

Understanding the climate–nature nexus and its implications for the economy and financial system

This policy brief has been written by **Elena Almeida**, **Laudine Goumet**, **Wallis Greenslade** and **Maria Waaifoort**

Summary

- Nature degradation and climate change are deeply interconnected crises that reinforce each other, exacerbating risks for the economy, financial system and societal wellbeing. This relationship is often described as the climate–nature nexus.
- We identify five interactions within the climate–nature nexus: (1) the physical impacts of climate change contribute to nature degradation; (2) the physical impacts of nature degradation contribute to climate change; (3) climate mitigation and adaptation efforts can contribute to nature degradation; (4) environmental policy and legislation can delay the roll-out of climate mitigation projects; and (5) conserving nature can contribute to climate adaptation, mitigation and resilience.
- For policymakers, adopting a systemic approach to the climate–nature nexus is no longer optional: considering climate and nature separately or sequentially in monetary, financial, economic and fiscal policymaking will leave blind spots in risk assessments, reduce the effectiveness of policy interventions, and overlook opportunities for co-benefits.
- Central banks and financial supervisors need to improve their understanding of the risks and opportunities associated with the climate–nature nexus and adapt current tools or create new approaches to better take them into account. For example, nature degradation should be incorporated alongside climate change in supervisory expectations, risk assessments and scenario analyses.
- Ministries of Finance sit at the heart of government decision-making and have a range of levers at their disposal to address the climate–nature nexus, including developing better decision support tools (e.g. natural capital accounting), broadening green taxonomies to include nature, catalysing cross-departmental work on harmful subsidy reform, and integrating nature criteria into public spending screening.

Policy briefs provide analysis on topical issues, presenting specific recommendations to inform ongoing policy debates. Drawing on the Grantham Research Institute's expertise, they either summarise our research findings or the state of knowledge about a particular issue.

The climate–nature nexus

Nature degradation and climate change are not isolated threats; they are deeply interconnected crises that reinforce each other, exacerbating risks for societal and economic wellbeing. This policy brief examines the relationship between climate and the broader nature dimensions (including biodiversity and water), which is often described as the climate–nature nexus (Pörtner et al., 2021). It argues that addressing these challenges sequentially or in silos risks missing critical opportunities for building economic, social and ecological resilience and reducing vulnerabilities.

Climate change and nature degradation are interconnected dimensions of the same environmental crisis. However, they materialise through different mechanisms and affect Earth systems in different ways. Climate change is a global systemic issue driven primarily by greenhouse gas emissions created from burning fossil fuels (IPCC, 2023). Nature degradation is driven by more localised pressures, including land-use change, pollution, overexploitation and invasive species (IPBES, 2019) as well as climate change.

Because nature degradation tends to be locally specific, economic and financial assessments increasingly draw on the concept of ecosystem services — defined as the benefits nature provides to people — to help identify where businesses and financial institutions depend on and impact nature (ENCORE, 2024). Examples of ecosystem services include water purification, pollination, climate and temperature regulation and carbon storage. However, unlike drivers of climate-related risks, which are often measured using a singular metric like carbon emissions, drivers of nature-related risks are complex, multidimensional and cannot be captured by a single indicator, complicating efforts to assess and manage these risks across sectors and geographies.

Despite being distinct processes, climate change and nature degradation also share many drivers and characteristics. Both processes exhibit non-linearity, meaning that they do not respond to changes in a linear or proportional way, are subject to tipping points, and are deeply embedded within ecological feedback loops that reinforce and intensify each other's impacts. The relationship between climate change and nature degradation can be referred to as the 'climate–nature nexus'.

Climate change and nature degradation both create risks for the economy. The economy relies on a stable climate and the ecosystem services provided by nature, and their disruption exposes firms, households, the macroeconomy and financial system to significant risks. Disruptions to climate and natural ecosystems translate into economic and financial risks, often framed in terms of physical and transition risks (NGFS, 2024a). Physical risks include the direct economic damage from extreme weather events or ecosystem collapse such as infrastructure damage from floods or loss of crop yields due to decline in soil quality. Transition risks arise from regulatory, policy, market and technological shifts to address climate change and nature degradation. These can include measures such as carbon pricing, restrictions on deforestation-linked commodities, and new land-use regulations. Technological shifts such as the rapid adoption of renewable energy, alternative proteins or precision

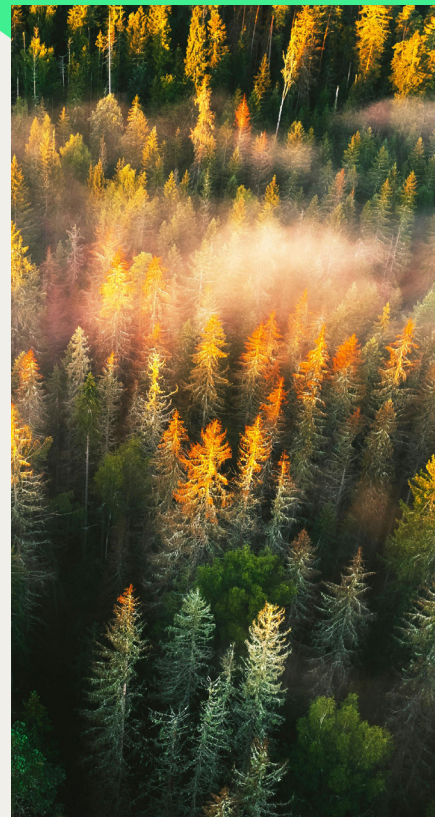


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“Climate change and nature degradation are interconnected dimensions of the same environmental crisis.”

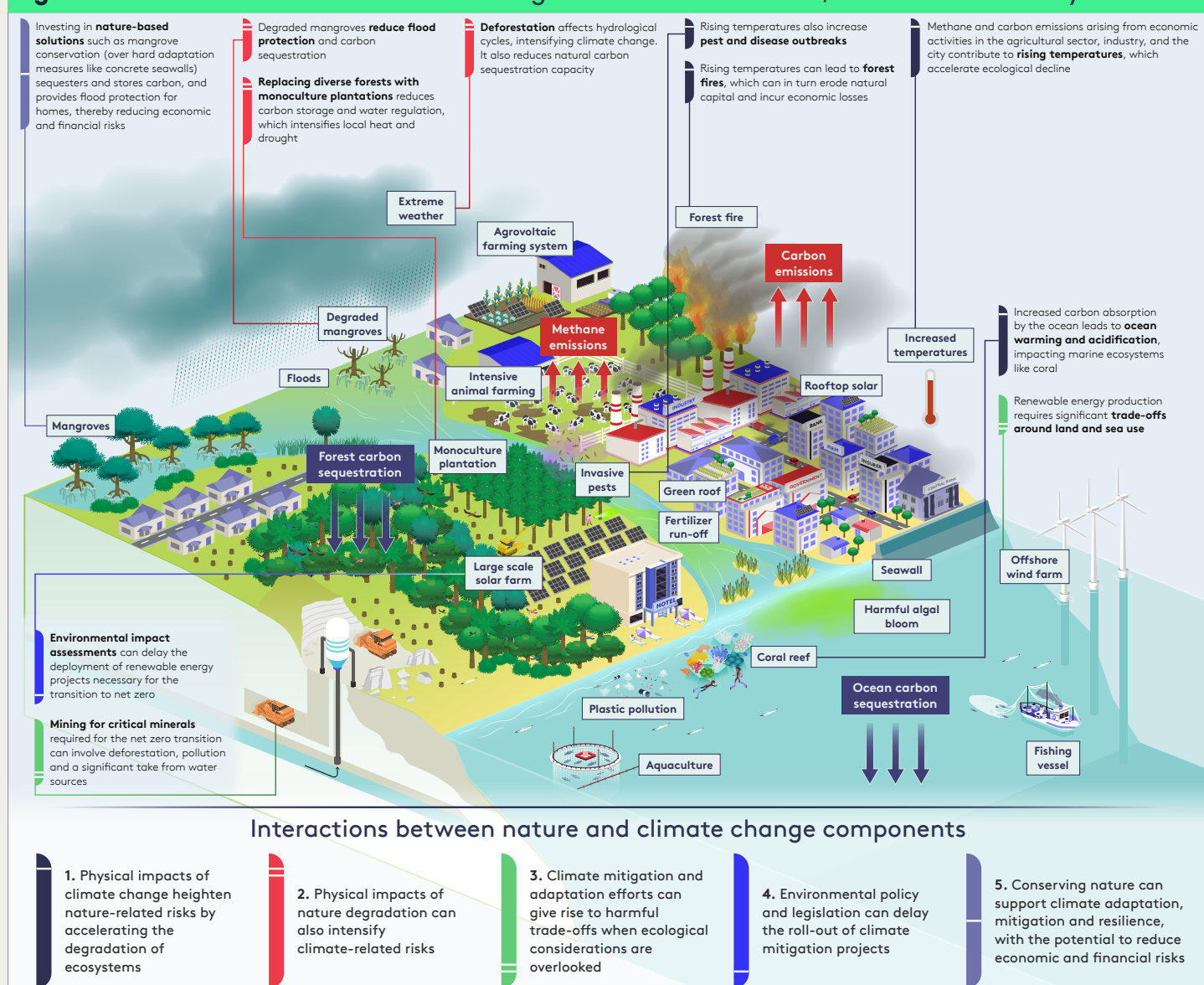
agriculture can also disrupt existing industries and supply chains that depend on carbon-intensive or nature-depleting practices.

Interactions within the climate–nature nexus

The risks created by climate change and nature degradation amplify and interact with each other in multiple ways, with implications for the economic and financial system. We identify five interactions within the climate–nature nexus: (1) the physical impacts of climate change contribute to nature degradation; (2) the physical impacts of nature degradation contribute to climate change; (3) climate mitigation and adaptation efforts can contribute to nature degradation; (4) environmental policy and legislation can delay the roll-out of climate mitigation projects; and (5) conserving nature can contribute to climate adaptation, mitigation and resilience. These interactions are explored in more detail below and illustrated in Figure 1.

“The risks created by climate change and nature degradation amplify and interact with each other in multiple ways, with implications for the economic and financial system.”

Figure 1. The climate–nature nexus showcasing interactions across land, sea and the economy



First, the physical impacts of climate change heighten nature-related risks by accelerating the degradation of ecosystems.

Climate-related physical impacts such as rising temperatures, extreme weather and ocean acidification all contribute to biodiversity loss and ecosystem collapse. These impacts undermine the natural systems that support economic activities, in particular, agriculture and forestry. For example, the mountain pine beetle outbreak in Canada illustrates how climate change can intensify nature degradation and amplify economic risks (Almeida et al., 2025). Warmer temperatures enabled the beetle to survive longer and reproduce more quickly. This led to an unprecedented rise in its population, disrupting ecosystems, destroying millions of hectares of pine forests, and affecting the livelihoods and industries that depend on them. This is a clear example of how changes in climate can set off ecological chain reactions, turning local environmental pressures into economic risks.

Second, the physical impacts of nature degradation can also intensify climate-related risks.

The loss of forests, wetlands and other ecosystems reduces carbon storage, amplifying the greenhouse effect (Palmer and Pearson, 2023). Degraded ecosystems also fail to regulate water flows or temperature, making droughts, floods and heatwaves more severe. These ecosystem service losses compound climate-related physical risks, increase adaptation and recovery costs, and can undermine food and water security. In many cases, nature degradation occurs before climate risks fully materialise (Almeida et al., 2024), eroding natural resilience and exposing the economy to cascading impacts. Deforestation, for instance, disrupts the water cycle, which exacerbates flood risk and reduces carbon absorption long before those effects appear as droughts or higher temperatures. This amplification of risks can lead to higher human and economic costs.

Third, climate mitigation and adaptation efforts can give rise to harmful trade-offs when ecological considerations are overlooked.

Renewable energy infrastructure and electric vehicles require significant land and natural resources which can lead to significant land- and sea-use change. For example, in Southeast Asia, studies show that hydropower, biofuel production and geothermal projects have caused biodiversity loss, habitat fragmentation, pollution, and even species extinction (Pratiwi and Juerges, 2020). This highlights the environmental and social costs of energy transitions that fail to integrate ecological integrity. In Indonesia, current industrial policy focuses on mining for nickel (a necessary component for many low-carbon technologies) to support the global energy transition. However, there are trade-offs between nickel extraction and forest conservation (Gill, 2025), just as there are between deep-sea mining and marine ecosystem protection (Almeida and Reitmeier, 2024). Moreover, climate mitigation that overlooks ecological integrity — such as large-scale monoculture conversions for carbon credit farming — often underdelivers on carbon and degrades biodiversity and the water cycle (Warner et al., 2023; Webb et al., 2025).

On the adaptation side, maladaptation (adaptation measures that inadvertently increase vulnerability or shift risk elsewhere [IPCC, 2001]) can also contribute to nature degradation. For example, hard adaptation measures such as seawalls can disrupt sediment flows and damage mangroves, reefs and biodiversity, the very ecosystem services that moderate climate risk (Nunn et al., 2021). Both climate mitigation and adaptation efforts need to consider climate and nature jointly.



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Fourth, environmental policy and legislation can delay the roll-out of climate mitigation projects. Environmental impact assessments and permitting processes, while essential for preventing the kind of nature degradation described above, can also delay or prevent the deployment of renewable energy infrastructure, the expansion of electric grids or even mining for minerals required for the energy transition, leading to unintended climate outcomes. For example, the National Environmental Protection Act (NEPA) in the US has been identified as an impediment to the roll-out of renewable energy projects, with nearly a third of solar projects that completed NEPA environmental impact statement reviews facing court challenges (Fraas et al., 2025; Gribbin, 2021).

While it is critical that environmental and social safeguards are built into legislative frameworks, it is also important to recognise that these very frameworks can be perversely utilised to inhibit the deployment of climate mitigation technologies, again highlighting the relationship between nature degradation and climate change (OECD, 2024; UBS, 2024; Outka, 2012).

Fifth, conserving nature can support climate adaptation, mitigation and resilience, with the potential to reduce economic and financial risks. Embedding nature into climate policy and financial planning recognises the intrinsic value of ecosystems and the essential role they play in risk reduction. Investing in nature-based solutions (such as protecting mangroves, restoring degraded forests, and installing green roofs) delivers double dividends: on both climate adaptation and mitigation (WEF and WRI, 2021; (NGFS, 2024b). Compared with hard adaptation measures (such as concrete seawalls or air conditioning), nature-based solutions can reduce vulnerability to climate shocks like flooding or landslides. For example, mangrove forests alone are estimated to provide around US\$855 billion in annual flood reduction benefits and safeguard millions of people and their livelihoods (Beck et al., 2024). Nature-based solutions also contribute to climate mitigation through sequestering carbon.

Fundamentally, urgent action to restore ecosystems should be considered an early-stage defence to curb future climate physical shocks and their knock-on economic costs because the degradation of ecosystems often occurs before physical climate risks fully emerge.

Embedding the climate–nature nexus approach into policymaking

Adopting a systemic approach to the climate–nature nexus in policymaking is no longer optional. Central banks, financial supervisors and governments are beginning to acknowledge this (UK Government, 2025; Coalition of Finance Ministers and NGFS, 2021). Considering climate and nature separately or sequentially in monetary, financial, economic and fiscal policymaking will leave blind spots in risk assessments, reduce the effectiveness of policy interventions, and overlook opportunities for co-benefits. Central banks, financial supervisors and Ministries of Finance will need to adapt to this ecological and economic reality.

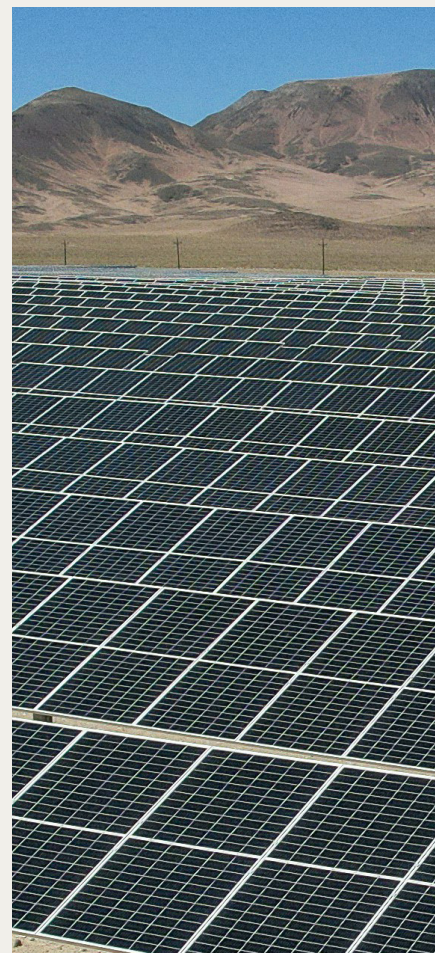


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“Adopting a systemic approach to the climate–nature nexus in policymaking is no longer optional.”

Central banks and financial supervisors need to improve their understanding of the risks and opportunities associated with the climate–nature nexus and adapt current tools or create new approaches to better take them into account. For example, nature degradation should be incorporated alongside climate change in supervisory expectations, risk assessments and scenario analyses. Here, some central banks are taking first steps: the Central Bank of the Netherlands has made progressive steps forward, incorporating best practices on managing nature-related risks in its supervisory expectations (De Nederlandsche Bank, 2025); the Swiss Financial Market Supervisory Authority has adopted official guidance for insurance and credit institutions on nature-related risks (FINMA, 2024); and the French insurance supervisor has analysed French insurers’ disclosures on biodiversity (ACPR, 2024).

Financial supervisors are also increasingly aware of the need for a holistic approach to the climate–nature nexus: with national governments such as Costa Rica, Malaysia and Colombia integrating nature-related dimensions into their sustainable finance taxonomies (Costa Rica Government, 2024; Securities Commission Malaysia, 2022; Climate Bonds Initiative, 2022). Recent scenario analysis confirms that siloed approaches underestimate risks (Stevanović et al., 2024), while integrated frameworks offer a more accurate understanding of compounding physical and transition risks. Such work could lay the foundation for integrated stress-testing by central banks and building a climate–nature nexus lens into macroeconomic modelling to better endogenise and capture the risk landscape.

For Ministries of Finance, understanding the mutually reinforcing relationship between climate change and nature degradation is key to responding to the fiscal impact of both climate- and nature-related risks. Without integrated risk assessment and forward-looking financial planning, governments will be left to face mounting, unbudgeted bills for disaster relief, healthcare and infrastructure, thereby adding to public debt burdens and squeezing already-constrained fiscal space. Ministries of Finance sit at the heart of government decision-making and have a range of levers at their disposal to address the climate–nature nexus (Power et al., 2022). These levers include developing better decision support tools (e.g. natural capital accounting), broadening green taxonomies to include nature, catalysing cross-departmental work on harmful subsidy reform, and integrating nature criteria into public spending screening.

Furthermore, any public investment in nature-based solutions should be understood as an investment towards climate, ecological and economic resilience. To scale up this investment alongside conventional mitigation technologies, governments need to support initial research around the effectiveness of nature-based solutions. This requires acknowledging the central role that Ministries of Finance can play in embedding the climate–nature nexus approach into policymaking across government (UK Government, 2025).

Ultimately, achieving an ecologically sustainable future is not a secondary concern to action on climate change. Climate-related risks are increasingly recognised as material and awareness of nature-related risks is growing. Understanding how the climate–nature nexus affects the economy and financial system is essential for comprehensive risk management and achieving social and ecological resilience.

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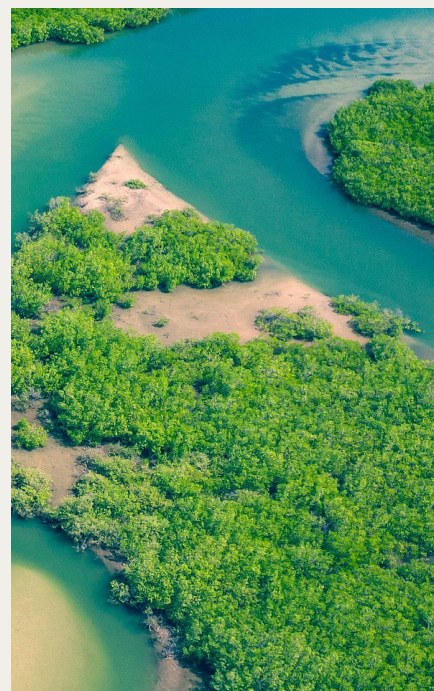


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Authors' declaration

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