologies spanning physical, transition and systemic impacts for financial institutions.** Assessment frameworks for climate offer concepts and language suitable for an integrated climate-nature framework.

**Climate change and nature loss both create physical, transition and systemic risks. Physical risks (sometimes referred to as “biophysical risks” in the context of nature) include both long-term, chronic risks, and event-driven, acute risks.** Transition risks include changes in policies, regulations and laws, technologies, market and consumer preferences which take place as a response to climate change or nature loss. Systemic risks include the aggregate macroeconomic impacts of widespread physical and transition risk across economies, which include both collapse of natural ecosystems and the collapse of the financial sector<sup>8</sup>. Climate change and nature loss both create each of these types of risks to the economy, creating material risk for financial institutions.

**As defined by the Taskforce on Nature-related Financial Disclosures (TNFD), “nature-related risks and opportunities” broadly refers to both opportunities and risks to an organisation created by the links between its activities and nature.**<sup>9</sup>

These links include both the impact of an organisation on the state of nature, and its dependency on the ecosystem services that nature provides. An organisation’s dependencies and impacts on nature are the key drivers of its physical and transition risks respectively. The same holds for opportunities. As ecosystem services cease to function properly, systemic risks at the portfolio and financial system levels can arise due to impacts and dependencies across the economy.<sup>10</sup>

**The integrated framework aligns key concepts for nature and climate.** It breaks down financial impact into opportunity and risk, and it deconstructs risk into physical, transition and systemic risk for both climate and nature.

## Component 2

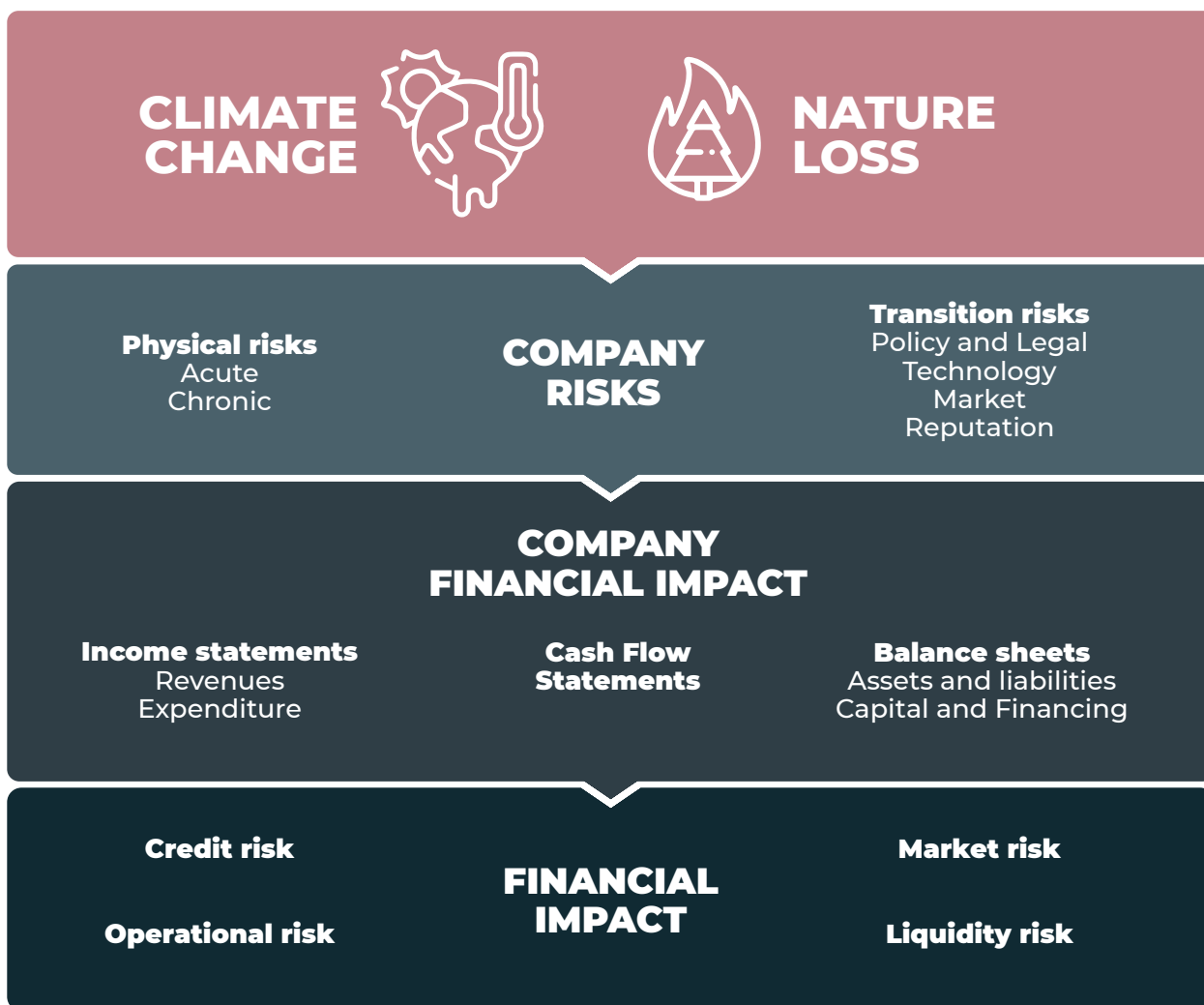
# The channels transmitting risk onto value

**The risks from climate change and nature loss affect the revenue, cost and risk profiles of companies, affecting asset and business valuation, and creating risk for financial institutions.**

As shown in Figure 4, the channels of physical and transition risk, and by definition systemic risk, affect companies' cash flow statements and future risk profiles. As the value of an asset can be defined by the net present value of future

cash flows, these risks affect the valuation of assets and, for financial institutions, they create a variety of risks including credit, market, liquidity and operational risk.<sup>11</sup> 'Company' in the figure below refers to a company in the real economy, not including financial institutions. It is possible to adopt the same channels for transmitting risk and opportunity to asset value in an integrated framework.

**Figure 4** | Integrated channels of financial risk from climate change and nature loss



**Source:** Adapted from TCFD (2017) Recommendations of the Task Force on Climate-related Financial Disclosures and NGFS (2021) Biodiversity and Financial Stability: Building the Case for Action

## Component 3

# Integrated approach to uncertainty

**Current approaches to assessing the risks and opportunities created by climate change employ an uncertainty-based approach often leveraging scenarios.** Given the uncertainty around the drivers of climate-related risk and opportunity, assessment of climate risk to date has largely been based around scenario analysis. This uses standardised scenarios such as those developed by the NGFS to assess the materiality of risks and opportunities under different future states of the world. The use of scenarios enables financial institutions to assess the effects of possible external conditions on their risk exposure, giving a picture of how risk and opportunity changes under, for example, more or less ambitious policy scenarios, more or less optimistic estimates of the dynamics of the climate, and assumptions about adaptive behaviour. Throughout its publications, the TCFD often discussed scenario analysis, including providing specific supplements to the recommendations offering guidance on their use.<sup>12</sup> As a result, the TNFD may be expected to take a similar focus on scenario analysis as a tool to deal with uncertainty.

**An integrated approach uses scenarios to address uncertainty across both climate and nature and chooses internally consistent assumptions about climate and nature within those scenarios.**

The same approach to scenario analysis that has been deployed for climate can be used to consider climate and nature together. In particular, climate scenarios can be expanded to consider a range of nature loss and nature policy pathways to understand the resulting financial risks and opportunities for financial portfolios. In such an integrated framework, assumptions must be internally consistent. For example, in the integrated framework, the climate scenario assumptions about land use change are the same as the assumptions about land use change in the nature scenario.

## Component 4

# Interaction effects

**Climate and nature systems interact, creating feedback loops and compounding risks which can be jointly accounted for.** A number of emerging frameworks in the space have provided initial guidance on the interactions between climate and nature including those put forward by the TNFD, CDSB and SBTN.<sup>13</sup> The framework presented below seeks to build on this existing work, offering suggestions for how financial institutions could action this within their assessment of risks and opportunities.

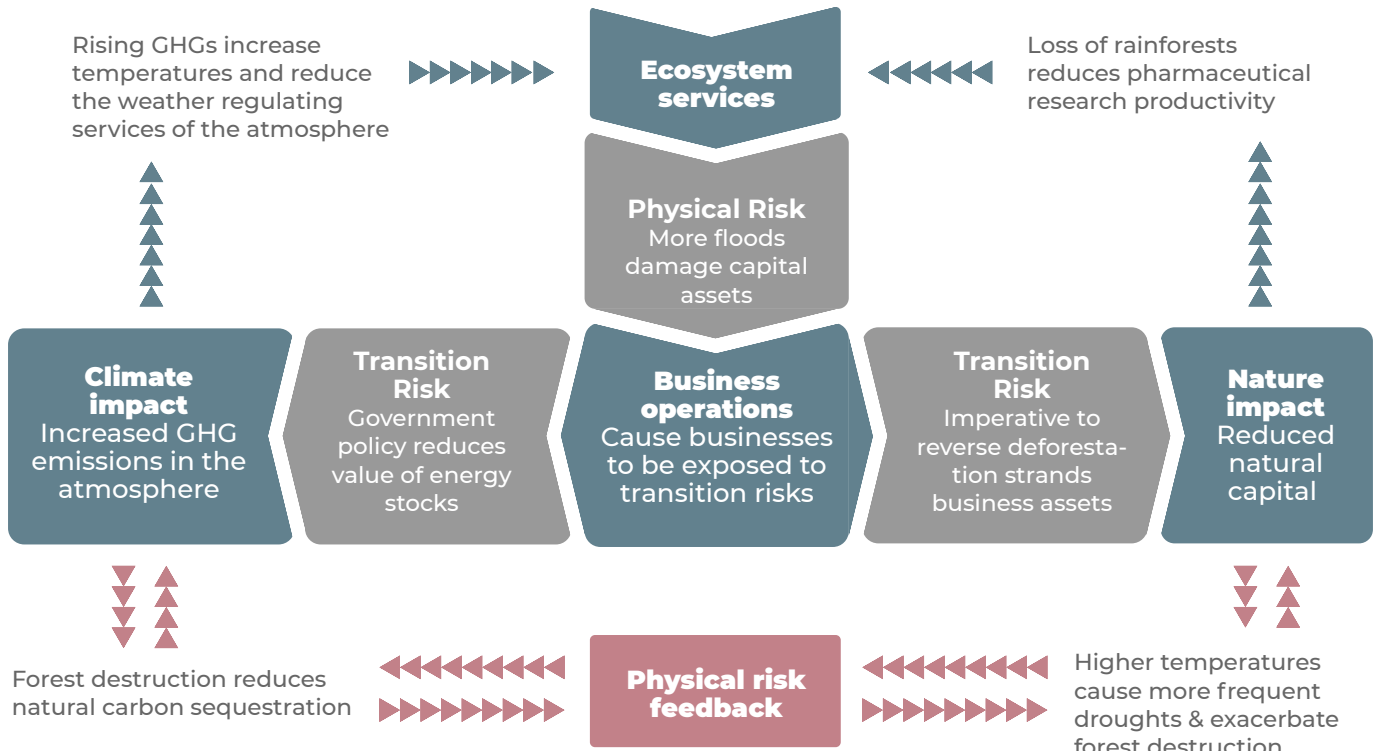
### Feedback loops

**Climate and nature systems are interconnected, creating a feedback effect between climate change and nature loss.** Feedback occurs when the outputs of one system become inputs to another. In the case of climate change and nature loss, climate change is a driver of nature loss, and nature loss can also be a driver of climate change. This is illustrated in Figure 5, as well as how this exacerbates physical risk.

**There are several examples of feedback between climate change and nature loss.**

For example, healthy ecosystems act as carbon sinks which mediate the carbon cycle and help regulate the climate. Large-scale nature loss reduces the carbon storage potential of ecosystems, altering the carbon cycle and driving forward additional climate change. Similar feedback effects exist, for example, with nitrogen and water cycles. More examples can be found in the IPCC-IPBES joint report on biodiversity and climate change.

**Figure 5** | Nature loss and climate change feed one another



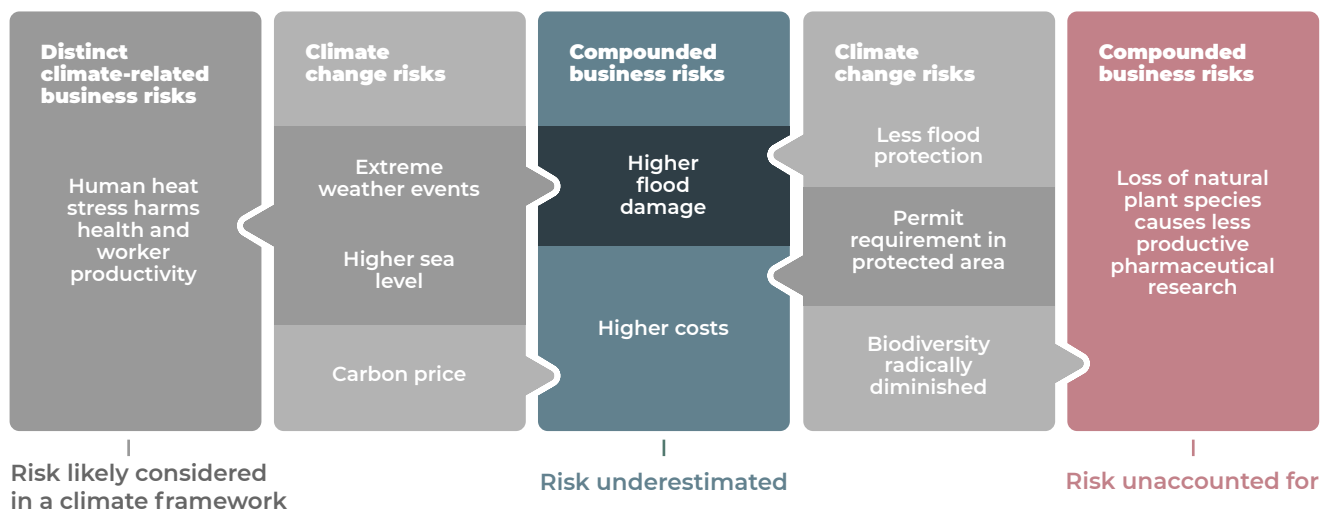
Source: Vivid Economics

**As the feedback loop increases the pace of climate change and nature loss, this increases the urgency for a transition to a net-zero and nature-positive economy.** As described above, the rate of expected climate change will increase when account is taken of nature loss, and vice versa. As a result, physical risks will rise and there will be a greater need for policy, market and technological change to take earlier action to tackle climate and nature impacts. Accelerated action will lead to a faster than expected increase in transition risk. In summary, the feedback loop between climate and nature exacerbates both physical and transition risk.

**Compound risks**

**Some risks related to nature loss overlap with climate risks, creating a compounding effect, while others are additional.** A compound effect occurs when two systems affect the same outputs in a similar way. In the case of climate change and nature loss, both systems can drive the same financial risks for companies; see Figure 6. As these risks compound, they increase the magnitude of risk faced, and this may not occur in a linear way. In other words, the financial risk posed by climate and nature jointly may be greater than the sum of the financial risks posed by each individually. Not all climate and nature risks overlap, however; some nature-related risks create additional risks beyond those created by climate change (see Figure 6).

**Figure 6** | Nature loss and climate change can combine to drive compound risks: an agriculture example



Source: Vivid Economics

**There are several examples of how the compounding effect between climate and nature works in practice.** For example, climate change increases the frequency and severity of floods in some parts of the world, creating risk to physical assets located in those areas. At the same time, nature loss such as deforestation reduces the protective capacity of nature to act as a natural moderator of flood risk. As a result, climate change and nature loss compound the flood risk faced by businesses, meaning expected losses are greater when considered together. The compounding effect applies to opportunities as well. For example, investments in nature-based solutions can both improve nature outcomes and reduce vulnerability to climate risks.

**Climate- and nature-related transition risks can also be compounded.** One of the transition risks stemming from climate change is increased policy costs, for example through the payment of a carbon price on emissions. This increases costs for businesses which emit carbon as part of their production processes. Similarly, nature-related transition risks can generate policy costs for businesses. For example, the restriction of access to natural landscapes may mean that some companies need to pay additional costs to maintain access to the same inputs for their production processes. As a result, in this example, the two costs of carbon and access to nature-related inputs can be considered together to give a full picture of total transition risk.

**Some risks created by nature loss are independent of those created by climate change, and vice versa.**

While some nature-related risks overlap with those created by climate change, some nature-related risks are more independent of climate risks. For example, deforestation may be driven by market factors rather than by climate change, but it still results in a reduction in biodiversity. The loss of plant species has negative implications for pharmaceutical research, which depends on natural species as the basis for many new drugs. The loss of plant species as a nature-related risk therefore has direct financial implications for pharmaceutical companies which may not currently be being accounted for. On the other hand, climate risks that are direct to humans – like heat stress – are relatively independent from risks created by nature loss.

## Component 5 Aggregation

**The output of the integrated framework is an aggregate measure of opportunity and risk.**

This aggregated measure can sum climate risk, nature risk and any additional joint climate-nature risk, allowing the feedback and compounding effects described above to be properly accounted for. By adopting an aggregated measure, both private and public FIs can incorporate a more accurate value of climate and nature risk and opportunity into their core operations.



## 3

# Integrated climate-nature risk process

The integrated process follows a similar structure to processes for climate risk, such as those developed by Accounting for Sustainability<sup>15</sup> and Principles for Responsible Investment (PRI).<sup>16</sup>

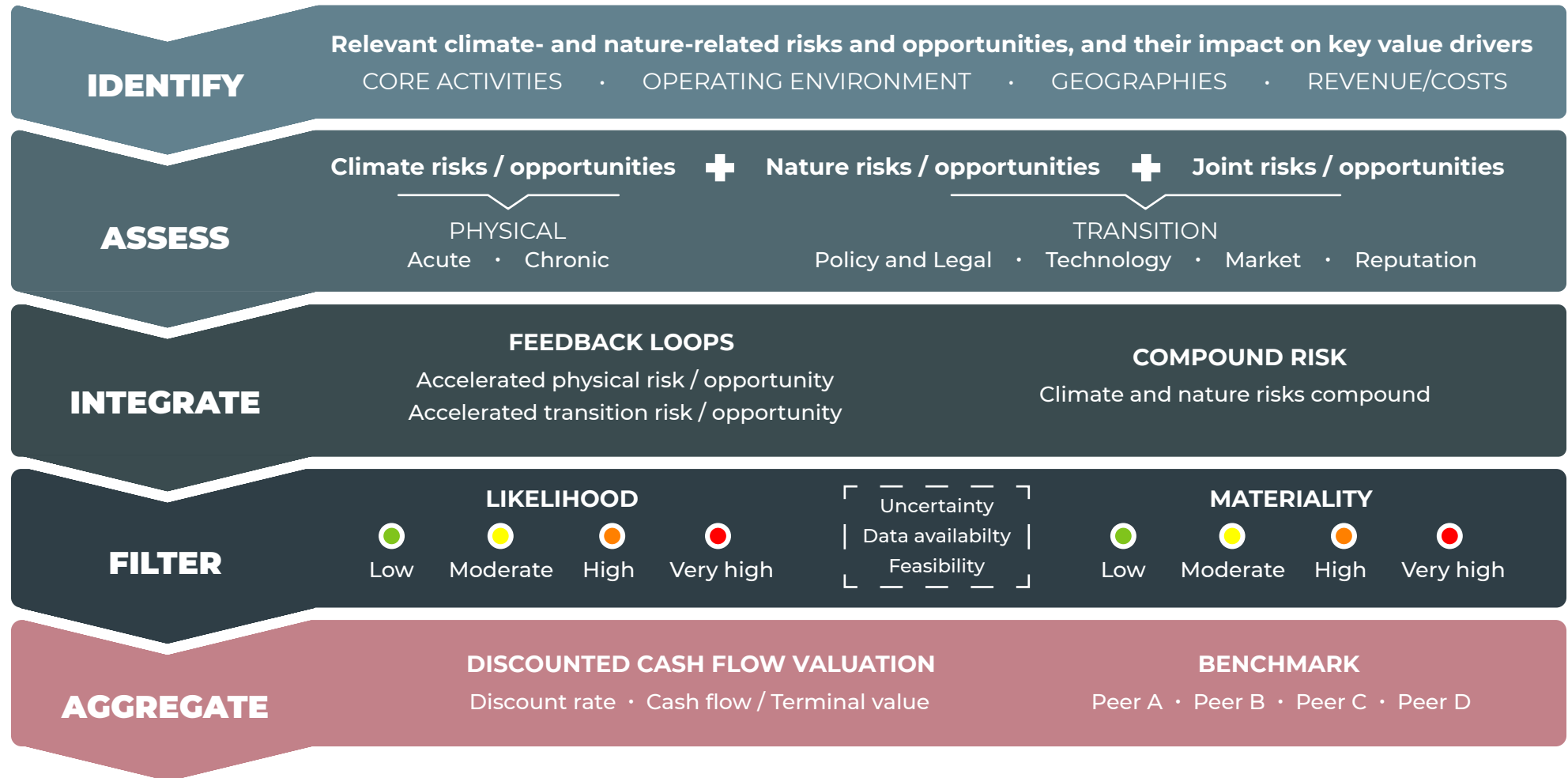
## **The integrated climate-nature risk assessment framework is undertaken in five steps.**

The framework follows a value-at-risk approach, which is the 'best-in-class' approach. These steps are adaptable so that, for example, the approach could be simplified for FIs of a small scale or with a narrow scope.

The five steps below are also shown in Figure 7:

- | Identify value drivers and risks;
- | Assess risks;
- | Integrate climate-nature interactions;
- | Filter risks for materiality; and
- | Aggregate risks into a joint climate-nature account.

**Figure 7** | An integrated climate-nature risk assessment framework for asset valuation



**Source:** Adapted from Accounting for Sustainability (2021). Essential Guide to Valuations, Climate Change, TCFD (2017) Recommendations of the Task Force on Climate-related Financial Disclosures, and NGFS (2021) Biodiversity and Financial Stability: Building the Case for Action

## Step 1 Identify risks and opportunities, and their effect/s on value drivers

**This step identifies the key value drivers of the asset in question, as well as the opportunities and risks to those value drivers.** The financial impact of a risk or opportunity on asset value is determined by the properties of the risk or opportunity, and the way in which these affect the value drivers of the asset. The output of the step is a list of the climate- and nature-related risks and opportunities that the asset may be exposed to, and an understanding of the channels through which these risks or opportunities drive change in value. These channels can include the core activities related to that asset, the operating environment it exists within, the markets in which it trades, as well as other elements of its revenue and cost structure. For example, assets in nature-intensive sectors and biodiversity-rich environments will face a different set of risks and opportunities compared with those in other sectors and geographies. This step is typically included in the initial scoping stage of existing assessment frameworks such as those put forward by the TCFD, CDSB, SBTN, and the Natural Capital Protocol (NCP).<sup>17</sup> In particular, they identify relevant impacts and dependencies for nature, and relevant physical effects of climate change.

## Step 2 Assess risks and opportunities

**Once the risks and channels through which they change asset value have been identified, climate- and nature-related risks and opportunities can be assessed.** This includes establishing the time horizon over which risks, and opportunities, will be assessed, identifying how the relevant physical, transition and systemic risks and opportunities for the asset are likely to change over time, identifying the impact of potential risk mitigation, and relating those outputs to key value drivers. The TCFD, CDSB and SBTN frameworks provides, and the TNFD framework will provide, a guide to the key risks and value considerations for FIs to focus on for climate- and nature-related risk, typically included as part of a materiality assessment. This includes the use of scenario analysis to assess how risks and opportunities are likely to change in the future.

## Step 3 Integrate climate-nature interactions

**After assessing climate- and nature-related risks and opportunities as distinct risks, the assessment considers the ways in which the risks interact with and compound one another.** These include positive feedback loops which exacerbate both physical and transition risk, for example under joint climate-nature transition policy scenarios. These also include compound risks from climate and nature, as described in Section 2. This step would form an extra consideration under the materiality assessment of existing assessment frameworks such as those put forward by the TCFD, CDSB, SBTN, and NCP.<sup>18</sup>

## Step 4 Filter risks for materiality (including likelihood)

**Using the list of individual and compound climate- and nature-related risks or opportunities, this step estimates the financial impact on asset values and selects those financial impacts which are material.** This step introduces the likelihood of impacts occurring under the range of climate-nature scenarios used, and combines this with the magnitude of those impacts on asset financial performance, producing an estimate of expected change in asset value. This step is typically included as the final consideration of a materiality assessment in existing assessment frameworks such as those put forward by the TCFD, CDSB, SBTN, and NCP.<sup>19</sup>

## Step 5 Aggregate risks and opportunities into a joint climate-nature account

**In this final step, the filtered list of risks is aggregated to show the total financial impact on asset value.** Two methodologies are typically used: discounted cash flow models, and benchmarking. Under the discounted cash flow approach, each risk or opportunity affects either the discount rate or the cash flow of the asset and is translated into a value change. Under the benchmarking approach, asset values are then compared to a range of peers which share similar characteristics to the asset in question.

## 4

# Using the integrated framework

## 4.1 How to integrate existing approaches

**The Task Force on Climate-related Financial Disclosures (TCFD) recommends that reporting entities consider risks that they consider financially material.** The TCFD was formed with the aim of increasing market transparency and stability by developing a framework to help public companies and FIs disclose climate-related risks and opportunities.<sup>20</sup> Published in 2017, the TCFD's framework is based on a financial materiality approach, recommending scenario analysis to assess the financial risk of climate change on individual companies under scenarios of physical climate impacts and climate policy.<sup>21</sup> In particular, the TCFD framework is largely focused on risks to companies themselves ('outside-in') rather than the impact of companies on climate change ('inside-out').<sup>22</sup> This focus places a greater emphasis on short-term financial risk resulting from existing or announced policies such as carbon pricing.

**In practice, FIs have taken a broader approach to climate risk, considering impacts and associated long-term risks alongside short-term risk.** The financial sector's approach to climate risk assessment, management and reporting has evolved to extend beyond the TCFD framework to include longer-term risk management strategies such as alignment to the Paris Agreement. It also has a clear focus on measuring and reporting portfolio-level emissions, representing a shift of thinking to consider impacts. This means reporting accounts for both how climate change impacts FIs ('outside-in') and also how FIs impact climate change ('inside-out'). Central banks have placed increasing attention on long-term systemic risks by undertaking stress testing under climate scenarios, such as those developed by the NGFS. The result is a long-term, impact-focused approach to risk across the financial sector that extends beyond a narrower focus on short-term financial materiality.

**This comprehensive view is especially relevant for nature-related risks, where evidence on physical impacts and plans for future policy are less well developed.** Climate policy, while still uncertain in the long-term, comprises a relatively clear set of policy instruments which affect asset value. Political leaders and policy makers are, however, at an earlier stage of policy development to tackle the nature crisis, though this situation is evolving. G7 and G20 countries, as well as the overarching global nature policy-setting body, the UN Convention on Biological Diversity, are rapidly placing priority on the nature crisis alongside the climate crisis. Nevertheless, the current state of public policy on nature makes it hard for most FIs to undertake a short-term assessment of financial risk for nature in a way that allows them to incorporate these as material risks.

**A longer-term, holistic approach incorporates both risks to FIs ('outside-in') and impact on nature ('inside-out') and opportunities.**

The Taskforce on Nature-related Financial Disclosures (TNFD) embraces this approach, building on the TCFD's framework, and including both risk and impact. The TNFD's approach accounts for both the way nature affects businesses and FIs ('outside-in'), and the way businesses and FIs affect nature ('inside-out'). It considers nature-related risks to include both short-term and long-term financial risks. The TNFD views this long-term approach as essential.<sup>24</sup>

**In line with this approach, the framework presented in this report helps institutions to more accurately value assets and associated expected cash flows.** To that extent, this framework applies to both private and public financial institutions that base investment decision on these criteria. Where public institutions focus on factors outside of the realm of asset valuation (e.g. value for money considerations), the framework in this report should be expanded.

## 4.2 How to incorporate the framework into management architecture

**The integrated climate-nature framework applies to all core financial institution management functions, including governance, strategy, and risk management.**

In **governance**: Visibility of climate- and nature-related risks and opportunities are required at the board and management level to monitor and guide strategy and risk management; to comply with public and internal financial and regulatory reporting processes; to and monitor compliance with corporate policy.

In **strategy**: Insights into how climate and nature drive value creation and value-at-risk help with optimising capital allocation, financial planning, and corporate strategy, including product development, research and acquisitions.

In **risk management**: The use of metrics and data related to climate and nature impacts and risks supports risk assessment, risk mitigation policies and processes, adaptation, and communication including financial, legal, reputational and broader risk.

**Even though FIs are the target user group, corporates can also use the framework as a starting point to build out a set of strategies congruent with a more accurate, nature-inclusive accounting of revenues and costs.**

This framework can be expanded, if needed, to plug into the strategy and management approaches of corporates.

## 4.3 How to tailor the framework

**FIs can use this framework to adapt and expand existing climate frameworks into a joint climate-nature assessment framework.**

For all institutions, this will unlock value through both risk management and opportunity creation, but institutions can emphasise aspects of particular interest and relevance to their context.

**There are several methodological shifts or adaptations that institutions can make to simplify the proposed integrated framework.**

Where computing 'expected value-at-risk' is prohibitively difficult, value-at-risk can be calculated under a range of clearly defined scenarios. This removes the need to assess the likelihood of an event or series of events.

Incorporating broader qualitative indicators within the framework can help financial institutions to complement quantitative analysis and overcome gaps.

Shift to qualitative measures of risk while data and risk assessment capacity improves and becomes more widely available.

Reduce the sectoral and/or geographical scope of the assessment.

Begin by considering only how climate-related risks would change under a joint climate-nature scenario before moving on to nature-related risks.

Financial institutions can focus first on compound risks, and then expand over time to consider additional nature-specific risks.

## 5

# Appentices

## A.1 Glossary of key terms

**Financial materiality** – a traditional view of materiality which considers impacts of climate change and nature loss on a business or institution which would impact the judgement of an informed investor.

**Outside-in risks** – the impacts of climate change and nature loss on a business or institution

**Inside-out risks** – the impacts of that business or institution on the climate and on nature.

**Physical risk** – the risks which arise from the impact of climate change and nature loss on physical assets, people, and the economy.

**Acute risk** – physical risks which are event-driven, including weather events or natural disasters.

**Chronic risk** – physical risks which stem from longer-term shifts in climate or nature systems, including changes in long-term temperature patterns or the availability of resources.

**Transition risk** – the risks which arise from the various ways in which society transitions to a low-carbon, nature-positive economy.

**Policy and legal risk** – transition risks which arise from changes in policy, regulation, and laws which are aimed at reaching climate and nature goals and targets.

**Technology risk** – transition risks which arise from changes in technology and innovation which support the transition to a low-carbon, nature-positive economy.

**Market risk** (within transition risk) – transition risks which arise from shifts in consumer preferences around climate change and nature loss which impact consumption and demand patterns.

**Reputational risk** – transition risks which arise from changing consumer and investor sentiment around climate change and nature loss which can damage the reputation or brand of a business or institution.

**Systemic risk** – the risk that the climate or nature system no longer functions properly or risks to system-wide financial stability.

**Financial risk** – the risks that arise from climate change and nature loss from efforts to mitigate them, their related impacts, and their economic and financial consequences.

**Credit risk** – the risk that climate and nature risk drivers reduce borrowers' ability to repay and service debt or banks' ability to fully recover the value of a loan in the event of default.

**Operational risk** – the risk of increasing legal and regulatory compliance associated with climate or nature-sensitive investments and businesses.

**Market risk** (within risks to financial institutions) – the risk of reduced financial asset values, including the potential to trigger large, sudden and negative price adjustments where climate and nature risk are not yet incorporated into prices.




**Liquidity risk** – the risk that banks' access to stable sources of funding could be reduced as market conditions change.

**Tipping point** – a level of change in the climate or nature system beyond which a system reorganises, often abruptly, and does not return to its initial state even if the drivers of the change are abated.

## A.2 Summary of nature-related risks

While TCFD recommendations provide a categorisation of the climate-related risk channels that should be considered, such guidance does not yet exist for nature. Figure 8 highlights a selection of value considerations which could be used for an initial assessment of nature-related risks. A complete categorisation of nature-related risks will be a key output of the TNFD, to be released in summer 2023. Further details on each channel and examples of how they translate into financial risk can be found in A3.

**Figure 8** | Drivers of physical, transition, and systemic nature-related risk

DESCRIPTION	VALUE CONSIDERATIONS
<b>PHYSICAL RISKS</b>	
 <p><b>Enabling production (chronic)</b>            Businesses rely on ecosystem services for their production processes. A change in the provision of ecosystem services due to nature loss causes businesses productivity to change over time.  <i>Examples of ecosystem services which enable and regulate production processes include:</i></p> <ul style="list-style-type: none"> <li>• Maintenance of air, water, and soil quality</li> <li>• Crop pollination</li> <li>• Water flow maintenance</li> <li>• Water filtration and dilution</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced production capacity in the long-term</li> <li>• Increased costs of production</li> <li>• Change in commodity supply and, therefore, prices</li> </ul>
 <p><b>Direct inputs (chronic)</b>            Businesses use natural materials as direct inputs. A change in the availability of those inputs due to nature loss causes input prices to change over time.  <i>Examples of direct inputs whose availability may be impacted by nature loss include:</i></p> <ul style="list-style-type: none"> <li>• Fibres such as cotton, wood, or hemp</li> <li>• Ground and/or surface water</li> <li>• Genetic materials</li> </ul>	<ul style="list-style-type: none"> <li>• Change in long-term availability of production inputs</li> <li>• Change in commodity supply and, therefore, prices</li> </ul>
 <p><b>Protection from disasters (acute)</b>            Businesses rely on the protective role that natural assets have in mitigating the impact of disasters. Nature loss reduces the protective capacity of natural assets causing a change in damages from disasters.  <i>Examples of protection provided by natural assets include:</i></p> <ul style="list-style-type: none"> <li>• Pest and disease control</li> <li>• Flood and storm protection</li> <li>• Erosion control</li> <li>• Climate regulation</li> <li>• Temperature regulation</li> </ul>	<ul style="list-style-type: none"> <li>• Impact on physical assets</li> <li>• Change in short-term availability of production inputs</li> <li>• Viability of operations</li> <li>• Increased cost of adaptation</li> <li>• Level of supply chain exposure</li> </ul>

**DESCRIPTION**

**VALUE CONSIDERATIONS**

**PHYSICAL RISKS**



**Nature Policy**

Nature policy includes all policy and regulation explicitly aimed at achieving nature-positive outcomes or targets. The introduction of new nature policy and regulation can lead to a change in costs and/or the spatial stranding of assets.

*Examples of nature policy and regulation includes:*

- Market-based instruments such as biodiversity offsets
- The expansion of protected areas in biodiversity-sensitive regions
- Supply chain regulations aimed at reducing nature impacts such as deforestation

- Changes in costs, especially for sectors with high a nature impact such as agriculture, mining, and forestry
- Spatial stranding of assets
- Changes in relative competitiveness



**Financial Regulation**

This includes regulation of the financial sector related to nature, most notably around nature-related disclosures. The risk of increased future liabilities faced by financial institutions include both the direct risk of facing litigation as well as the indirect risk of being impacted by litigation involving their clients through credit, investment, and underwriting risks.

*Examples of these liabilities include:*

- Failure to prevent nature loss
- Failure to manage or adapt to biodiversity-related risks
- Failure to comply with regulatory requirements
- Misrepresentation of biodiversity risks or impacts

- Legal and liability risk for financial institutions
- Brand reputation



**Other nature-related policy**

Other nature-related policy

Other nature-related policy includes policies not directly related to nature, but which have significant implications for nature-relevant sectors and will therefore be key to the nature transition. A change in these policies can lead to a change in cost and/or a change in demand for businesses.

*Example of other nature-related policy includes:*

- Food and nutrition policy, such as policy aimed at reducing food waste
- Zoning and development policy
- Trade policy, especially around agricultural goods
- Policy around single-use plastics

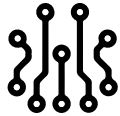
- Changes in demand
- Changes in costs, including compliance costs
- Changes in relative competitiveness



**DESCRIPTION**

**Value considerations**

**TRANSITION RISKS**



**Innovation**

This includes all forms of innovation which has a significant impact on nature. Innovation creates opportunities for new markets, but also creates risk that some businesses get left behind.

*Examples of innovations which can impact nature include:*

- Product innovation, including technological development
- Process innovation
- Business model innovation

- Changes in operations and associated costs
- Disruption of supply chains
- Changes in demand
- Changes in competitiveness and competitor positioning



**Preferences**

This includes any change in consumer and/or investor preferences around nature impacts. A change in preferences creates reputation risk/opportunity for businesses or banks with a high/low impact on nature.

*For example, increased awareness around nature impacts such as deforestation or biodiversity loss creates risks for producers of products linked to these issues, such as palm oil.*

- Change in reputation or brand value
- Changing investor-relations
- Availability and cost of capital
- Change in demand

**TRANSITION RISKS**



**Risk to the natural system**

This refers to the risk that natural systems no longer function properly. This includes the risk of breaching “tipping points” or crossing “planetary boundaries,” beyond which natural systems may collapse beyond the point of repair.



**Risk to the financial system**

This refers to risks to financial stability which can arise at a portfolio or FI-level or across the entire financial system. This can occur, for example, if nature-loss drives simultaneous large losses in several sectors (creating risk a portfolio-level) or if policy and regulatory responses to nature loss has a large cumulative negative impact across the economy (creating risk across the financial system).

While private financial institutions are not responsible for managing overall systemic risk, these risks still need to be understood and integrated into risk frameworks at a high-level. Doing so will enable FI's to better understand, for example, how regulators may respond to managing systemic risk.

## A.3 Drivers of nature-related risk and opportunity

### Nature-related opportunities

**The adoption of a joint climate and nature framework can unlock a range of opportunities for investors.** Investors can increase their resilience and avoid future disruptions in their activities thereby securing a competitive advantage by identifying and planning for nature-related physical and transition opportunities, such as nature protection and restoration (e.g. reforestation, innovative technologies). Opportunities for FIs can be identified by mapping out the positive and negative impacts and dependencies of businesses on nature, and the financial opportunities that stem from these impacts and dependencies.

**Evaluating transition opportunities can be more challenging for FIs, as they can arise suddenly and result from any aspect or driver of nature transition.** Policy, financial regulation, innovation, and changing market and consumer preferences are just some areas where FIs can financially benefit from transition opportunities. In any case, FIs can reap the rewards from having a positive impact on nature and, as with climate change, can push forward with nature targets ahead of policy.




### The physical risks from nature degradation

**Nature provides business value through three channels: by enabling production, by providing direct inputs to production, and by protecting assets from natural disasters.** Businesses rely on ecosystem services for production, use natural resources as inputs to their processes, and benefit from the capacity of habitats to mitigate the impacts of natural catastrophes. Figure 9 below defines the three nature contributions to business value and how each is connected to chronic and acute physical risks when nature is degraded.

**Nature enables production - Biodiversity provides a wide range of ecosystem services that enable production processes by moderating natural phenomena.** These functions are known as regulating services and maintain the quality of air, soil and water; they pollinate crops, control diseases, floods and climate, and store carbon. By different measures, all industries depend on regulating services, either directly or through their supply chains, and would suffer degrees of financial consequence from the degradation of these functions. Historically, these regulating services have not been fully accounted for despite the fundamental role they play in the proper functioning of production processes.




**The disruption of ecosystem services enabling production is linked to negative financial impacts for businesses and, by extension, FIs.** The financial impacts linked to the loss of productive ecosystem services can unfold through four channels of risk: credit, market, operations and liquidity. Credit risk arises as FIs underestimate the increased materiality of nature to businesses, and provide misguided asset valuations. For example, higher exposure to the risk of coastal erosion might be left out of property valuations. Market and operational risks might also increase as entire sectors become more vulnerable to the loss of regulating services and business as usual is disrupted. The reduced control over the emergence of zoonotic diseases like Covid-19, causing significant market losses and supply chain disruptions, is an example of the increased market and operational risks. Finally, liquidity risk can rise due to business disruptions and unproductive assets, as well as more volatile commodity prices. Figure 10 summarises how these risks unfold across the three channels of business value from nature.

**Figure 9** | Types of physical risks deriving from nature loss

	 <b>DIRECT INPUTS</b>	 <b>ENABLING PRODUCTION</b>	 <b>PROTECTION FROM DISASTERS</b>
<b>DEFINITION</b>	Businesses use natural materials as direct inputs into their production processes.	Businesses rely on ecosystem services for their production processes.	Businesses rely on the protective role that natural assets have in mitigating the impact of disasters.
<b>EXAMPLE</b>	Ground water, surface water, fibres (e.g. cotton), genetic materials	Pollination, soil quality, water quality, water filtration	Flood protection, storm protection, pest control, erosions control, disease control
<b>RISK</b>	A change in the availability of inputs due to nature loss causes <b>input prices</b> to change.	A change in the provision of ecosystem services due to nature loss causes business <b>productivity</b> to change.	Nature loss reduces the protective capacity of natural assets causing a change in <b>damages from disasters</b> .
	<b>CHRONIC RISK</b>		<b>ACUTE RISK</b>

Source: Vivid Economics

**Figure 10** | Nature-related financial risks to businesses and FIs

	<b>ENABLING PRODUCTION</b>	<b>DIRECT INPUTS</b>	<b>PROTECTION FROM DISASTERS</b>
<b>CREDIT</b>	Pollinator loss could reduce agricultural revenues, impacting the ability of producers to meet existing loan obligations	Reduced availability or genetic materials could decrease pharma sales & increase investor vulnerability	Increased occurrence or floods, storms and wildfires can cause affected businesses to default
<b>MARKET</b>	The increased occurrence of zoonotic diseases like Covid-19 can disrupt international supply chains and cause significant market losses	Reduced access to clean water can increase market risks as the price or water changes	The increased severity and frequency of natural disasters can cause changes in commodity prices across the market
<b>OPERATIONAL</b>	Increasing spread of zoonotic diseases can affect workers' productivity & sickness rates	Lack of inputs at risk of extinction might disrupt FIs' operations, plans and business models	Increased occurrence of natural disasters leads to withdrawal of investments in vulnerable assets and countries
<b>LIQUIDITY</b>	Unpredictable harvest volumes can make commodity prices highly volatile	Pressure to liquidate assets due to a biodiversity tipping point approaching might affect access to liquidity	Direct damage to assets due to natural disasters can unpredictably reduce access to liquidity
	<b>CHRONIC RISK</b>		<b>ACUTE RISK</b>
	 <b>Highly material</b>	 <b>Material</b>	 <b>Somewhat material</b>

Source: Vivid Economics; Cambridge Institute for Sustainability Leadership, Handbook for nature-related financial risks: key concepts and a framework for identification (2021).

**Nature provides direct inputs to businesses - Companies provide goods and services which rely on components sourced from the natural environment.** As nature loss reduces ecosystem service output, the availability of these inputs can slow or stop. Businesses might adapt and find substitutes for the nature-based components of their production processes, at higher cost; however, the loss of nature, species and organisms are not always replaceable with substitutes. Examples of production inputs are ground and surface water, food, fibre and genetic material.

**Nature loss can affect the availability of inputs into companies' production processes, disrupting their cashflows.** Mining, constructions, energy and textiles are examples of sectors vulnerable to the diminished availability of production inputs such as water, timber, cotton and fibres. Business productivity might be affected by the lack of inputs if this cannot be offset through the use of substitutes or water treatment plants which can be built within costs and reasonable timeframes. Another example is genetic material, an input to the pharmaceutical and medical industries. As the resources coming from nature to the study of new treatments can be complex to synthesise and re-create, there is a material prospect of their loss affecting research and development in this industry.

**The lack of direct inputs can generate credit, market, operational and liquidity risks to financial institutions.** As businesses are negatively affected by the lack of inputs, financial institutions are also likely to suffer negative repercussions from a credit risk perspective. Financial institutions might be investing in sectors whose nature-related risks have been previously underestimated, and are now being affected by financial losses. As a consequence, market risks might increase for financial institutions, as the lack of inputs might cause permanent and irreversible price increases and shifts in market preferences for the invested assets. In addition, there might be increased operational risks as activities and services are disrupted, with potential financial and reputation costs, resulting in liquidity losses. Some examples of financial risks deriving from the loss of nature inputs are represented in Figure 9, together with an assessment of the materiality of these risks.

**Nature protects assets from natural disasters - Ecosystem services such as coral reefs and wetlands provide protection from natural disasters.** The progressive collapse of these services is associated with acute nature-related physical risks and an increased occurrence and severity of extreme weather events such as floods, storms and droughts. Businesses rely on the protective role that natural assets have in mitigating the impact of disasters. Habitats such as wetlands, reefs, marshes and mangroves provide natural and effective protection from floods and storms. Upwind forests are critical to rainfalls which prevent droughts, as observed between the Amazon and the Cerrado ecoregion and between West African forests and East Africa.<sup>26</sup> Plants, predators and clean water also provide effective control against the spread of pests and diseases, whereas vegetation prevents coastal erosion. Regulating services can have long-range trans-boundary impacts, as shown by acid rains in Europe.

**As the frequency and severity of natural disasters increases with ecosystem loss, businesses are exposed to substantial economic losses.** Catastrophes harm businesses through three main channels: by disrupting business activities and services; by directly damaging business assets; and, by forcing businesses to invest in adaptation measures, which might result in the displacement of activities. The increased occurrence and severity of natural disasters can raise costs for businesses and reduce revenues. Catastrophes can lead to permanent and temporary financial losses for businesses, reducing their long-term productivity, and harming the economy of entire at risk areas.

# The transition risks deriving from nature loss

**A more disorderly transition - While no less urgent, the nature transition is at an earlier stage than the climate transition, meaning change will happen quickly and uncertainty is high.**

Although there is still a long way to go before achieving a full net-zero economy, we are further along in the climate transition than we are in the nature transition. Action around the nature transition is, however, beginning to unfold at pace as policy makers begin to understand the urgency of the crisis, as can be seen through the recent increase in attention to nature at the G7 and G20 Summits and at UNFCCC COP26.<sup>27</sup> Significant uncertainty remains about what will drive forward the nature transition, including whether the Post-2020 Global Biodiversity Framework due to be agreed at CBD COP15 in 2022 will provide as clear a signal to the financial and corporate sectors as did the Paris Agreement on climate change. As such, scenario analysis will be critical to account for the full range of potential transition risks and opportunities.






**The nature transition is likely to be even more disorderly than the climate transition, relying more heavily on bottom-up change.** The primary difference between climate and nature is added complexity. Nature loss is a multi-dimensional issue, driven by a range of causes. Progress towards a nature-positive world requires a holistic view embodying all of these aspects. In addition, whilst climate impacts are global, nature impacts are for the most part local, further emphasising the bottom-up approach to the nature transition.<sup>28</sup> The transition therefore includes the full range of drivers and organisations which layer on top of each other in a bottom-up way to support the achievement of nature-positive outcomes. Such initiatives can already be seen through the creation of the TNFD, the Science-Based Targets Network (SBTN), and so on.

**Therefore, the nature transition involves more than just international nature transition targets, but rather all the drivers which have significant implications for nature outcomes.** These include nature policies, financial sector regulation, other policies relevant to nature, innovation and technological changes, and changes in market and consumer preferences. The full range of drivers affecting nature outcomes represent the transition risks that businesses and financial institutions will need to prepare for on the journey towards a nature-positive world.

**Channels of transition risk - The drivers of the nature transition will occur simultaneously and target different aspects of nature, making risk evaluation particularly complex.** As outlined above, the nature transition will involve more than just nature policy, but rather a range of drivers which have implications for nature outcomes. Figure 11 outlines each of these drivers.

**Nature policy impacts the costs and revenue of businesses and assets, creating both market risk and credit risk for FIs.** Policies and regulations specifically aimed at achieving nature-positive outcomes (e.g. taxes on pollution, biodiversity offsets, protected areas, etc.) impact the costs and revenues of individual assets and businesses. Input prices might increase or assets might become less productive and profitable as a consequence of nature policies, resulting in negative financial impacts for businesses and, by extension, for FIs. As such, as nature policy changes and evolves, this creates the risk that assets become unprofitable or become spatially stranded in areas placed under protected status, resulting in both market and credit risk for financial institutions invested in those assets.

**Figure 11** | Drivers of nature-related transition opportunity and risk

	 <b>NATURE POLICY</b>	 <b>FINANCIAL REGULATION</b>	 <b>OTHER POLICY</b>	 <b>INNOVATION</b>	 <b>PREFERENCES</b>
<b>DEFINITION</b>	Policy and regulation explicitly aimed at achieving nature-positive outcomes or targets.	Regulation of the financial sector related to nature.	Policies not directly related to nature, but which have significant implications for nature-relevant sectors.	Innovations (such as technological disruptions) which have a significant impact on nature.	Changes in consumer and/or investor preferences around nature impacts.
<b>EXAMPLE</b>	Market-based instruments like impact pricing, protected areas, supply chain regulation	Monitoring, evaluation, and disclosure requirements	Food and nutrition policy like taxes on ruminant meat, among others etc.	Increased demand for metals to produce batteries	Increased awareness of nature impacts like deforestation from palm oil production
<b>RISK</b>	The introduction of new nature policy and regulation can lead to a change in costs and/or the spatial stranding of assets.	A change in financial regulation related to nature (e.g. disclosure requirements) creates litigation risk if FI's misrepresent risks.	A change in other nature-related policy can lead to a change in cost and/or a change in demand.	Innovation creates opportunities for new markets, but also creates risk that some businesses get left behind.	A change in preferences creates reputational risk/opportunity depending for banks and companies with a high/low impact on nature.

**ACCELERATORS**  
 Through their role in market infrastructure and information channels, accelerators act to reinforce drivers of transition risk. Examples of accelerators include data providers, ratings agencies, and stock exchanges and analytics. While not an initial driver of transition risk, accelerators are necessary for financial institutions to overcome these risks.

Source: Vivid Economics

**Financial regulation around nature-related disclosures creates direct and indirect liability risk for financial institutions.** The risk of increased future liabilities faced by financial institutions include both the direct risk of facing litigation as well as the indirect risk of being impacted by litigation involving their clients through credit, investment, and underwriting risks. These liabilities include liabilities around failure to prevent nature loss, failure to manage or adapt to biodiversity-related risks, failure to comply with regulatory requirements, and misrepresentation of biodiversity risks or impacts.<sup>29</sup>

**As data and technology enables increased transparency related to nature impacts, governments and other organisations will have stronger grounds to pursue liability claims.** Laws and financial regulations governing environmental liabilities and disclosure requirements are likely to tighten as governments across the world align domestic policy with new national targets. At the same time, innovations around data and technology expand the grounds to pursue legal action and the scope of activities that companies can be held liable for, turning previously hidden costs into explicit liability.<sup>30</sup>

**There is precedent for legal liability risk related to nature impacts.** Successful legal action has been taken against companies for polluting or causing environmental damage. Following the 2010 Deepwater Horizon oil spill in the Gulf of Mexico, BP was successfully sued for \$65 billion in compensation for environmental damages causing its stock prices to drop 2.65% as a result.<sup>31</sup> Other examples include the environmental due diligence obligations in the EU, which will cover financial institutions<sup>32</sup>, and the inclusion of environmental crime under anti-money laundering regulations.<sup>33</sup>

**In addition to liability risk, credit ratings agencies may consider adding nature impact to their ratings methodologies, creating credit risk for FIs with high nature impact.** In recent years, credit rating agencies have integrated ESG scores into their ratings methodologies, including elements around climate risk and impact. As attention to nature-related risk increases, it is only a matter of time before nature risk and impact is included in ESG scoring, creating credit risk for FIs with high nature impact.

**Nature-related policy - Policies such as those aimed at reducing food waste<sup>34</sup>, ruminant meat consumption or single-use plastic are not 'nature policies' as such, but they do highlight the drivers of biodiversity loss and the need for changing unsustainable patterns of production and consumption.** These policies also show the need to mainstream biodiversity into all sectors of the economy, including financial institutions. This broader set of policies can impact positively on nature, and will undeniably play a role in preserving biodiversity. From a business perspective, these policies can pose risks by increasing production costs and changing demand, while also creating new market opportunities. As regards finance, these policies might increase credit risk if new policy requirements are not accurately and promptly anticipated. An interesting example of nature-related policies with financial risk implications is in the area of development planning and land use zoning.

**Innovation can affect nature by creating transition risks, especially if it disrupts well-established markets.** There are three aspects to innovation: product innovation, which relates to technological development; process innovation; and business model innovation. While some innovations have a slow onset and give businesses time to adapt, others can be leaps forward and leave some businesses behind. As a result, FIs could be exposed to significant risks if disruptions are not predicted accurately and promptly. Some innovations can create new markets and provide additional business opportunities, however, such as the market opportunities provided by alternative proteins.<sup>34, 35</sup>

**Preferences - As awareness of nature risks grows, consumers increasingly shape their choices around sustainability.** As a result, investors put additional resources in nature-positive products and markets due to their growth potential. For example, the increased awareness of the impact of palm oil production on deforestation and habitat loss has led some consumers towards products perceived as more ethical, and led to companies becoming more accountable for their nature impact. From the perspective of businesses and financial institutions, changing consumer preferences mean a heightened reputational risk arising from goods and services with a high impact on nature. Changing consumer preferences might also open up new market opportunities, as businesses reap the benefits of positive nature impacts, as represented, for example, by the growth in the milk alternatives market.

**BOX 3**

**Case study of financial risk from other nature-related policy: zoning policy**

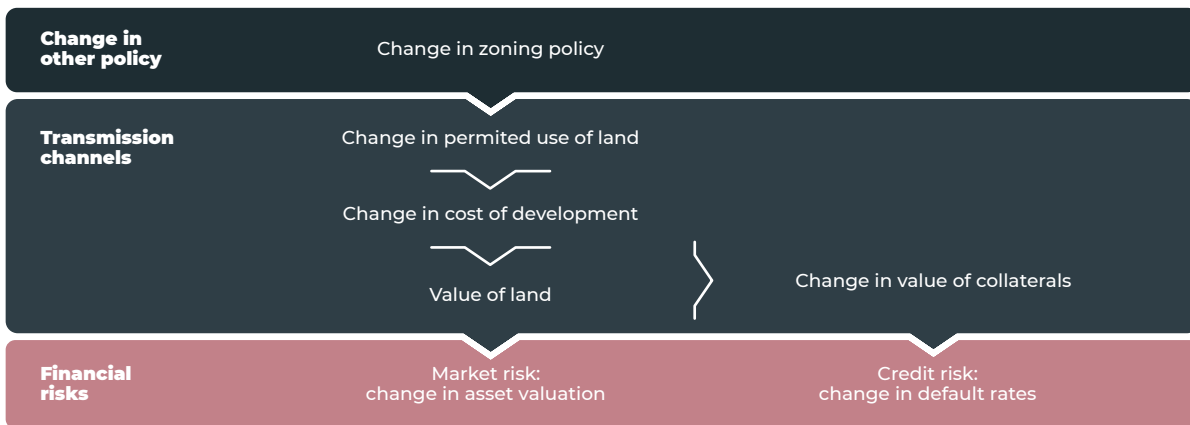
**Zoning policy is a key mechanism that local and national governments use to manage economic development but has major implications for nature loss.**

Zoning policies such as permitted development rights of special economic zones can incentivise certain industries to locate themselves in a target area or region, thus impacting patterns of land use change by directing where development occurs. Therefore, zoning policy has significant implications for nature outcomes.<sup>a</sup>

**Changes in zoning policy affects asset and land values, creating market and credit risk for financial institutions.**

Changes in zoning laws can impact both permitted development rights and the conditions required to secure development rights on undeveloped or partially developed land. As shown in Figure 12, a change in permitted development rights changes the value of undeveloped or underdeveloped land by introducing additional costs to development, resulting in market and credit risk for the financial institutions whose assets hold this land.

**Figure 12** | Financial risk driven by changes in zoning policy



<sup>a</sup> Turgel et al (2019) Impact of Zones with Special Status on the Environment: Experience in Russia and Kazakhstan



**BOX 4**

**Case study of financial risk from changes in consumer preferences: palm oil**

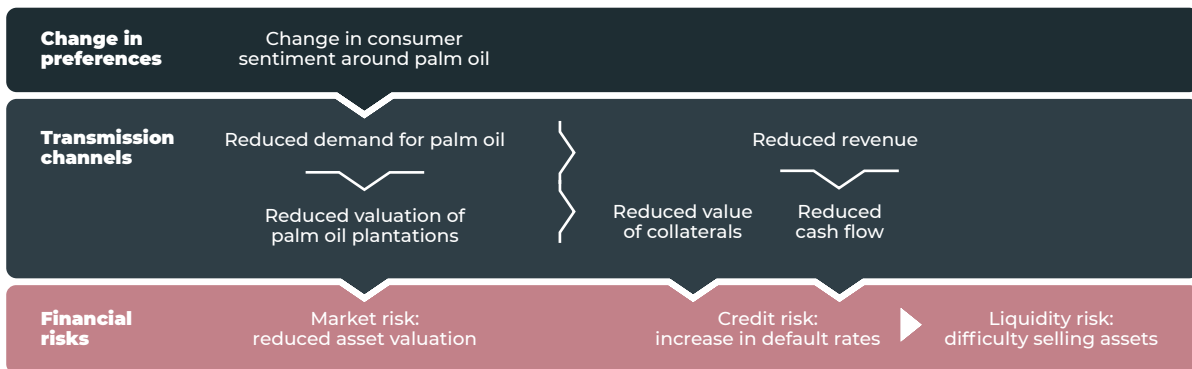
**Increasing awareness around the impacts of nature-intensive goods has led to changing consumer demand for such goods, especially in the case of palm oil.**

The development of new palm oil plantations is a major driver of deforestation and nature loss globally, especially in the biodiversity-rich tropical forests most conducive to oil palms. In recent years, efforts from environmental groups have begun to shift consumer sentiment around palm oil, and palm oil-free labelling has been deployed in the EU and other regions, enabling consumers to reduce their demand for goods containing palm oil.<sup>a</sup>

**Changes in consumer demand for end-use products which contain palm oil creates liquidity, market, and credit risk for financial institutions.**

As Figure 13 demonstrates, changes in consumer sentiment around palm oil not only reduces demand for palm oil itself but also for assets which produce palm oil, creating liquidity, market, and credit risk for financial institutions with assets related to palm oil production. While palm oil has faced significant media attention as a driver of nature loss, similar risk is faced for all nature-intensive sectors which may face increased scrutiny in the future.

**Figure 13** | Financial risk driven by changes in consumer preferences for palm oil



<sup>a</sup> UNEP-WCMC and IUCN (2021) Protected Planet Report 2020

<sup>b</sup> Campaign for Nature (2021) IUCN World Conservation Congress Overwhelmingly Supports Motion to Protect at Least 30% of the Planet by 2030

**Through their role in market infrastructure and information channels, accelerators act to reinforce drivers of transition risk.** Examples of accelerators include data providers, ratings agencies, and stock exchanges and analytics. While not an initial driver of transition risk, accelerators are necessary for financial institutions to overcome these risks. Data providers can give access to accurate and timely information leading to more precise asset valuations. Similarly, ratings agencies can avoid undervaluing or overestimating private companies and governments whose growth has links with climate and nature systems.

Finally, stock exchanges can also drive markets towards investing in net-zero and nature-positive outcomes by encouraging or requiring nature-related disclosures, providing frameworks for the listing of nature-related financial products, or highlighting companies that are better performers on nature-related metrics. Due to their key role, accelerators can also harm the climate-nature agenda, for example decision-makers might be misled if the quality of data from providers is poor.

## Nature loss and systemic risk

**As defined by the TNFD, nature-related systemic risk includes risk to both natural systems and the financial system.**<sup>37</sup>

Systemic risk to natural systems refers to the risk that natural systems no longer function properly. This includes the risk of breaching 'tipping points' or crossing 'planetary boundaries', beyond which natural systems may collapse beyond the point of repair. Systemic risk to financial systems, however, refers to risks to financial stability which can arise at a portfolio- or FI-level, or across the entire financial system. This can occur, for example, if nature-loss drives simultaneous large losses in several sectors (creating risk at portfolio-level) or if policy and regulatory responses to nature loss has a large cumulative negative impact across the economy (creating risk across the financial system). The fact that nature loss creates systemic risk means that financial institutions cannot simply diversify or divest away from nature-related risks.

**While private financial institutions are not responsible for managing overall systemic risk, these risks still need to be understood and integrated into risk frameworks.** Ultimately, it is the regulators and policy makers at both a national and international level who are responsible for assessing and managing systemic risk both to natural systems and to the financial system. FIs do, however, still need to understand sources of systemic nature-related risk and how they carry through to create financial risk to their own organisations. For example, by understanding the risks nature poses to the financial system overall, FIs can better anticipate how regulators may respond when managing that risk through mechanisms such as capital requirements and stress testing. Integrating systemic risk into nature risk frameworks at a high level enables FIs to anticipate how these risks may impact their organisations, even if managing the risk itself is out of their control.

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<sup>22</sup> 'Risk in' refers to financial risks to FI's while 'risk out' refers to risks to the environment generated by FIs.

<sup>23</sup> NGFS (n.d.) Scenarios Portal

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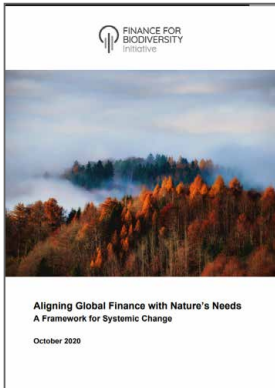
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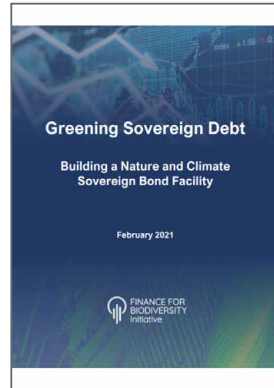
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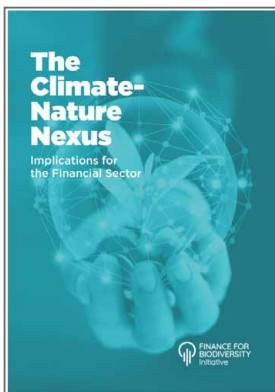
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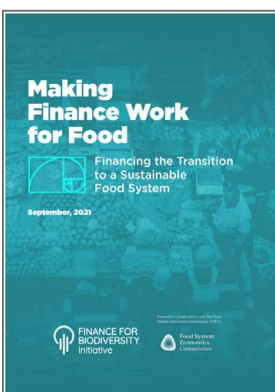
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