Network for Greening the Financial System

NGFS Report

Note on the supervision of nature-related financial risks

April 2026

NGFS

Central Banks and Supervisors
Network for Greening the Financial System

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Executive summary

Financial institutions[1] are increasingly exposed to nature-related risks, and the intensity of these risks is expected to rise across all plausible future nature scenarios[2]. In line with the NGFS definition of nature-related financial risks[3], these risks encompass – and go beyond – climate change. However, compared to climate-related risks, the collective understanding of broader nature-related risks (e.g., biodiversity, soil quality, water cycles) remains at an earlier stage due to their complexity. The multifaceted form of these risks does not yet allow for a single metric or a universally agreed transition pathway. To address these challenges and foster an integrated approach, the NGFS published in 2024 a Conceptual Framework (NGFS, 2024a)[4] to identify and assess the various ways in which physical and transition risks related to nature can materialise and impact the financial system.

In recent years, supervisors worldwide – from advanced, emerging and developing economies – have approached nature-related financial risks from multiple angles and at variable depths. Supervisory measures range from raising awareness to enforcing concrete changes in financial institutions' risk management practices. Based on these observations, good practices have been identified and could be promoted to pave the way for further operationalisation.

Micro-prudential supervision of nature-related financial risks can include both qualitative and quantitative assessments at the level of financial institutions, leveraging available methodologies and indicators. As part of their fact-finding and materiality assessment journey, some financial institutions are now well positioned to select the appropriate tools for obtaining data and assessing dependencies and impacts. In this process, supervisors could play a significant role in catalysing and guiding financial institutions' actions by developing a supervisory framework calibrated to the estimated financial exposures and vulnerabilities.

In addition to micro-prudential supervision, supervisors may form a financial system-wide view of nature-related financial risks by consolidating institution-level assessments and implementing stress-testing exercises. This could facilitate the calibration of supervisory expectations while enabling the potential development of macroprudential tools in the medium term.

Based on risk assessment, supervisors can set a supervisory framework and strive to overcome certain challenges associated with supervising nature-related financial risks. These challenges include, but are not limited to, the nexus between climate and nature, proportionality, socio-economic impacts and – more broadly – incomplete data and the need for refined impact measurement. Given the dynamic dimensions of these challenges and the need for forward-looking assessments, transition plans could be a useful tool to understand financial institutions' strategy and risk management actions.

Nevertheless, supervisors can make a difference in their action to get financial intermediaries to heed nature-related risks without gathering ad hoc data or building ad hoc frameworks as a prerequisite. A key action could be to raise awareness of supervised entities about such risks that may sit in their balance sheets and ensure that they heed them. This could be achieved, for example, through on-site inspections, which make it possible to examine specific cases and assess whether supervised entities are exposed to nature-related risks through their counterparties and clients (e.g., a large share of loans granted to companies in the agricultural or tourism sectors that are vulnerable to drought, mortgage loans to households exposed to flooding, insurance coverage for the activities of fishing companies affected by overfishing).

1 Throughout this note, the term "financial institutions" generally refers to banks and insurance companies supervised by supervisors. However, a specific annex to this note lays out considerations for other kinds of financial entities (e.g. market infrastructures, funds), as they can be materially exposed to nature-related financial risks as well.

2 Potsdam Institute for Climate Impact Research, European Central Bank and Nature Finance (2024), Climate-nature scenario development for financial risk assessment.

3 These risks are defined in the introduction of the note.

4 NGFS (2024a), Nature-related Financial Risks: a Conceptual Framework to guide Action by Central Banks and Supervisors.

The note proposes a four-step approach to help supervisors develop the supervision of nature-related financial risks, composed of the following steps:

1. **Enhance understanding of nature-related financial risks:** supervisors can start by identifying and assessing nature-related risks and their link to the financial stability mandate.

2. **Define supervisory expectations:** based on initial assessments, supervisors can set supervisory expectations for individual financial institutions and at the market level.

3. **Engage with financial institutions:** supervisors can engage proportionally with financial institutions, using tools such as a proposed[5] questionnaire to assess their practices.

4. **Support risk management by financial institutions through supervisory tools:** supervisors could integrate nature-related financial risks into traditional risk categories (e.g., credit, market, operational risks) and develop future supervisory tools (e.g., nature stress-testing, integration of nature into transition plans).

To support this four-step approach, the note provides 10 practical recommendations for supervisors, within the scope of their prudential mandate and considering the materiality of nature-related financial risks. These recommendations are designed to accommodate all levels of supervision with regard to nature-related financial risks and are not dependent on the regulatory context.

5 Refer to box 11.

Recommendations for supervisors

NGFS has defined a set of flexible recommendations to support the implementation of a nature-related supervisory framework. These recommendations are not binding standards. Supervisors can use these recommendations as a possible basis and adapt them to their specific institutional context, the essence and level of identified risks, and their operational capacity.

Understanding of nature-related financial risks

1. **Clarify how nature-related financial risks are part of supervisors' mandates** given the financial stability and prudential soundness implications for both outside-in risks and, where applicable, inside-out risks on financial institutions.

2. **Integrate the supervision of nature-related financial risks with climate-related risks,** since climate-related risks are a sub-category of nature-related risks.

3. **Strengthen indicators and assessment frameworks to quantify nature-related physical and transition risks.** Facilitate access to these indicators for both supervisors and financial institutions by supporting data identification and collection, and encourage the use, reporting, and disclosure of nature-related data by financial institutions.

4. **Explore methodologies for nature-related scenario analysis, stress-testing, reverse stress-testing, and consider system-wide risk mapping** through the aggregation of institutions' data, linking nature and financial databases.

Supervisory expectations

5. **Define clear supervisory expectations for financial institutions regarding nature-related risks** to address material physical and transition risks across the financial sector; set supervisory work programmes and allocate resources accordingly.

6. **Apply expectations in a proportionate manner, based on a materiality assessment of nature-related financial risks** rather than simple size criteria (e.g., balance sheet size).

Supervisory dialogue

7. **Engage with supervised financial institutions to assess their management of nature-related financial risks and support progress in monitoring material risks** (e.g., from raising awareness to publishing good practices).

8. **Critically analyse supervised institutions' techniques for mitigating nature-related risks,** including the use of insurance, nature-based solutions and exclusion policies, given limited offsetting opportunities and potential concentration risks.

Supervisory tools

9. **Implement supervisory measures gradually and proportionally,** in an integrated way with existing tools, starting with basic qualitative recommendations and considering more specific, binding or quantitative requirements as appropriate.

10. **Where possible, support the integration of material nature-related financial risks into transition plans** to supervise how financial institutions strategise and manage these risks.

Introduction

Financial institutions[6] are materially exposed to nature-related financial risks through their corporate and investment portfolios. The European Central Bank (ECB) found that 75% of bank loans to companies operating in the euro area have at least one major nature-related dependency (ECB, 2023a)[7] while the International Monetary Fund (IMF) found that 38% of loans among the 100 largest global banks are exposed to transition risks stemming from the implementation of the Global Biodiversity Framework (IMF, 2024)[8].

These nature-related risks have been defined by the NGFS in the Conceptual Framework. The NGFS understanding of nature relies on the IPBES Conceptual Framework, which indicates that nature corresponds to "the natural world with an emphasis on the diversity of living organisms and their interactions among themselves and with their environment". Based on this, the NGFS considers nature to encompass both the biotic (living) and abiotic (non-living) elements of our planet, including biodiversity, water, air, soils, climate etc.

Nature degradation leads to nature-related financial risks. These financial risks are defined as possible negative effects on economies, individual financial institutions and financial systems resulting 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) from the misalignment of economic actors with actions aimed at protecting, restoring, and/or reducing negative impacts on nature (i.e., transition risks).

The NGFS therefore uses the term "nature-related financial risks" as an umbrella term covering both environmental and climate-related financial risks[9]. This comprehensive term has the advantage of encompassing all risks caused by ecosystem degradation. **For simplicity, "nature-related financial risks" will be referred to as "nature-related risks" in the remainder of this note.**

Nature-related risks are endogenous. This indicates that financial institutions and companies contribute to varying extents to the nature-related risks they are exposed to. Some economic activities may be detrimental to nature and expose financial institutions to physical and transition risks through various micro-transmission channels. As drivers of traditional financial risks (i.e., credit, market, operational, liquidity, underwriting risks) and given their potential impact on financial stability, nature-related risks are part of supervisors' mandates, whether considered through the outside-in or where applicable, inside-out perspectives.[10]

The relationship between nature-related physical risks and transition risk assessment is complex as they may be interconnected. For example, high land use involving deforestation exposes companies to water scarcity risks (i.e., physical risk) and may lead to regulatory measures (i.e., transition risk). Hence, physical risks in one sector can unexpectedly influence transition risks in another.

The channels through which nature-related risks are transmitted to the economy and the financial system are outlined by the NGFS in the Conceptual Framework. This framework is based on three phases:

- **Phase 1: Identify sources of physical and transition risks.** This can be done by analysing exposure to dependencies on nature and the impacts of economic activities on nature. Two main prioritisation methods can be used: i) sector-based prioritisation (identification of key economic activities that are vulnerable based on their level of dependency or impact on nature and their significance to the economy), and ii) ecosystem-based prioritisation (identification of essential ecosystem services that economic activities rely on).
- **Phase 2: Assess potential economic risks stemming from transition and physical risks exposures.** This involves conducting a materiality assessment that evaluates both direct and indirect impacts on institutions' counterparties. This assessment may consider both micro and macro scales, as well as counterparties' vulnerabilities.

6 See footnote 1.

7 ECB (2023a), The economy and banks need nature to survive.

8 IMF (2024), Embedded in Nature: Nature-Related Economic and Financial Risks and Policy Considerations.

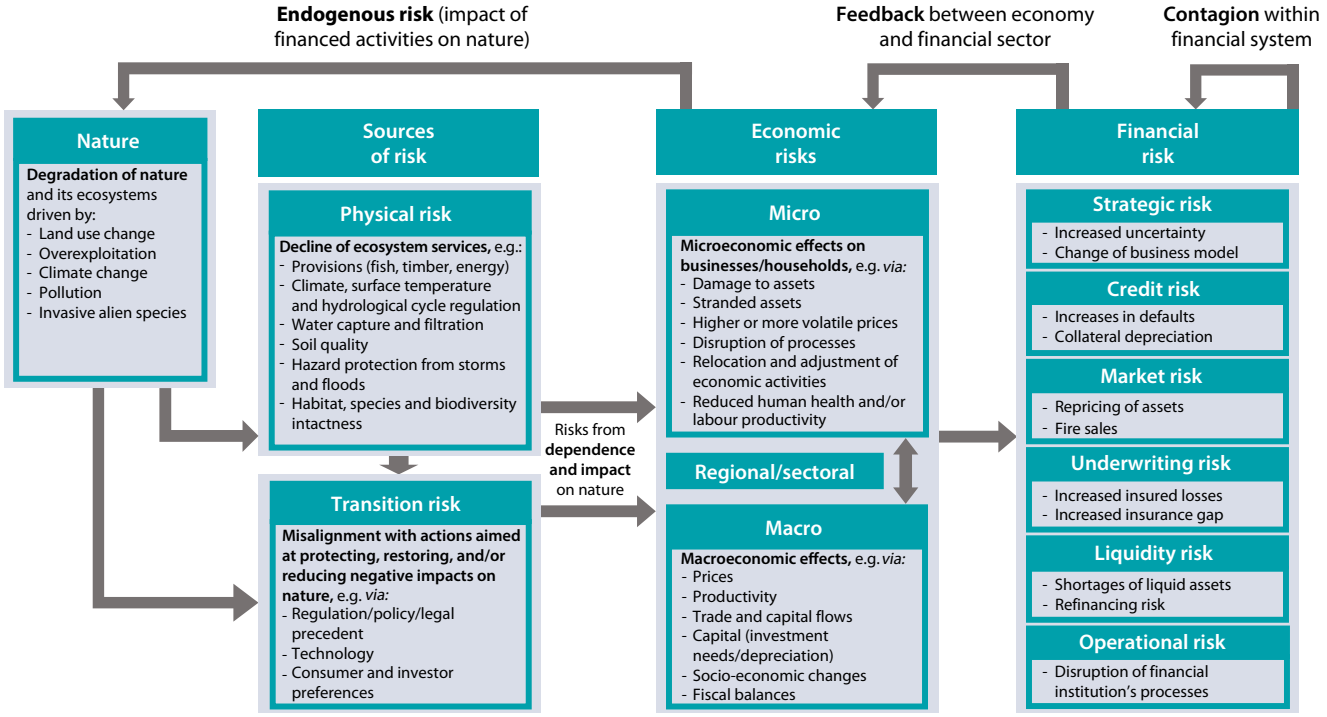
9 The NGFS recognises that there are other conceptual frameworks in which the "environment" is sometimes used as the umbrella term. However, for consistency with previous NGFS publications, "nature" is used as the umbrella term throughout this note.

10 "Outside-in" perspective refers to the impacts of nature on financial institutions, whereas "inside-out" refers to the impacts of financial institutions on nature.

- **Phase 3: Assess risk to, from and within the financial system.** This phase evaluates how economic risks related to nature translate into traditional financial risks (i.e., strategic, credit, market, underwriting, liquidity and operational risks).

These three phases are illustrated in the diagram below, which provides concrete examples of risks.

Figure 1 **Transmission channels of nature-related risks to the economy and financial system**



Source: NGFS Conceptual Framework on Nature-related risks, 2024.

Building on the Conceptual Framework, this note aims to share practical approaches for supervising nature-related risks in financial institutions. The first section focuses on risk assessment and methods applied at both individual and system-wide levels, drawing on concrete examples developed by supervisors. The second section proposes a progressive four-step approach for supervisors, recognising key challenges and sharing insights to overcome them. The approach described in the paper and the recommendations are not mandatory standards. These recommendations draw on the practical experience of supervisors and are intended to facilitate the implementation of measures to assess nature-related risks, regardless of supervisors' level of progress on the topic.

This note has been prepared by the NGFS with the participation of numerous supervisors from different regions worldwide. The note is notably based on a series of internal presentations made by authorities showcasing state-of-the-art supervisory practices.

Apart from the foundations laid by NGFS in the Conceptual Framework, this note also draws on NGFS work on transition planning, nature scenarios and nature data[11]. It will also serve as a basis for future work by the NGFS on the supervision of nature-related risks.

Recommendation: Clarify how nature-related financial risks are part of supervisors' mandates given the financial stability and prudential soundness implications for both outside-in risks and, where applicable, inside-out risks on financial institutions.

11 NGFS (2026), Summary Note on the Improvement of Modelling Tools for Nature-related Financial Risk Scenarios; NGFS (2026), Information note on nature-related data.

1. Understanding and assessing nature-related risks

1.1 Current practices for assessing financial institutions' risk exposure at individual level

In addition to the NGFS Conceptual Framework, which enables a science-based understanding of nature-related risks and their transmission channels, other tools have been developed to analyse the financial risks associated with nature (e.g., heatmaps, indexes etc.). Most supervisors emphasized in the FSB Stocktake on nature-related risks (FSB, 2024)[12] the need for financial institutions to perform analytical work to move from exposure analysis to risk metrics that effectively quantify the magnitude of potential financial losses. Some financial institutions have started conducting exploratory work to assess their credit and investment portfolio dependencies and exposure to nature-related risks at the micro-level. The tools developed in section 1.1 are primarily methods that could be used by financial institutions to assess their nature-related risks. A good understanding of these tools by supervisors is useful in that it would enable them to collect information on the management of nature-related risks by financial institutions. In addition, these tools could in future serve as a source of inspiration for the development of reporting and supervisory requirements in relation to nature-related risks.

1.1.1 Identifying and quantifying nature-related physical risks

Qualitative tools to identify exposure to nature-related physical risks

Understanding the ecosystem components that underpin ecosystem services is useful for an effective micro-level assessment of nature-related physical risks to which economic activities are exposed[13]. Some tools such as **ENCORE** – presented below – already integrate the links between ecosystems and the services they provide and can therefore be used by supervisors who might not have the ability and capacities to study the ecosystem components that underpin ecosystem services. In addition, reviews of the latest scientific literature can clarify linkages between ecosystem services and their supporting components.

These linkages may be categorized by ecosystem types, aligned with the **IUCN Global Ecosystem Typology 2.0**. This typology is a hierarchical classification system, that defines ecosystems by their convergent ecological functions. It divides the biosphere into five realms: terrestrial, subterranean, freshwater, marine, and atmosphere. The Taskforce on Nature-related Financial Disclosures (TNFD) Guidance on the identification and assessment of nature-related issues further proposes a dependency measurement through "what if" scenarios. For example, dependency is "very high" when the scenario renders the activity non-viable, or "medium" if it causes a pricing rebalancing.

Heatmaps are often used to identify sources of risk in lending, investment, and insurance portfolios. Among others, the TNFD has published guidance risk assessment methods for institutions seeking to apply the **TNFD LEAP approach**, which also covers the use of heatmaps and enables financial institutions to identify high-risk areas within their portfolios or operations that may require further scrutiny. Such heatmaps may be developed using tools such as **ENCORE** (Box 1), the **WWF Biodiversity** or **Water Risk Filters** or the **Integrated Biodiversity Assessment Tool (IBAT)**, which assign qualitative ratings across various nature-related categories. These ratings could be adjusted based on risk mitigation track records of specific sectors and impacts along the value chain.

Financial institutions do not solely rely on these qualitative ratings for multiple reasons. First, these ratings are not designed to assess financial exposures. They rather focus on general economic sensitivity to ecosystem services. Additionally, these ratings may not fully account for dependencies and impacts throughout the value chain and do not capture all forward-looking risks and opportunities related to nature. Finally, the databases underpinning these assessments are often not granular enough to reflect local specificities and precisely locate risk (TNFD, 2023)[14].

12 FSB (2024), Stocktake on Nature-related Risks: Supervisory and regulatory approaches and perspectives on financial risk.

13 The ENCORE tool has a categorization of ecosystem services different from the IUCN Global Ecosystem Typology and the one used by the TNFD in its recommendation. A table is available in the July 2024 NGFS Conceptual Framework (Table 1, page 45).

14 More details about constructing heatmaps can be found in TNFD (2023), Nature-related financial risk and Opportunity Management and Disclosure Framework.

Box 1

Example of analysing exposure to nature-related physical risks with the ENCORE tool

To support the process of identifying nature-related physical risks, financial institutions could use publicly available methodologies such as the **ENCORE (Exploring Natural Capital Opportunities, Risks and Exposure)** tool, which serves as an initial assessment tool to identify how businesses depend on and impact ecosystem services[1]. The ENCORE tool is anchored by a knowledge base featuring two interconnected pathways: one focusing on dependencies and the other on impacts related to ecosystem components. The dependency pathway analyses the reliance of various economic activities on ecosystem services, assigning a materiality rating to each identified link between an economic activity and an ecosystem service. The ENCORE tool provides materiality scores for the dependency of economic activities on ecosystem services, ranging from 0 (no material dependency) to 1 (very high dependency).

In the 2023 Financial Stability Report, the European Insurance and Occupational Pensions Authority (EIOPA, 2023)[2] conducted a nature-related physical risk assessment in collaboration with the European Central Bank (ECB). The study presents initial findings on insurers' exposures to nature-related physical risks through their direct investments in corporate bonds and equity. The methodology employed assesses the dependency of an economic activity (e.g., agriculture) on a range of ecosystem services and maps this to insurers' investments by NACE sector of economic activity.

The research reveals that almost 30% of insurers' investments in corporate bonds and equity are in economic activities with a high direct dependency on at least one ecosystem service. The major vulnerabilities related to surface and ground water, as well as flood and storm protection. The figure below provides an overview of how material the dependence of selected economic sectors on ecosystem services is.

…/…

1 In FSB (2024), it is mentioned that while the ENCORE tool serves as the main dataset used by most of the financial authorities' initial work, it does not differentiate between jurisdictions, which has been noted as a critical limitation. This is why some supervisors, namely the ECB (2023) and Banco de Mexico (2023) have used alternative datasets in their work (e.g., Biodiversity Risk Filter, Natural Capital Index Framework).

2 EIOPA (2023), Financial Stability Report December 2023.

Source: ECB calculations based on Natural Capital Finance Alliance ENCORE database. Note: sector dependencies in the analysis are mapped to the lowest level of granularity, i.e., the four-digit NACE level (e.g., growing of cereals). For higher levels of granularity (e.g., crop and animal production), dependencies are aggregated up from four-digit NACE level, so the maximum materiality score for each ecosystem service out of all four-digit NACE sectors is assigned to the higher-level NACE sectors.

Quantitative indicators to measure financial exposures to nature-related physical risks

After qualitatively identifying sources of physical risks, financial institutions could quantify physical risk sensitivity by assessing individual risk drivers. A common approach is to measure dependency in more detail, which involves evaluating the extent and type of reliance on ecosystems stemming from portfolio companies' activities. To effectively measure dependency on nature, financial institutions could adopt a bottom-up approach, which entails selecting indicators that quantify ecosystem dependencies. Examples of indicators for assessing dependency on nature include water intensity (percentage of revenue reliant on water use) and dependency on pollination (percentage of revenue reliant on pollination-dependent crops)[15].

In addition, financial institutions could **quantify their financial exposure to physical risk**. An example of a methodology to convert sensitivity exposure data into financial loss quantification is the **Ecosystem service Degradation Sensitivity Indicator (EDSI)** developed in a paper from the De Nederlandsche Bank (DNB) by Gallet *et al.*,

15 Table 16 of the TNFD Guidance on the identification and assessment of nature-related issues provides concrete examples of exposure and magnitude indicators of nature-related physical risks. As for pollination, institutions could assess their exposure to chronic physical risk from a decrease in pollinators, and quantify the financial impact through, inter alia, the reduced supply and increased capital expenditure on adaptation (e.g. mechanical pollinators).

published in August 2024 (DNB, 2024)[16]. This methodology creates a risk indicator based on the following steps:

i) Assess firms' nature vulnerability using sectorlevel ENCORE dependencies, complemented by a multi-regional input–output tables and a naturedegradation index to capture indirect supplychain vulnerability;
ii) Estimate each firm's drop in distance-to-default from nature degradation and its specific vulnerabilities to this using the Merton model (which recalculates changes in asset values relative to liabilities);
iii) Revalue the probability of default (PD) and loss given default (LGD) for all assets held by financial institutions;
iv) Aggregate at the institution level to assess changes in an institution's prudential ratios, notably CET1.

Another option to explore is scenario analysis, which simulates plausible disruptions to ecosystems and their financial impacts. These scenarios could reflect physical events such as collapse of pollination systems, freshwater depletion or large-scale deforestation (NGFS, 2023)[17]. Although some financial institutions have begun exploring these approaches, modelling nature-related physical and transition risk scenarios requires for further methodological development and capacity building.

1.1.2 Identifying and quantifying nature-related transition risks

Tools to identify exposure to nature-related transition risks

Transition risk identification could be conducted at the sector level using heatmaps and at the client or asset-level. For instance, this approach helps evaluate client and asset-level impacts on nature, such as deforestation, which may face regulatory scrutiny and lead to increased costs. This approach can be qualitative or quantitative and applied at different levels of granularity, depending on the data available and the maturity of financial institutions.

A proxy approach to assessing these transition risks is to identify financial institution's impacts on nature. Where these impacts are significant, there is high potential for significant exposure to transition risk, as public authorities may eventually apply regulatory measures to curb such activities.

Possible sources of data that could be used for identifying transition risks include the EXIOBASE and GLOBIO databases. EXIOBASE is a global input-output database that provides insights into the nature-related pressures linked to the production and consumption of goods and services. By leveraging EXIOBASE for sector-specific value chain data, financial institutions can estimate the indirect impacts for each sector, deepening their understanding of the nature footprint. GLOBIO models are used to evaluate the impact of various nature-related pressures, including climate change, land-use changes, road disturbances, atmospheric nitrogen deposition, mining, and habitat fragmentation. These models provide insights into how these factors influence biodiversity and ecosystem services, enhancing the understanding of the impact of economic activities on the environment.

In addition to these methods, financial institutions could use some common footprint metrics – such as Mean Species Abundance (MSA), Potentially Disappeared Fraction (PDF), Biodiversity Intactness Index (BII), Financed Absolute Biodiversity Footprint (MSA or PDF, loss/km^2/year) and Biodiversity Intensity per Unit of Capital Employed (MSA or PDF per million EUR of capital employed) etc.) – to evaluate more accurately the pressures of economic activities on nature, and thus, better identify their sensitivity to transition risk. These metrics are designed to convert the pressures exerted by companies on nature into global risk sensitivity indicators, and to compare the magnitude of risk exposures across portfolios.

Beyond the sole measure of impacts, understanding the challenges of the transition concerning nature-risks can be based on the Kunming-Montreal Global Biodiversity Framework, in particular the "30x30" policy target. This target sets the objective to protect and manage at least 30% of terrestrial areas, inland waters, costal zones and marine areas by 2030. Recognized by the international community as the most politically binding and globally consensual target in biodiversity conservation, it shall be fulfilled by all parties and incorporated into their national biodiversity strategies and

16 DNB (2024), The Ecosystem Service Degradation Sensitivity Indicator (EDSI): A New Framework for Understanding the Financial Risk Repercussions of Nature Degradation.

17 In this regard, the TNFD has provided guidance on nature-related scenarios and a scenario analysis toolbox for companies, defining a step-by-step process for implementation by firms. This offers a more comprehensive understanding of the implications tied to various transition risk drivers, taking into account macroeconomic effects and specific transmission channels of transition risk.

action plans. This means that many lands and marine areas globally that were previously in grey areas or developable status may be designated as protected areas, leading to stranded asset risks for industries dependent on resource development in these areas (such as mining, agriculture, and infrastructure construction), which in turn will give rise to credit risks. It is important to note that the operationalization of the Kunming-Montreal targets vary across objectives, but also across jurisdictions. Therefore, financial institutions and supervisors may wish to consider the applicable local legal frameworks implementing these objectives[18].

Indicators to quantify financial exposures to nature-related transition risks

Several quantitative indicators can be used by financial institutions to assess transition risks related to nature and the associated financial impacts, such as:

- **Revenue at risk from nature-related regulations** (i.e., the proportion of a counterparty's or sector's revenue that could be affected by stricter nature-related policies);
- **Sectoral exposure to protected areas** (i.e., the share of operations or supply chain stakeholders located in areas that are or may be designated as protected zones[19]);
- **Stranded asset risk in nature-intensive sectors** (e.g., fossil fuels, timber).

The use of nature-related scenarios would provide a forward-looking view of the financial impacts associated with transition risk and would enable these risks to be quantified. The development of nature-related scenario analysis may be fundamental in translating nature risk drivers into financial impacts. For example, scenarios could consider and possibly model the implementation of fertilisers bans, deforestation-free production measures, or changes in land-use policies and their associated financial impacts. **Furthermore, scenarios could incorporate quantitative objectives set by the Kunming-Montreal Global Biodiversity Framework[20]** and potential policy implications at the regional or national levels. Although some financial institutions have initiated pilot nature-based scenario analyses, developing necessary data, frameworks, and methodologies to support this type of analysis could be essential.

In addition, the **Inevitable Policy Response (IPR) Forecast Policy Scenario + Nature** (IPR, 2023)[21] addresses transition risks stemming from land-use policies that could be material to institutions (e.g., deforestation, afforestation, sustainable agriculture, food waste). It explores the impact of forecasted climate- and nature-related policies, focusing on the land-use sector, to produce a new database of value drivers that captures initial indications of potential effects on nature. A database of land-use value drivers for this scenario at one-year intervals between 2020 and 2050 is publicly available (IPR, 2023).

The policy scenario is then applied to the activities financed by the financial institution to quantify the financial impacts of potential regulatory restrictions on financed activities, as well as litigation or reputational risks that could arise.

Recommendation: Strengthen indicators and assessment frameworks to quantify nature-related physical and transition risks. Facilitate access to these indicators for both supervisors and financial institutions by supporting data identification and collection, and encourage the use, reporting, and disclosure of nature-related data by financial institutions.

18 An example is the 2024 EU Nature Restoration Law that sets thematic pathways and milestones for meeting the Kunming-Montreal objectives.

19 One concrete example: Table 16 of the TNFD Guidance on the identification and assessment of nature-related issues provides concrete examples of exposure and magnitude indicators of nature-related transition risks. As an example, institutions could assess their exposure to the costs of the loss of operating areas from their clients, e.g. by anticipating the objective of natural area protection that could be imposed to their activities, in line with international conventions and national legal framework.

20 Quantitative objectives of the Kunming-Montreal Global Biodiversity Framework: Extinction rate -90% by 2050; Restoration of 30% of degraded areas by 2030; Preservation of 30% of areas by 2030; Reduction of 50% of invasive species by 2030; Reduction of 50% of lost nutrients and food waste by 2030; Reduction of 50% of overall risk from pesticides/chemicals; Benchmarking on global financing objectives: eliminate 500 bnUSD/year of financing of harmful activities, +30 bnUSD/year in support to developing countries; Narrative on other qualitative objectives.

21 IPR (2023), IPR: Forecast Policy Scenario + Nature (FPS + Nature).

1.2 Current supervisory practices for assessing risk exposure at system-wide level

1.2.1 A number of studies on risk mapping and transmission channels are already published

The work carried out by various supervisory authorities demonstrates a clear link between nature and financial risks. In 2020, the DNB provided the first comprehensive national assessment of how financial institutions are exposed to risks related to biodiversity loss. In the paper "Indebted to nature" (DNB, 2020)[22], DNB analysed biodiversity-related risks for Dutch banks, pension funds and insurers as well as their adverse impact on biodiversity, as source of transition risk. This paper shows how these risks are transmitted to the financial sector, as well as how physical and transition biodiversity-related risks reinforce each other. According to DNB, Dutch financial institutions provided EUR 510 billion in financing to companies highly or very highly dependent on one or more ecosystem services (36% of financial sector exposures examined). Regarding transition risk, DNB found among other things, the Dutch financial sector invested in or lent to companies involved in environmental controversies relating to biodiversity or ecosystem services, amounting to EUR 96 billion at the end of 2019.

A year later, Banque de France's paper on "Exploring Biodiversity risks" (Banque de France, 2021)[23] built on DNB's works to propose an analytical framework for understanding biodiversity-related financial risks. The paper finds that 42% of the value of securities held by French financial institutions comes from issuers highly or very highly dependent on one or more ecosystem services. Comparable analyses conducted by the World Bank in Brazil as well as in Malaysia revealed even larger dependencies.

These studies, based on common methodological considerations (Box 2), highlight the importance of supervisors interacting with external stakeholders to improve their understanding of nature-related risks. In this respect, networking with academic partners is useful for supervisors. Both Banque de France and DNB drew on academic work as a basis for their analyses. In addition to academic partnerships, supervisors may also engage with public or private organisations with expertise in nature-risk assessment, as CDC Biodiversité. For its study, DNB collaborated with the Netherlands Environmental Assessment Agency (PBL).

A more granular analysis was conducted by the ECB on the sensitivity analysis of euro-area banks' portfolios to changes in a given ecosystem service (ECB, 2023b)[24]. Results show that expected losses are sensitive to changes in species abundance. Compared to the best-case scenario, banks would experience 2.5 to 2.7 times higher expected losses under adverse scenarios where climate change and nature degradation are self-reinforcing. The ECB and the Resilient Planet Finance Lab of the University of Oxford (ECB, 2025)[25] estimate that 15% of the euro area's economic output is at risk from surface water scarcity and that 34% of banks' loans (total outstanding nominal amount) are extended to sectors exposed to high water scarcity risk.

These examples can provide a template for similar exercises at jurisdictional level. Such exercises offer a system-wide view of risks, impacts and dependencies linked to nature and raise awareness in the private sector. They also allow the supervisory community to better understand the magnitude of potential financial losses due to nature-related risks and the implications of nature degradation on financial stability.

22 DNB (2020), Indebted to nature Exploring biodiversity risks for the Dutch financial sector.

23 Banque de France (2021), A "Silent Spring" for the Financial System? Exploring Biodiversity-Related Financial Risks in France.

24 ECB (2023b), Towards macroprudential frameworks for managing climate risk.

25 ECB (2025), The European economy is not drought-proof.

Box 2

De Nederlandsche Bank's and Banque de France's studies: Two different studies with methodologies based on similar approaches

The Dutch and French studies both adopt a double materiality approach. They use similar methodologies, as the Banque de France's work was inspired by the DNB's study.

To quantitatively determine the dependency of the Dutch financial sector, DNB used the ENCORE database which describes the dependencies of 86 business processes on 21 ecosystem services and 8 types of natural capital. The business processes are then linked to economic sector, and the exposure of Dutch financial institutions to those sectors through shares, corporate bonds, and loans is determined.

To define the biodiversity footprint of the Dutch financial sector, DNB used the Mean Species Abundance (MSA) indicator developed by the PBL Netherlands Environmental Assessment Agency, which shows the degree of naturalness[1] of an ecosystem. The central bank then calculated the biodiversity footprint of more than 8 000 companies by means of land use and GHG emissions, with granularity at sector and continent levels (i.e., two companies in the same sector located on the same continent have a similar footprint per euro of turnover). The total biodiversity footprint of the company is then multiplied by the share owned by Dutch financial institutions.

In its work, Banque de France explicitly drew on the DNB's previous analysis. To assess the dependence of its financial system, Banque de France also used the ENCORE dataset. First, the French central bank linked the securities held by French financial institutions ("security holders") to the companies that issued them ("security issuers"). Then, the authors assessed the impacts and dependencies of each security issuer. Each issuer receives a dependency score to measure its dependency on ecosystem services and an assessment of its biodiversity footprint (using the MSA.km^2 metric). To do so, Banque de France used CDC Biodiversité's Global Biodiversity Score. Then, the authors assigned the dependencies and impacts of the security issuers to the portfolio combining the amount of the securities of each issuer held by French financial institutions with the issuers' dependency scores (respectively, their biodiversity footprints), and thereby obtaining a dependency score (respectively, a biodiversity footprint) for the total securities portfolio of French financial institutions. Overall, Banque de France's results are consistent with those obtained by the DNB.

The two studies therefore propose similar approaches by using similar data and methodologies.

1 i.e., comparison between undisturbed systems and those influenced by humans.

In addition to measuring the magnitude of risks, work can be done to improve the understanding of transmission channels. Macro-economic transmission channels may fall into different categories (e.g., prices, productivity, trade and capital flows) and vary in intensity across regions. While these transmission channels are often direct for corporates – whose activity is directly impacted by natural degradation (e.g., water scarcity) – the financial system is mainly exposed indirectly through its investments and protections provided.

Box 3

ACPR's analysis of the transmission channels of biodiversity loss-related risks in the insurance industry

In 2024, the French Prudential Supervision and Resolution Authority (ACPR) published an analysis of transmission channels of biodiversity loss-related risks in the insurance industry (ACPR, 2024)[1].

It shows that insurers are significantly exposed to these risks through indirect channels. On the one hand, insurers are exposed through their investments, loans and assets held in companies highly dependent on ecosystem services. On the other hand, insurers are exposed through the provision of insurance or reinsurance services to these companies that are highly dependent on ecosystem services or have a negative impact on biodiversity, given their exposure to associated financial loss. The report concludes with several recommendations, noting that **involvement in activities associated with a positive impact on biodiversity is not sufficient: efforts must also focus on reducing adverse pressures from other activities.**

In conclusion, being aware of the different transmission channels – even though data is lacking and methods are not yet fully established – the analysis shows that it is still possible to use aggregated biodiversity footprint indicators to provide an initial measure of impact, as already done by 55% of the insurers surveyed[2].

1 ACPR (2024), French insurers facing the risks associated with biodiversity loss: Challenges and lessons learned for the insurance industry and supervisors.

2 In the insurers' reports issued in 2022 in compliance with the French Energy and Climate Law, the Mean Species Abundance (MSA) was the most frequently used metric, providing a concise assessment of their impact on biodiversity. Other indicators included the BIA-GBS developed by Carbon 4 Finance and CDC-Biodiversité, the Corporate Biodiversity Footprint developed by I Care & Consult and Iceberg Data Lab, and, lastly, the tools developed by MSCI as part of a more general-purpose ESG assessment.

Finally, beyond domestic exposures assessed by supervisors, it is useful to understand the overall mechanisms of transmission of nature-related risks. Nature-related risks can be transmitted across borders through trade networks (e.g., imported inflation or production stoppages caused by ecosystem failures in sourcing countries). For open economies, these imported risks can be a source of systemic vulnerability, as highlighted by Global Value Chain (GVC) analysis. These analyses can trace embedded ecosystem services (e.g., virtual water or land use) hidden within international trade. The use of these analyses by supervisors to assess how localized nature shocks propagate through global supply chains could help them gain a more comprehensive view of indirect dependencies, concentration risks, and potential contagion channels that can be overlooked in entity-level assessments.

1.2.2 By analysing financial institutions' practices, supervisors improve their understanding of nature-related risks

By analysing market practices, supervisors can identify the data, indicators, and methodologies that appear most advanced to date. These analyses enable supervisors to gain a clearer picture of progress made by supervised entities and promote good practices. They can broaden supervisors' perspectives, who may draw inspiration from market practices (e.g., databases, methodologies used) to enrich their supervisory activities.

For instance, the ACPR is responsible for compliance with Article 29 of the French Energy and Climate law, which requires life insurance undertakings and institutions for occupational retirement provision to publish a report that defines their sustainability risk management policy. As part of those reports, information on the strategy for alignment with long-term biodiversity objectives must be included. In this context, the ACPR has been able to gain a better understanding of the data used by French insurers (Box 3).

By understanding trends and developments in the industry, supervisors can identify and promote good practices. In 2022, the ECB published a report (ECB, 2022)[26] on good practices, serving as a compendium to its "Climate & Environmental thematic review" results. The report describes observed good practices among euro-area banks in managing nature and biodiversity risks. It covers financing restrictions (i.e., institutions restrict the financing of certain

26 ECB (2022), Good practices for climate-related and environmental risk management – Observations from the 2022 thematic review.

controversial activities, in line with international conventions and standards), heat-mapping (i.e., institutions develop portfolio analysis to identify pockets of environmental risk at sub-sector level), and biodiversity foot-printing (i.e., institutions calculate their biodiversity footprint considering the negative impact, avoided negative impact and positive impact on biodiversity of all loans and investments).

1.2.3 Towards a greater use of stress tests and scenario analyses to get a quantitative view of global nature-related risks

The forward-looking aspect is essential for properly understanding nature-related risks. To that end, the NGFS recommendation on developing nature-related scenarios (NGFS, 2023a)[27] identified three key components:

1. A scenario of hazards/shocks (physical and transition shocks) that could translate into financial risks;
2. Metrics showing financial institutions' exposure hazards through different transmission channels;
3. An assessment of financial institutions' vulnerability to nature-related risks for given hazards and exposures (propensity to incur losses and ability to cope).

Regarding the first component, in the medium-term, the lack of global reference scenarios may hamper financial authorities from developing scenario analysis and stress tests to account for nature-related financial risks (OECD, 2023)[28]. Nevertheless, financial authorities and supervisors could leverage their experience with climate scenarios and stress testing exercises to inform their approach and move towards an integrated assessment of climate and nature-related risks. Conversely, insights from stress-testing exercises could also be applied at the micro level to calibrate risk models in financial institutions and possibly inform quantitative prudential treatment.

Ambitious work on nature scenario analysis and stress testing has been underway for several years. The NGFS recommendations on the development of nature scenarios provide a list of options to advance quantified nature-related scenarios. Following a sequenced approach, the NGFS proposes using input-output tables and biophysical models in the short term – even if they are static – as well as equilibrium-based modelling frameworks, with caution, as they may underestimate the economic impacts generated by nature-related hazards. In the longer term, supervisors could improve existing models by incorporating more transmission channels to better capture interlinkages between the economy and nature, as well as by integrating crucial characteristics of nature-related risks such as tipping points. Supervisors may also consider modelling joint stress-testing exercises to capture the interplay between physical and transition nature risks. The technical document from the NGFS helps supervisors and central banks develop physical and transition scenario narratives.

Supervisors can draw inspiration from these existing narratives or create their own scenarios, as DNB has done (Box 4). Similar work was conducted by FSA Africa and McKinsey on five African banking systems (Box 5) or ACPR and Banque de France focusing water shortage risks (Box 6).

27 NGFS (2023a), NGFS Recommendations towards the development of scenarios for assessing nature-related economic and financial risks.

28 OECD (2023), A supervisory framework for assessing nature-related risks: Identifying and navigating biodiversity risks, OECD Business and Finance Policy Papers.

Box 4

DNB's 2023 study on nature scenario analysis

In 2023, DNB published "The Economic and Financial Stability Repercussions of Nature Degradation for the Netherlands: Exploring Scenarios with Transition Shocks". This paper uses scenarios to explore economic and financial risks associated with five different nature scenarios. Due to methodological limitations, the study focuses on transition risk scenarios, except for a scenario on pollination decline. The initial assessment shows a limited financial impact on Dutch financial institutions, which suggest that **transition measures can be implemented without strongly impacting the Dutch economy**. However, several limitations of the analysis are identified, most of which point to a likely underestimation of risk. The authors therefore make clear that the study is primarily a first methodological contribution to the analysis of nature risks. Drawing policy conclusions from the analysis would require further work.

Box 5

FSD Africa and McKinsey Sustainability study on the exposure of African banks

This study, conducted in 2024 on **five African banking systems (Ghana, Mauritius, Morocco, Rwanda and Zambia)** assessed nature-related risks driven by 11 dependencies and impacts, such as air quality, water pollution, deforestation, or pollinator population decline. The countries were chosen to reflect different risk profiles and sectoral distribution, representing most of the African continent. The study uses Global Biodiversity Framework (GBF) scenarios to compare a "current policy" scenario with two scenarios aligned with GBF goals. The study finds that nature-related risks are lower under an "orderly transition' scenario" (where both decision makers and businesses take action) than under a "disorderly transition' scenario" (where decision makers act to reverse nature loss, but companies do not substantially reduce their negative impacts on nature). Under the "disorderly scenario", nature-related risks could increase exposure-weighted cumulative expected credit losses by up to 9% by 2030, and up to 21% by 2050. Conversely, business actions taken under the "orderly scenario" could significantly reduce credit risk in most countries (e.g., up to an 18.5 percentage points reduction in cumulative losses in Zambia by 2050).

Box 6

ACPR and Banque de France exploratory works on water shortages

Exploratory work has also been launched by supervisors to conduct scenario analysis focusing on a single component of nature-related risks. For instance, ACPR, in collaboration with Banque de France, is currently analysing the impact of water shortages on national banks and insurers. To do so, Banque de France and ACPR identify national companies subject to water stress (based on sector and geographical location[1]) and cross-reference this information with water dependency (estimated from water consumption).

As water is considered a non-substitutable production factor, a negative impact is assigned to companies' turnover[2]. Banque de France then models this negative impact under specific scenarios according to banks' and insurers' exposure to these vulnerable counterparties. The work remains exploratory and requires methodological refinement before it can be used for supervisory purposes. Nevertheless, it represents a new step towards a better forward-looking understanding of a specific nature-related risk.

1 The sectors considered are those highly dependent on water consumption based on CDP assessment. To identify geographical areas considered subject to water drought, ACPR/BDF identified areas where a decree was decided locally to limit water consumption and then used Meteo France's "projected river flows" data to get a forward-looking view of projected decrees.

2 As water is not substitutable, a 1% decrease in water consumption leads to a 1% decrease in turnover.

By approaching vulnerability analysis from a different perspective, conducting reverse stress testing exercises[29] could become the next major milestone for supervisors in deepening their assessment of nature-related risks. Achieving this may require scenario analysis and stress testing exercises to become more mature and reliable, particularly with regards to transmission channels and the sensitivity of the financial system. On these grounds, supervisors could determine predefined outcomes as a basis for building scenarios. An alternative way to apply reverse stress-testing logic could be to build on the previously mentioned "what if" approach. For both supervisors and financial institutions, there could value in exploring nature scenarios that could seriously affect the safety and soundness of financial institutions or the stability of the financial system. Such outcomes could be used as a supervisory tool.

Recommendation: Explore methodologies for nature-related scenario analysis, stress-testing, reverse stress-testing, and consider system-wide risk mapping through the aggregation of institutions' data, linking nature and financial databases.

29 A stress test is a forward-looking exercise that evaluates how a financial institution or system would perform under hypothetical adverse scenarios. A reverse stress testing exercise works in the opposite direction: it aims at identifying scenarios that could cause a specific failure condition. In such exercises, supervisors would assess the stress nature scenarios most likely to have a specific impact on banks solvability.

2. Supervisory approach

2.1 Challenges to consider

Nature-related risks span a broad range of issues, including biodiversity loss, and degradation of ecosystems and natural resources. Their diverse and interconnected nature makes them complex. Where necessary, supervisors can adopt pragmatic approaches to tackle nature-related challenges. Such approaches should be subject to regular review to ensure they remain effective in addressing existing challenges and incorporating emerging ones.

2.1.1 Incomplete data and non-standardised methodologies

Although data and tools exist, it is important to recognise that data gaps limit the assessment of nature-related risks. Moreover, natural systems are highly complex and difficult to quantify (i.e., there is no unified measurement equivalent to CO_2, as for climate[30]). Therefore, fragmented nature data complicates risk assessments for ecosystems that are poorly monitored or understood. **Key considerations to address these challenges include:**

Identifying data gaps

Identifying data gaps is an early step of the supervisory risk assessment process. Possible approaches may include:

- **Data quality assessment:** checking the accuracy, completeness, consistency, timeliness, and relevance of data sources and methods.
- **Sensitivity analysis:** assessing how risk results change when input data or assumptions are altered.
- **Uncertainty analysis:** quantifying the degree of uncertainty or variability in the data and its impact on results.
- **Peer review:** seeking feedback and validation from other experts or supervisors on the data and methods used.

Assessing the impact of data gaps on supervision

Supervisors can seek to understand how data gaps affect supervisory risk assessments. Possible approaches may include:

- **Comparison of data availability and quality** against supervisory needs and expectations.
- **Risk ranking:** categorizing data gaps according to their potential effect on supervisory risk assessment objectives and outcomes and prioritizing the sourcing of critical data or inputs.
- **Decision analysis:** assessing how data gaps influence supervisory risk assessment options and trade-offs.

Addressing data gaps

Supervisors can take pragmatic steps to address data gaps. Possible approaches may include:

- Integrating data from multiple sources.
- Modelling or extrapolating missing or uncertain data with mathematical or statistical models.
- Identifying substitute proxy or surrogate data.

More generally, the development of localized nature-related data infrastructure and the use of technologies such as remote sensing, Internet of Things (IoT), and artificial intelligence (AI) could support the collection of high-frequency, high-resolution natural data.

Variety of methodologies

The methodologies used to assess and manage nature-related risks vary widely, reflecting the complexity of modelling nature. Different methodologies may be applied depending on the specific nature risk driver, the data available, and the supervisory objectives. This highlights the need for flexibility and integration of different approaches as these become more refined and effective.

30 However, recent approaches have been developed to capture absolute nature-related impact. One example is an "Earth system impact score" that would integrate GHG, water consumption and land use, allowing aggregation of local impacts and comparison with planetary boundaries. See Crona *et al.* (2023), "Going beyond carbon: An "Earth system impact" score to better capture corporate and investment impacts on the earth system".

Supervisory frameworks often rely on a combination of **quantitative and qualitative** methodologies. Qualitative approaches may allow supervisors to take initial steps towards nature-related supervision while refining quantification methodologies. Quantitative approaches enable supervisors to estimate potential impacts of nature-related risks. Modelling can be used to project potential nature risk scenarios affecting individual entities.

2.1.2 Proportionality

Proportionality cannot be considered as a one-dimension issue with a linear positive correlation between institution size and risk. While smaller institutions may have limited resources to closely track nature risks, concentrated business models can be highly vulnerable to specific nature risk, warranting strong risk management.

Supervision should be commensurate with the impact of the counterparties on the institution and the financial system, and with the nature, complexity and scale of the risks being managed. Some risks may demand immediate and effective supervisory interventions, while others might allow more localised or gradual actions, requiring a more adaptive supervisory approach. Supervisors can leverage on their risk identification processes and financial institutions' materiality assessments to proportionately supervise entities. Materiality assessment delineates the perimeter of relevant and significant nature-related risks for each financial institution.

Larger counterparties may be better able to provide detailed data on their nature-risk exposure and impacts. Supervisory expectations may also consider proportionality from this perspective, by adjusting the granularity of data collected according to the size of its corporate counterparties.

Proportionality is a particularly relevant for Emerging Markets and Developing Economies (EMDEs). There is a tension between the inclination to maintain light requirements and supervisory measures due to limited supervisory capacity and institutions' resources, and the significant exposure of EMDEs to nature-related risks given the sectoral dependencies and geographic location.

2.1.3 Addressing the climate-nature nexus and socio-economic considerations through an integrated framework for nature risk supervision

Climate-nature nexus

Although nature also encompasses climate, the terms climate and nature are used separately in this subsection to highlight synergies and progress already made in climate risk assessment.

To properly address nature-related risks, supervisors can assess and clarify how nature fits within their mandate, based on financial stability implications. Financial risks related to climate and nature are interdependent and may compound through reinforcing mechanisms between climate change and nature degradation. At the same time, measures to mitigate these risks can present trade-offs and synergies, requiring a balanced approach to capture similarities and differences within the supervisory framework. Furthermore, interdependencies among different ecosystems need to be considered.

Due to the strong interconnections between climate and nature risks, integrated risk assessment models addressing both climate and nature-related risks are becoming essential. These models combine multiple methodologies and data sources – scientific, economic, and demographic – to provide a holistic view of nature-related risks. They can identify areas where supervisory actions would have the greatest impact.

Despite challenges, the nature-climate nexus offers an opportunity for supervisors to leverage existing climate supervisory frameworks to strengthen nature-related supervision.

Box 7

Example of Integrated risk assessment model – Potsdam Institute for Climate Impact Research (PIK), European Central Bank (ECB) and NatureFinance (NatureFinance, 2024)[1]

This research marks evolving efforts to develop integrated scenario narratives and implications through a sophisticated modelling infrastructure combining macroeconomic and biophysical models. Integrating climate and nature-related risks into scenario analysis yields materially different risk assessments and provides a more nuanced understanding of biophysical and economic risks compared to analysing these factors separately. The integrated approach reveals material differences under varying climate and nature policy scenarios (aligned with NGFS). In particular, the project shows that while integrated climate-nature policies still present risks, **there are less pronounced than siloed policy scenarios**.

This research **demonstrates that modelling nature and climate risks together in scenario development is feasible and delivers a more rigorous and comprehensive scope of potential risks than existing approaches**.

The climate-nature scenario modelling framework focuses on economic risks for the **global agriculture and land-use sector from 2020 to 2050**. This sector is chosen for its direct dependencies on Nature's Contributions to People (NCP). Modelled changes in land degradation and NCPs significantly impact this sector. The framework uses spatially variable biophysical and socio-economic data to derive indicators of physical and transition risks. Within the framework, the **degradation of ecosystem services is assessed, focusing on two key NCP indicators: pollination insufficiency and soil erosion**. These two NCPs were selected due to robust scientific basis and global data availability. Findings indicate that a business-as-usual scenario lacking effective climate and nature protection measures leads to significant biodiversity loss and ecosystem services degradation, particularly in land use.

An integrated climate-nature equilibrium scenario promotes long-term agro-economic stability and sustainability through efficient resource use and minimized environmental degradation. This is achieved through the synergistic effects of climate and nature policies. For example, establishing biomes that enhance terrestrial carbon storage by 2030 mitigates physical and transition risks associated with delayed climate action, supporting long-term climate goals. While investments in advanced technologies and infrastructure are needed to boost agricultural productivity, the integrated scenario avoids substantial increases in production costs and food prices, as nature protection policies buffer climate-related costs.

The report underscores the critical role of biodiversity, soil health, and pollination in supporting economic activity and calls for innovative modelling solutions – such as sensitivity analyses of banks' portfolios to biodiversity loss – to translate findings into actionable supervisory insights.

Although estimated impacts are likely underestimated due to scope, data, and methodological challenges, this work forms a useful basis for immediate action and ongoing development in this area.

1 NatureFinance (2024), Climate-nature scenario development for financial risk assessment: Presentation of Final Results.

While the supervision of climate-related risks is in general more established, leveraging the work done in this area can yield beneficial synergies when developing a supervisory approach for nature risk supervision. In practice, this could include incorporating all nature-related risk factors into the climate-related regulatory and supervisory initiatives. For instance, authorities in Malaysia have used an approach analogous to climate-related risks when addressing broader nature-related risks (Box 8). The approach includes awareness raising and capacity building to develop supervisory and regulatory expectations.

Box 8

Example of the development of nature-related measures based on the supervision of climate-related risk by Bank Negara Malaysia

This example is based on insights from the World Bank's analytical report on the exploration of nature-related risks in Malaysia (WB, 2022). Malaysia leveraged its climate policy framework – particularly through financial sector initiatives – to integrate nature-related considerations into national strategies and risk management practices.

Bank Negara Malaysia (BNM) used climate policy as an entry point for nature-related risks. Malaysia's climate commitments under its national determined contribution (NDC) created a regulatory context where financial institutions were expected to manage climate risks. BNM played a pivotal role by issuing the Climate Change and Principle-based Taxonomy (CCPT) in 2021, guiding banks to classify economic activities based on climate impact. BNM also supported integration of climate risk into supervisory frameworks, which later became the template for nature-related risk integration.

BNM further supported policy integration of nature-related risks into its own remit by extending its work and considerations to risks related to nature. BNM collaborated with the World Bank to develop the Nature-Related Financial Risk Assessment Guide, aligned with TNFD principles and promoted stress testing for climate risks while signalling that similar methodologies would apply to nature-related risks (e.g., deforestation exposure in supply chains). BNM also raised awareness that ecosystem degradation poses financial stability risks similar to climate change.

BNM's leadership aimed to prevent siloed climate and nature policies by leveraged existing climate data infrastructure for biodiversity and coordinating with ministries and financial institutions to embed nature considerations into sustainable finance frameworks. This positions Malaysia as an early mover in integrating nature-related financial disclosures into regulatory expectations.

Socio-economic considerations

Supervisors and financial institutions may find useful to be aware of potential interactions between nature-related risks and socio-economic risks. These interactions can take the form of trade-offs (negative correlation, requiring balance) or feedback loops (positive correlation that reinforces itself). Such effects may materialize through both inside-out and outside-in transmission channels. Examples may include:

- Nature degradation reducing local economic resources and weakening communities (positive correlation of inside-out impacts, with outside-in effects on credit quality);
- Rapid divestments due to nature transition risks leaving local inadequate actors without alternative economic strategies (negative correlation of inside-out impacts, with outside-in effects on credit quality of actors).

Box 9

Example of a study assessing the socio-economic impacts of nature-related risks – (Hadji-Lazaro *et al.*, 2023)[1]

This research paper introduces new methods for evaluating nature-related risks, focusing on granular, spatially explicit assessments (at municipality level) of vulnerabilities related to water scarcity and threatened terrestrial ecosystem protection. The paper highlights the intertwined goals of economic prosperity, social stability and nature sustainability needed for a just transition.

The study addresses socio-economic consequences of biodiversity loss such as impacts on employment, fiscal revenue, or wage income. For instance, the degradation of pollination services could substantially affect consumer prices, particularly for low-income households. Even if only 3% of household demand in South Africa is supplied by pollination-dependent sectors, more than 12% is supplied by sectors heavily reliant on intermediate goods supplied by pollination-dependent sectors. For low-income households, whose consumption basket is largely composed of food products, price effects from pollination service degradation can be significant. Regarding transition risks, the study highlights direct trade-offs between certain nature conservation measures and employment. For instance, closing mines to protect threatened terrestrial ecosystems could jeopardize around 175 000 jobs and have negative socio-economic impacts.

The authors conclude that integrating multidimensional socio-economic vulnerabilities and spatially explicit assessments is essential for a comprehensive understanding of nature-related risks.

1 Hadji-Lazaro *et al.* (2023), Socioeconomic and Spatially-Explicit Assessment of Nature-Related Risks in South Africa.

Supervisors and institutions may approach these interactions qualitatively to gauge their scales (e.g., recognizing that localisation of nature and socio-economic effects often overlaps). As with climate, integrated solutions and methodologies are emerging to address these interactions, while transition planning can enable a comprehensive supervisory approach.

A possible tool for an integrated approach: transition planning and transition plans

Transition plans articulate an entity's overall strategy for managing risks and opportunities arising from system-wide adaptation. Until now, recommendations, frameworks and disclosures for these plans have primarily focused on climate change, often overlooking the dimension of nature-related implications for the financial sector, as well as the interconnection between climate change mitigation/adaptation and nature degradation (including biodiversity loss). Transition plans could benefit from incorporating nature-related risks, considering interdependencies between climate and nature, and possibly socio-economic risks in a more holistic approach. The effectiveness of such transition plans as supervisory tools will depend on further developments in international guidance on transition planning, including nature risks, standardize and harmonize approaches[31] (Box 10).

31 While the report acknowledges the benefits of developing an integrated view of risks in transition plans, the NGFS also recognizes the complexity of extending the plans – initially designed for climate risk assessment – to natural hazards. Extending these transition plans to nature-related risks would involve integrating additional multi-dimensional indicators, location-specific dependencies and impacts, and non-linear thresholds on nature-related risks. Alternatively, a distinction between climate transition plans and nature-related risk transition plans could be considered, while encouraging alignment and cross-referencing between these plans where material interlinkages exist.

Box 10

Developing nature transition plans for integrated supervision

While existing transition plan frameworks and requirements still largely focus on climate, guidance is beginning to emerge on including nature targets and risks in transition planning and plans.[1] With respect to climate, the NGFS has highlighted the micro-prudential relevance of transition plans (NGFS, 2023b)[2] and the importance of financial institutions developing credible transition planning and plans (NGFS, 2024b)[3]. Similar considerations could apply to nascent nature-related transition plans.

In recent years, following the adoption of the Kunming-Montréal Global Biodiversity Framework (GBF), there has been a growing recognition of the materiality of nature-related risks and opportunities within the financial system. This has led to guidance on nature transition plans and planning, aimed at facilitating the development of stand-alone nature transition plans or supplementing climate transition plans with nature-related considerations. Examples of guidance on strategic nature transition plans include papers by the TNFD (2024[4], 2025[5]), GFANZ (2024)[6] and frameworks by WWF (2022, 2023, 2024)[7] and (WEF, 2023)[8], respectively.[9] These documents detail how institutions can use transition plans as strategic tools to modify business models and operations to meet nature-related targets, address related risks, and comply with relevant laws and regulations.

Emerging guidance provides first insights into the maturity of nature transition planning and potential future developments. Based on the above examples, the following observations can be made:

- **Tailored recommendations for financial institutions on nature transition plans are rare.** Most guidance focuses on corporates and has not specifically targeted financial institutions. One exception is GFANZ, which included in their consultation paper voluntary guidance for financial institutions to incorporate nature-related levers into their net-zero transition plans. TNFD[10] also provides actionable recommendations for financial institutions, these include integrating financing, engagement, metrics, governance, and disclosure, while addressing data and methodological challenges with a pathway for improvement.
- **Almost all existing guidance acknowledges the need for integrated climate-nature transition planning and plans.** For example, the WWF proposes a stepwise approach to integrate nature into existing transition planning frameworks of businesses (first integrate nature into climate transition planning, then align transition planning with nature positive goals). GFANZ emphasizes the critical role of nature in achieving net-zero goals. TNFD urges companies to align their transition plans with the Paris Agreement and the GBF, addressing climate and nature goals while balancing social objectives and acknowledging the interconnected drivers of nature change.

.../...

1 In line with the NGFS work on transition plans, transition planning and transition plans are understood as two interconnected yet distinct essential elements: Whereas transition planning refers to the internal process by which a firm develops a transition strategy to meet climate targets, transition plans are the external-facing outputs of those planning processes.

2 NGFS (2023b), Stocktake on Financial Institutions' Transition Plans and their Relevance to Micro-prudential Authorities.

3 NGFS (2024b), Credible Transition Plans: The microprudential perspective.

4 TNFD (2024), Discussion paper on Nature transition plans.

5 TNFD (2025), TNFD guidance on nature in transition plans.

6 GFANZ (2024), Nature in Net-zero Transition Plans.

7 WWF (2022), WWF's Criteria for Credible Climate and Nature Transition Plans for financial institutions.
WWF (2023), Nature In Transition Plans: why and how?.
WWF (2024), Catalysing Change: The Urgent Need For Nature Transition Plans.

8 WEF (2024), Nature-Positive Industry Sector Transitions.

9 It should be noted that some jurisdictions (particularly the EU) also require prudential transition plans, i.e., plans that are not limited to strategic considerations and include all "financial risks arising from ESG factors".

10 TNFD guidance on nature in transition plans (2025).

- **While all guidance refers to the GBF, guidance on metrics and targets is still relatively limited.** GFANZ recommends financial institutions develop and use standardized, comparable metrics to measure the impact of their activities on nature and biodiversity. Its guidance includes an indicative list of resources on nature-related metrics and targets, such as those developed by TNFD and SBTN[11]. TNFD also covers metrics and targets in their guidance on nature transition plans. Among other things, it provides further detail on metrics and targets for dependencies and impacts on nature (while recognizing that gaps and quality issues related to data and methods may make it more complex for financial institutions to measure some dependencies and impacts at the portfolio level). It suggests using "anchor points" (e.g., scientifically or policy-defined thresholds like sustainable water use or nutrient runoff limits) to define baselines, scope, and timelines. It should be noted that work is ongoing by various stakeholders to further the understanding around and develop methodologies for the complex matter of nature target setting. In their report (WWF, 2023), WWF refers to the commitment of the IFRS-ISSB to enhance its climate disclosure framework by integrating natural ecosystems and the just transition.[12]
- All guidance highlights the need for further development, highlighting in particular the need to improve data, scenarios and nature transition pathways.

Similar to climate-related transition plans, emerging nature-related transition plans can have micro-prudential relevance. Accounting for these plans in supervisory practices may for instance allow effective assessment of financial institutions' preparedness and resilience against nature-related risks (e.g., evaluating plan credibility and feasibility, monitoring progress, and ensuring that financial institutions take appropriate steps to mitigate identified risks). However, effective supervisory oversight of nature transition plans requires these plans to be reliable and credible. This may necessitate advancements with respect to the understanding of nature-related risks, developing relevant data and scenarios and creating methodologies for robust target setting.

The emergence of nature transition plans may also challenge the credibility of existing climate plans. In particular, greater understanding of the interconnectedness between climate and the broader nature dimensions[13], as well as examples of integrated climate-nature plans, could expose vulnerabilities and gaps in transition plans that focus solely on climate.

11 Science Based Targets Network (SBTN), https://sciencebasedtargetsnetwork.org/.

12 In April 2025, The IFRS Foundation and the Taskforce on Nature-related Financial Disclosures (TNFD) have announced that they have signed a Memorandum of Understanding (MoU) signalling both parties' commitment to build upon the TNFD recommendations in the ongoing work of the International Sustainability Standards Board (ISSB), to enable nature-related financial disclosures for use by capital markets.

13 See "Climate-nature nexus" section in NGFS (2024a) and relevant developments in this note.

Recommendation: Integrate the supervision of nature-related financial risks with climate-related risks, since climate-related risks are a sub-category of nature-related risks.

Recommendation: Apply expectations in a proportionate manner, based on a materiality assessment of nature-related financial risks rather than simple size criteria (e.g., balance sheet size).

Recommendation: Where possible, support the integration of material nature-related financial risks into transition to supervise how financial institutions strategize and manage these risks.

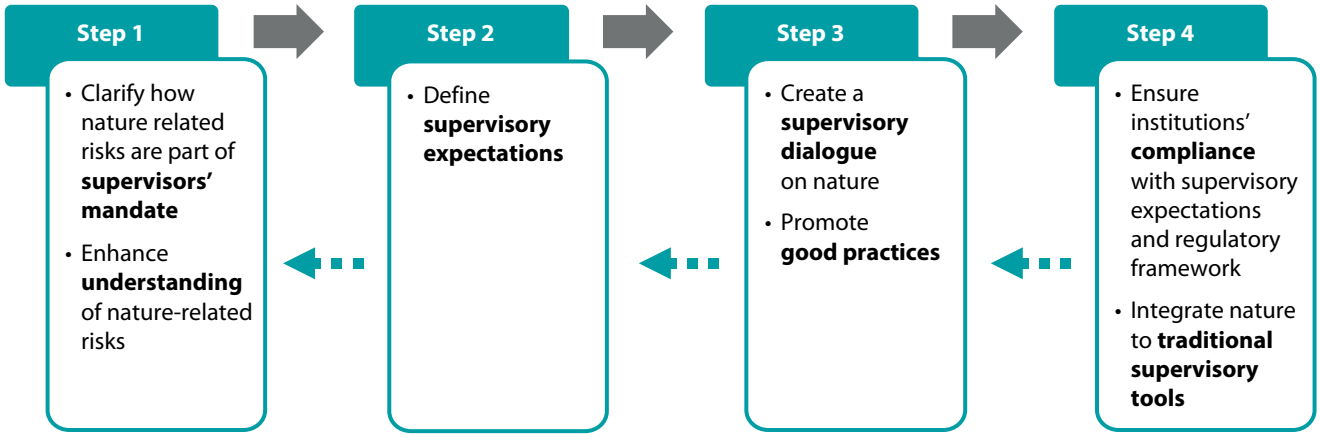
2.2 Four-step approach to address nature-related risks, including possible supervisory tools

Supervisors can use several tools to foster and support sound assessment, monitoring, and management of nature-related risks. This section proposes a four-step approach to facilitate the operationalisation of the NGFS conceptual framework, regardless of how advanced supervisors are in assessing nature-related risks:

- Step 1: Clarify how nature-related risks are part of supervisors' mandates and strengthen the understanding of these risks through analytical work.
- Step 2: Define initial nature-related supervisory expectations.
- Step 3: Engage in supervisory dialogue with financial institutions to promote the implementation of risk assessment and risk management practices. Additionally, conduct further work on data and metrics, assessing dependencies and exposures to better quantify the magnitude of financial impacts.
- Step 4: Ensure financial institutions' compliance with supervisory expectations by integrating nature-related risks in supervisory exercises and incentive mechanisms (e.g., timed recommendations supported by supervisory measures if expectations are not met).

The various dimensions of nature have unique features and differ in some aspects. However, due to their interconnectedness and previous work on climate-related risk management, **supervisors can adopt a pragmatic approach and leverage existing climate-related frameworks when implementing these steps** to enhance supervisory actions on broader nature-related risks. The implementation of some of the practices described below also depends on data availability and the maturity of currently developing methodologies.

Figure 2 **A four-step approach to implement supervision of nature-related risks**



The four-step approach is iterative by nature and should evolve through repeated cycles of refinement. For instance, once sufficient progress is made on Step 2, supervisors can begin enhancing micro-supervision, promoting good practices and creating a supervisory dialogue. However, starting Step 3 does not prevent supervisors from returning to Step 2 later to further refine supervisory expectations. The same principle applies across all steps of the approach.

Step 1: Enhancing understanding of nature-related supervisory mandate and financial risks

Enhancing supervisory understanding of nature-related risks is a foundational step towards effective supervision. Supervisors can start by clarifying how these risks fall within their mandate – whether through financial stability or prudential soundness – as nature loss and ecosystem degradation trigger traditional financial risks. To strengthen the conceptual understanding, supervisors can draw on the NGFS Conceptual Framework's three-phase approach. They can also build on work already done in

climate risk supervision and leverage existing frameworks and tools to extend their scope to broader nature-related risks, while considering interdependencies between climate and nature.

Supervisors could use existing indicators and develop new tools to assess nature-related exposures. Metrics, such as biodiversity footprints, could be integrated into supervisory analysis using data already available. Furthermore, supervisors could initiate the development of nature-related stress testing frameworks, drawing on lessons from climate stress tests. These exercises could help assess financial institutions' resilience to nature-related shocks, as shown in Section 1. By investing in these analytical capabilities, supervisors could be better equipped to identify vulnerabilities, guide risk management practices, and enable the establishment of a supervisory strategy to address these risks.

Step 2: Defining supervisory expectations

To foster robust risk management practices and ensure financial system resilience against nature-related risks, supervisors can define or explicitly detail their supervisory expectations. While system-wide expectations may be helpful, specific expectations for sub-sectors (e.g., banks, insurers, asset managers etc.) may be necessary due to their distinct risk profiles[32]. Actions aiming at awareness raising and strengthening internal expertise could be undertaken, and performing an initial exposure analysis may also be considered.

Supervisory expectations may cover the following dimensions:

- **Risk identification and assessment:** Financial institutions may be expected to systematically identify and assess a spectrum of nature-related risks and their impacts, notably through materiality assessment. These assessments could consider the materiality of nature factors for the institution's risk profile and business model, highlighting their transmission into traditional risk categories and evaluating both likelihood and scale of impacts over short, medium and long term.
  - **Credit risks:** Financial losses arising when borrowers fail to meet obligations due to ecosystem service degradation or environmental transition policies. Supervisors could expect materially exposed institutions to identify nature risk at a granular level (e.g., borrower-level with geospatial data) and assess integration of nature-related risks in credit risk models (e.g., direct parameter integration, add-ons, or qualitative considerations), valuation of collateral and provisioning.
  - **Market risks:** Price volatility may be exacerbated by nature-related risk factors (e.g., physical risks affecting commodities markets or transition risks impacting asset valuations). Supervisors may define expectations for integrating of nature-related risks in market risk models and sensitivity analyses.
  - **Operational risks:** Risks arising when nature-related events disrupt infrastructure, supply chains, or processes. Supervisors may expect financial institutions to assess business continuity and adapt their procedures to account for natural events. Operational risks also include reputational risks linked to perceived negative ecosystem impact or litigation risks linked to failure to manage nature-related dependencies responsibly.
  - **Liquidity risks:** Risk arising when liquid assets become ineligible or subject to higher haircuts, or when rapid nature shocks force asset liquidation.
  - **Underwriting risks:** Risks affecting guarantors and insurers providing protection against damages caused by nature-related risks.
  - **Concentration risks:** Risks arising when exposures are heavily concentrated in sectors, regions, or counterparties dependent on the same natural resources or ecosystems – amplifying vulnerabilities if those resources are disrupted.
- **Governance and strategy:** Financial institutions may be expected to assign responsibilities for nature-related risk management at the board and senior management levels, and to ensure adequate training and information for the relevant staff. It could be expected that the strategy encompasses several time horizons, covers the three lines of defence, ensuring that each business unit owns and manages its share of nature-related risks, and that the remuneration strategy is adjusted accordingly. Transition planning processes and frameworks could also be in place to mitigate nature-related risks, incorporating specific targets and actions to address identified risk drivers.

32 Further details are shared in the annex.

- **Risk management framework:** Supervisors may expect financial institutions to reinforce their risk management framework to encompass material nature-related risks, measure potential financial impact and inform decision-making over several time horizons. Risk mitigation measures may also be expected. Examples include but are not limited to:
  - The definition of key risk indicators with associated early warnings and thresholds;
  - The definition of contingency plans;
  - The definition of risk policies, notably at the risk-driver level;
  - The adjustment of collateral valuation (physical, real estate and financial);
  - Insurance and client engagement and monitoring (including both backward and forward-looking metrics).
- **Engagement:** Financial institutions may be expected to actively engage with stakeholders, including other financial institutions, regulators, counterparties, clients, and investees, especially those exposed to or encompassing significant nature risks, to reinforce evolving methodologies and ensure resilience to risks.
- **Data and disclosure:** Financial institutions may be expected to implement data collection and estimation methodologies to tackle the data gap related to environmental-related financial risks. They may also be expected to report on their risk exposure and policies.

Box 11

An example of setting supervisory expectations: the FINMA Circular

In a 2024 circular, FINMA communicates its expectations for banks' and insurers' management of climate- and other nature-related risks. The circular adopts the definitions of nature-related risks from the NGFS Conceptual Framework and applies the principle of proportionality by setting higher expectations for larger and more complex supervised entities. The circular entered into force on 1 January 2026 and initially applies exclusively to climate-related financial risks. This reflects the differing degrees of maturity of "climate risks" and "other nature risks" as well as the level of preparedness by the supervised entities. The circular will apply to all nature-related risks from 1 January 2028.

The circular specifies overarching expectations with a focus on governance, and the risk identification and materiality assessment processes, which also includes the use of scenario analysis. For scenario analysis, the circular allows the use of qualitative approaches and only requires quantitative assessments where feasible. Based on the materiality assessment, specific provisions for the management of relevant financial risks (e.g., credit risk) apply. The circular's intent is not to introduce new, separate risk management processes. Instead, banks and insurers shall integrate the identification, assessment, mitigation, monitoring and reporting of nature-related risks appropriately into their enterprise-wide risk management and internal control system.

Recommendation: Define clear supervisory expectations for financial institutions regarding nature-related risks to address material physical and transition risks across the financial sector; set supervisory work programs and allocate resources accordingly.

Step 3: Enhancing micro-supervision and supervisory dialogue

Supervisors may reinforce the dialogue with financial institutions on nature-related financial risk:

- **Identify and tackle common challenges;**
- **Promote the adoption of good practices;**
- **Foster compliance with supervisory expectations through individual feedback**.

Supervisors may engage with financial institutions to identify and tackle common challenges. This can be done through market outreach, and/or *via* individual supervisory dialogue. Such engagement enables supervisors to better understand market challenges, monitor nature-related risks, and identify emerging practices.

Supervisors may use this dialogue to promote good practices. They may subsequently publish reports on good practices, illustrating how financial institutions can meet supervisory expectations. They may also promote robust methodologies and provide insights into the most commonly observed practices and data sources used for nature-related risk management purposes.

Finally, **such engagement with financial institutions, along with individual assessment and feedback, may be used by supervisors to ensure that financial institutions become compliant with their supervisory expectations**. Individual requirements, taking into account the outcome of the materiality assessment, the specificities of each business model, and the existing practices of the financial institutions, can help ensure alignment. For example, financial institutions may be required to define an action plan and timeline to become compliant with supervisory expectations. This action plan could be subject to regular review to monitor its implementation and address potential challenges. Alternatively, the supervisor may use the supervisory dialogue and its micro-level assessment to define deadlines for compliance with its supervisory expectations on nature-related risks.

To ensure an effective supervision of the risks, the supervisory dialogue and institution-specific expectations may focus on the most material risk drivers, geographies, and sectors. General expectations defined by the supervisors would then be adapted to each financial institution's risk profile and exposure.

Recommendation: Engage with supervised financial institutions to assess their management of nature-related financial risks and support progress in monitoring material risks (e.g., from raising awareness to publishing good practices).

Box 12 below lists guiding questions that supervisors may use to facilitate dialogue on nature-related risks.

Box 12

Questions for supervisors to consider when assessing financial institutions' practices

1) Materiality and risk assessment

- What is the financial institution's risk and materiality assessment methodology?
- Does the financial institution distinguish between physical and transition risks in its analysis, as well as between impacts and dependencies? Does it assess material risk drivers separately? Does it assess concentration risk across risk drivers?
- Does the financial institution identify material exposures to nature-related risks?
- If so, over which time horizons, and what level of risk? What are the most sensitive economic sectors, risk drivers and geographies for the financial institution in terms of nature-related risks?

2) Governance and strategy

- Have responsibilities been assigned within the financial institution to assess, monitor, and manage nature-related risks? Are the associated processes defined for the three lines of defence?
- Do training policies and remuneration policies include nature-related considerations?

3) Risk management framework

- Which risk metrics does the financial institution use to assess and monitor its exposure to nature-related risks? Does the financial institution use forward-looking tools such as scenario analysis or stress testing?
- Has it defined its nature risk appetite? Has it consequently adapted its risk policies and processes, notably through sectoral policies, and/or risk-driver-level policies to ensure that its strategic and risk objectives are met over time?
- How does the nature risk assessment impact decision-making by the financial institution?
- What mitigation strategies are implemented to address material impacts from nature-related risks to institutions' financial performance?

4) Engagement

- Does the financial institution participate in market initiatives to develop methodologies for nature risk assessment and management?
- Does the financial institution have client- or investee-level policies to engage with them on considerations of nature-related risk and impacts on nature, and ensure their alignment with group policies over time?

5) Data and disclosure

- Has the financial institution defined a data policy on nature-related risks and impacts on nature? Which data gaps does it face, and what are its policies in place to address these gaps?
- Does it disclose information on its exposure to nature-related risks and its impacts on nature? Does this disclosure accurately reflect the institution's practices?

6) Transition plans and transition planning

- Does the financial institution integrate nature-related risks into its transition planning processes, including the development of a transition plan? If so, what are the quantitative or qualitative objectives set in terms of transition risk and physical risk mitigation? If not, has the financial institution set out timelines for establishing these processes and plans?
- Does the financial institution allocate sufficient budget and capital to potential disaster events?
- Does the financial institution evaluate its nature-related footprint considering the negative impacts, avoided negative impacts, and positive impacts on nature resulting from its activities?
- Does the financial institution integrate policy scenarios in line with international conventions (e.g., the Kunming-Montreal Global Biodiversity Framework) or local regulatory objectives to determine its transition risk?
- Does the transition plan acknowledge trade-offs between climate and nature objectives considering their interconnectedness? If so, how does it address them and aim to mitigate negative impacts?

As part of the supervisory dialogue, supervisors may want to keep a critical eye on the effectiveness of financial institution's nature risk-mitigating techniques.

For instance, hedging and insurance may imply over-specialization, concentration[33] and wrong-way risks at the protection provider level. Poor risk management strategy may cast doubt on financial institutions' capacity to cover their obligations in case of large-scale materialisation of nature-related risks. Certain factors may also prevent the activation of protections, such as exclusion clauses.

Furthermore, since the recourse to insurance transfers risks outside the financial institution, substantial reliance on this tool might disincentivize the insured financial institution from developing an active risk management strategy and a business model adaptation. Failure to manage intensifying climate/natural risks could in turn affect the availability and affordability of insurance, as insurers raise premiums or withdraw insurance coverage from high-risk areas and customers, exposing the financial institution to the uninsured or under-insured.

Compensation techniques are another type of risk management method with limitations. For instance, stand-alone financing of nature restoration or conservation (i.e., nature-based solutions[34]) can be a potential de-risking measure, as highlighted by EIOPA in its article on biodiversity risks (EIOPA, 2025)[35]. While these practices could be incentivized and help provide an indication of the financial institution's maturity in managing nature-related risks, they generally cannot fully compensate for risk exposures or impacts, especially as nature-related risks are often localised. Moreover, these measures may also entail reputational risk exposures.

In addition, exclusion policies (e.g., loans, investment or underwriting activities in industries deemed harmful) may be considered part of a risk-based strategy. However, it is important that the financial institution specifies how such policies contribute to reducing the underlying financial risks linked to nature.

Supervisors may also discuss nature-related opportunities, identified by financial institutions. The existence of opportunities depends on the strategic orientation and resources allocation of the financial institution. While it is welcome that institutions explore nature-related opportunities in line with their risk appetite, supervisors are encouraged to ensure that opportunities are not interpreted by financial institutions as a direct mitigation tool for nature-related risks or a substitute for robust nature risk management. They can also consider any nature-related risks arising from capitalising on nature-related opportunities.

Recommendation: Critically analyse supervised institutions' techniques for mitigating nature-related risks, including the use of insurance, nature-based solutions and exclusion policies, given limited offsetting opportunities and potential concentration risks.

Step 4: Integrating nature-related risk in the traditional supervisory tools

Supervisors may integrate nature-related risks, arising from impacts and dependencies, into their traditional supervisory tools[36] to ensure effective monitoring of these risks, and appropriate institution-level follow-up.

Depending on the supervisors' mandate, powers and resources under the applicable regulatory framework, as well as the level of exposure of financial institutions, nature-related risks may be addressed through the following non-exhaustive tools.

- **Set disclosure requirements** on risk exposure and mitigation, either through public or non-public supervisory reporting. Supervisors could consider the need to standardize information by encouraging financial institutions to align with international sustainable disclosure standards and taxonomies.

33 To be noted that insurers may set underwriting concentration limits. These limits are designed to prevent excessive exposure to correlated risks, which could threaten the insurer's solvency if a large-scale nature-related event occurs.

34 The European Commission defines nature-based solutions as "solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience. Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions."

35 EIOPA (2025), EIOPA notes positive early steps by insurers in addressing biodiversity risk but calls for stronger collaboration in key areas.

36 In particular, frameworks and tools like the supervisory review process and capital assessments fully allow including nature-related risks as a dimension of a holistic assessment of the overall financial institution's risk profile. In the same fashion, existing stress testing may be updated to include nature risk scenarios or modules.

- **Set institution-specific qualitative requirements/ recommendations** to implement risk monitoring and management practices, which may be tied to target dates and graduated incentives to foster compliance (i.e., ranging from formal recommendations to penalties in case of significant and prolonged non-compliance).
- **Require financial institutions to reduce their risk level**, while considering the possibility, where permitted under the regulatory framework, of imposing limits on some transactions or operations if supervisors find that the level of risk driven by nature factors is excessively high.
- **Provide recommendations on Business Continuity Planning**, through the imposition of nature disaster scenarios or large-scale exercises.
- **Encourage the establishment of transition plans, through supervisory expectations**, where permitted under the regulatory framework, including **requirement to adjust nature-related targets** and related processes.
- **Develop and conduct nature stress testing exercises** to evaluate the resilience of financial institutions and the financial system to specific nature shocks. Supervisors could develop sector-specific scenarios, with the help of data analytics and innovative tools such as artificial intelligence to fill data gaps.
- **Strengthen macroprudential surveillance** and consider system-wide risk mapping, through the aggregation of supervised financial institutions' data.
- **Set capital expectations or requirements**, where justified by the materiality of risks to the financial institution to account for macro- and/or micro-financial exposures to nature-related risks, with the objective that financial institutions hold sufficient capital to cover potential losses from nature-related risks. Different approaches may be considered by supervisors and could consist either of a benchmarking approach relying on a holistic assessment of financial institutions' risk exposures and management practices, or of the quantification of financial impacts of nature-related risks. Given the current challenges in the calibration of both approaches, supervisors may consider running these different approaches in parallel to inform their final decision on the relevant prudential treatment. Such measures could benefit from an enabling regulatory environment.

Recommendation: Implement supervisory measures gradually and proportionally, in an integrated way with existing tools, starting with basic qualitative recommendations and considering more specific, binding or quantitative requirements as appropriate.

Annex 1: Supervision of nature-related risks: sector specific considerations

The increasing recognition of nature-related risks has created need for more comprehensive oversight across sectors, all of which are exposed to these risks. Each sector faces specific risks and challenges in incorporating nature-related factors into their risk management frameworks.

Banks

Banks are exposed to nature-related risks through both direct and indirect channels. Direct exposure includes lending to sectors vulnerable to nature-related risks, such as agriculture, energy, and real estate. Indirect exposure arises through the impact of nature-related risks on the broader economy (e.g., a decrease in productivity or inflation caused by nature degradation), which can affect the creditworthiness of borrowers.

Supervisory frameworks could provide guidelines on how banks could integrate nature-related risks into their credit, market and operational risk assessments, stress tests, and capital calculations.

Through their role in financing the economy, banks could significantly contribute to impacts and incur potential transition risk, depending on the activities of their borrowers.

Insurers

In addition to the exposures of their investment portfolios, insurers are particularly vulnerable to nature-related risks due to their exposure to claims arising from natural disasters. Degradation, causing impacts on human health and nature, could generate detrimental consequences for both life insurers and general insurers. As a result, insurers face potential challenges in pricing policies, managing underwriting risk, and ensuring long-term solvency.

Supervisory approaches could include assessing how insurers are managing nature-related risks in their underwriting and investment portfolios, ensuring adequate provisions for such risks, and incorporating these risks into capital adequacy models.

Commodities Dealers

Commodities dealers are exposed to nature-related risks through the volatility of commodity prices driven by nature factors. For example, agricultural commodities like wheat, corn, and soybeans are sensitive to droughts, floods, and changing weather patterns. Similarly, energy markets, particularly oil and gas, are affected by extreme weather events or disruptions in supply chains due to natural disasters.

Oversight for commodities dealers should focus on ensuring transparency in pricing mechanisms and the incorporation of nature risk factors into market analyses. Supervisory approaches may include disclosure of the potential impacts of nature-related risks on commodity prices and incorporation of these risks into trading algorithms and risk management practices, such as ensuring liquidity preparedness for margin calls.

Managed Funds

Managed funds are potentially exposed to nature-related risks *via* the underlying assets held on behalf of investors. In these situations, fund managers could incorporate nature-related risk considerations when selecting and monitoring investments. These risks may manifest in various ways, such as disruption in supply chains or degradation of ecosystems that underpin economic activity.

In the case of pension funds, there is the heightened risk of exposure to nature-related risks over a long-time horizon. Institutional investors may consider methodologies to capture country-wide nature-related risks (impacts and dependencies) in their sovereign debt portfolios, taking into account transition objectives and planned policies.

Supervisory approaches could include assessing the materiality of nature risk factors as part of investment strategy formulation.

Regulated markets and market infrastructures

Nature-related risks could affect market valuations due to cash flow impacts resulting from increased operating costs, new regulatory costs, supply chain disruptions or changes in revenue streams from shifts in the markets for products or services for example. Increased volatility and concentration of risks in some participants' portfolios should be considered, particularly when assessing the margin framework of central counterparties.

These entities could consider scenarios where the materialisation of nature-related risks could trigger a default or extreme price moves, necessitating emergency measures such as circuit breakers or default management. This is particularly relevant for undertakings on energy, metal and agricultural markets.

Given their key role for market functioning, these institutions' plans for operational continuity should have due regard to nature-related physical risks that could disrupt their day-to-day activity.

Annex 2: Legal risks, in particular litigation on corporate responsibility, greenwashing and 'nature washing' – cross sector considerations

As highlighted in the NGFS report on Nature-related litigation (NGFS, 2024)[37], it is essential for the financial system and supervisors to understand nature-related litigation, as it can be expected to generate nature-related risks through multiple channels, in the same way as climate-related litigation. The report identifies key emerging trends related to nature-related litigation, including cases concerning biodiversity loss, deforestation, ocean degradation, carbon sinks and plastic pollution.

More specifically, the report indicates that the number of cases based on corporate responsibility may continue to grow. Such cases might be expected to follow a variety of legal strategies, with the overarching aim of establishing corporate and financial responsibility for nature degradation through companies' global supply chains. These legal cases – regardless of their outcomes – generate financial costs and reputational risks for financial institutions. Moreover, they may also reveal weak internal governance, compliance and risk management at financial institutions' level.

In addition to corporate responsibility cases, litigation in the area of 'greenwashing' or 'nature washing' is also expected to grow. Greenwashing can be defined as unsubstantiated, misleading, or selective claims regarding an entity's environmental performance. 'Nature washing', is a specific type of greenwashing, which can be defined as practices where entities make claims to stakeholders which misrepresent the extent to which their policies and frameworks align with a nature risk aware stance.

According to RepRisk data (RepRisk 2025)[38], the number of cases of financial institutions linked with greenwashing risk incident reports is consistently higher than in other sectors (including high-impact sectors such as mining or oil & gas). In 2025, almost 300 financial institutions were flagged for greenwashing risk, which constitutes a 19% year-on-year increase. More specifically, in June 2025, biodiversity accounted for 38% of environmental risk incidents recorded (*vs.* 6.5% for climate change), making it the most flagged environmental issue.

37 NGFS (2024c), Nature-related litigation: emerging trends and lessons learned from climate-related litigation.

38 RepRisk (2025), Where biodiversity risks grow, greenwashing follows.

Acknowledgements

This note is a collaborative effort of the members of the NGFS Workstream on Supervision. The paper was prepared under the auspices of Workstream Supervision Co-Chairs Alberto Casillas (Banco de España) and Donald Chen (Hong Kong Monetary Authority).

The drafting of the note was led by Alexandre Garcia (Autorité de Contrôle Prudentiel et de Résolution), with his supporting team (Sarah Kaber, Stephen Lecourt, Cyrille Amand) and the NGFS Secretariat, Mario Lopatriello (European Central Bank), Laj Gajwani (Australian Prudential Regulation Authority), Viktória Horák-Deák (Magyar Nemzeti Bank) and Rachèle Sannier (Banque de France).

The Co-Chairs are grateful for contributions from Joanna Chang (Australian Prudential Regulation Authority), Safiye Bayazit (Deutsche Bundesbank), Thomas Robertet (European Banking Authority), Naelle Verniest (European Central Bank), Rasmus Rodhe (Finansinspektionen), Irene Leung (Hong Kong Monetary Authority), Charlotte Gardes-Landolfini (International Monetary Fund), Uli Agustina, Antonius Juanta, Nisrina Qurratu'Ain, Oscar Octafian and Hygea Marwany (Otoritas Jasa Keuangan), as well as for the contributions from the members of the Task-Force Nature, Safiye Bayazit (Deutsche Bundesbank), Johanna Lütterfelds (Austrian Financial Market Authority) and Aikaterini Paisiou (Bank of Greece).

The Co-Chairs are thankful for presentations made to the working group at the beginning of the analysis work by Luís Stancato (Banco Central do Brasil), Elías Albagli (Central Bank of Chile), Stefan Gross and Theo Helfenstein (Swiss Financial Market Supervisory Authority FINMA), Naelle Verniest (European Central Bank), Pamela Schuermans (European Insurance and Occupational Pensions Authority), Nepomuk Dunz (World Bank) and Maud Abdelli (WorldWide Fund for Nature).

Finally, the co-chairs would like to thank all members of the Woskstream on Supervision, Task-Force on Nature and Experts' Network on Legal Issues who participated in reviewing this document. The contents of this publication do not necessarily reflect the position or opinion of the above-mentioned institutions.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