

Joint NGFS-CFMCA event: From Nature Loss to Policy Response: Managing Macro-Fiscal and Financial Risks

Thursday, 25 June 2026, London Climate Action Week
UCL IIPP, 11 Montague St, London WC1B 5BP, UK and virtually

1. Event Overview

Background: Nature loss and ecosystem degradation are increasingly recognized as sources of material macroeconomic, fiscal, and financial risks. Nature-related macro-fiscal risks arise from economic dependence on ecosystem services and the impacts of nature loss—affecting growth, productivity, inflation, public finances, and long-term development—and can translate into nature-related financial risks when transmitted to balance sheets through credit, market, liquidity, and operational channels, often alongside climate-related shocks. For central banks and supervisors, the challenge is understanding how these dynamics affect financial stability; for ministries of finance, nature loss and policy responses influence revenues, expenditures, fiscal space, contingent liabilities, and economy-wide transition risks and opportunities.

The NGFS–CFMCA Sustainable Finance and Macro Platform was established to create a space for dialogue between central banks and finance ministries on issues at the intersection of macroeconomic policy, financial stability, and sustainable finance. As part of the Platform’s 2026 work plan, this joint event at London Climate Action Week will focus on clarifying links between nature-related financial and broader macro-fiscal risks, and exploring how ministries of finance and central banks’ mandates and tools can be better coordinated. Through discussion of analytical approaches and key policy levers, the event aims to support a coherent approach to managing nature-related risks and enabling nature-smart, resilient growth.

Key Messages

- **Nature loss is increasingly an economic, macro-fiscal and financial issue.** The discussion highlighted the multiple channels through which declining ecosystem services and natural capital can affect productivity, inflation, employment, trade, investment and long-term economic growth. These impacts can translate into lower government revenues, higher public expenditures, reduced fiscal space and increased sovereign risk, while also transmitting through firms and households into the financial system. Nature therefore increasingly intersects with the core economic, fiscal and financial mandates of public institutions.
- **Natural assets are productive economic assets.** Nature is not only a source of potential economic, fiscal and financial risk when it is degraded; healthy ecosystems provide services that directly support economic activity, productivity, employment, incomes, investment and public revenues. Natural assets such as forests, freshwater, coastlines, marine ecosystems and biodiversity underpin sectors including agriculture, tourism and fisheries, as well as water security and wider economic activity. Understanding nature as a form of productive capital can help shift the discussion from managing the costs of nature loss towards understanding how maintaining and investing in natural assets can contribute to economic prosperity and resilience.
- **Ministries of Finance, central banks and financial supervisors have distinct mandates and policy tools, but face increasingly interconnected risks.** Ministries of Finance approach nature through functions including

macroeconomic and fiscal policy, public investment, revenue mobilisation, sovereign risk management and financing, while central banks and supervisors focus on areas including price and financial stability, financial-sector resilience and risk assessment. Nature-related shocks can cut across these responsibilities. Greater information sharing, analytical cooperation and dialogue can help institutions understand these interconnections while respecting their respective mandates.

- **The analytical toolkit for understanding nature-related economic and financial risks is advancing, but important gaps remain.** Participants discussed progress in identifying nature-related dependencies and exposures, valuing natural capital and ecosystem services, developing scenarios and undertaking stress testing. However, nature presents particular analytical challenges, including geographic specificity, non-linearities, complex transmission channels and potential tipping points. Data availability and comparability also remain significant constraints. Participants nevertheless stressed that these limitations should not prevent institutions from beginning analysis using the information and tools already available.
- **Analysis needs to be translated into information that economic and financial decision-makers can use.** Increasingly sophisticated models and datasets will have limited impact if their findings cannot be communicated clearly or connected to policy decisions. A recurring theme was the importance of translating nature-related dependencies, risks and economic values into the language and metrics used by Ministries of Finance, central banks and supervisors. This includes understanding implications for growth, inflation, public revenues and expenditures, investment, fiscal sustainability, sovereign risk and financial-sector resilience.
- **The ultimate test is whether better understanding of nature-related risks changes economic and fiscal decision-making at country level.** Global research, methodologies and estimates are useful, but participants repeatedly emphasized the importance of translating them into practical application. This includes incorporating relevant nature-related considerations into macroeconomic and fiscal analysis, public investment and budgeting, risk assessment and financial-sector analysis. Peer learning and the exchange of practical experience can help institutions understand which approaches are useful in different country contexts and accelerate their application.
- **The discussion needs to move beyond identifying risks towards understanding investment, incentives and economic opportunities.** Participants highlighted the challenge that the economic value generated by ecosystems is often not reflected in the financial incentives facing governments, firms and investors. Mobilising greater investment therefore requires better understanding of how the economic value of ecosystem services can inform policy and investment decisions, how incentives can support their maintenance and restoration, and where private finance can contribute alongside constrained public resources.
- **Greater attention is needed to the balance between responding to shocks and investing in resilience before they occur.** Nature degradation can contribute to increasingly frequent and persistent supply-side pressures, including through food and water systems. Participants discussed the risk that policy frameworks favour emergency fiscal interventions and short-term stabilization aftershocks over earlier investment in prevention, adaptation and resilience. With constrained fiscal space, repeated crisis response can compete directly with the longer-term investments needed to reduce underlying vulnerabilities.
- **Closer collaboration can help connect macro-fiscal and financial perspectives without duplicating institutional responsibilities.** The discussion underscored the potential value of bringing together the

analytical capabilities and policy perspectives of Ministries of Finance, central banks and financial supervisors. Greater collaboration can support shared understanding of transmission channels, improve the exchange of data and analytical approaches, identify interactions between policies and strengthen peer learning. The objective is not to create identical approaches across institutions, but to ensure that complementary analysis and experience can better inform decisions within their respective mandates.

2. Detailed Summary of Discussions

Opening Remarks

Ana Zorić, Ministry of Finance of Croatia, Co-Chair of the Coalition of Finance Ministers for Climate Action:

Ms. Zorić highlighted that nature loss and ecosystem degradation are increasingly relevant to the core responsibilities of Ministries of Finance. Healthy ecosystems underpin productive sectors, employment, incomes, exports and public revenues, while their degradation can affect productivity and growth, damage infrastructure, reduce government revenues, increase public expenditure and contingent liabilities, and potentially affect borrowing costs. Nature-related risks can also transmit through businesses and households into public finances and the financial system, creating important links between the responsibilities of Ministries of Finance, central banks and financial supervisors.

Drawing on Croatia's experience, Ms. Zorić emphasized that natural assets are also productive economic assets. Croatia's coastline and marine ecosystems support tourism and fisheries, while forests, freshwater resources, biodiversity and protected landscapes contribute to agriculture, water security, investment and local communities. Degradation of these assets could therefore have direct implications for economic growth, government revenues and expenditures and longer-term development.

Ms. Zorić stressed that these interconnections strengthen the case for collaboration between Ministries of Finance, central banks, supervisors and regulators, while respecting their different mandates and responsibilities. The NGFS-CFMCA partnership provides an opportunity to bring together macro-fiscal and financial-stability perspectives, strengthen the analytical foundations available to policymakers and support a better understanding of how nature-related risks can be incorporated into economic, fiscal and financial decision-making.

Irene Heemskerk, Head of the Climate Centre, European Central Bank

Ms. Heemskerk presented the evolving approach of central banks and supervisors to nature-related risks, drawing particularly on work undertaken by the European Central Bank (ECB) and NGFS. She emphasized that economies are fundamentally dependent on nature and ecosystem services and that their degradation can translate into economic disruption, price pressures and financial instability. The NGFS conceptual framework provides a way of tracing these transmission channels from physical and transition risks through impacts on businesses, households and the wider economy and ultimately onto financial-sector balance sheets. Importantly, these relationships can also operate in the opposite direction, as financing decisions can contribute to activities that further degrade the natural assets on which economic activity depends.

She highlighted the growing body of analytical work demonstrating the potential materiality of these risks. Existing studies have examined nature-related credit losses across African banking systems, the macroeconomic implications of water scarcity and the potential effects of multiple breadbasket failures on GDP and inflation. The ECB has itself made nature-related risk one of the focus areas of its climate and nature strategy, alongside its work on the transition and physical climate risks. Its work covers economic and financial dependencies on nature, supervisory expectations for banks, legal and litigation risks and the relevance of nature to monetary policy.

A first step in the ECB's analysis was to assess the dependence of the euro-area economy on ecosystem services. An analysis covering 4.2 million companies found that around 3 million were highly dependent on at least one ecosystem service, including through upstream supply chains. The analysis identified dependencies including surface and groundwater, erosion control, flood and storm protection and climate regulation. Heemskerk stressed, however,

that dependency does not itself establish the level of risk, requiring further analysis of where and how ecosystem degradation could affect economic activity.

Water-related risks have subsequently emerged as particularly important. ECB analysis undertaken with academic partners found that a one-in-100-year drought could put 24 percent of euro-area economic output at risk from surface-water scarcity, while 19 percent of bank lending to non-financial corporations was associated with companies potentially exposed to this risk. Around half of the assessed nature-related risk was linked to global supply chains, illustrating that exposure cannot be understood solely by examining the physical location of economic activity. Water scarcity can also affect sectors well beyond agriculture, including manufacturing, mining, construction, tourism and real estate.

From a supervisory perspective, banks are beginning to incorporate nature-related risks into their credit processes, including through exposure mapping, financial-risk drivers, credit-risk modelling, scenario analysis, stress testing and monitoring metrics. Nevertheless, progress remains less advanced than for climate-related risks. Heemskerk emphasized the value of dependency assessments as a practical entry point for institutions beginning this work and of collaboration through NGFS to make methodologies and tools available across jurisdictions. She concluded by distinguishing the respective roles of institutions: central banks and supervisors can assess and manage risks falling within their mandates, while broader transition policies and pathways for preserving nature principally sit with governments and other policymakers.

Professor Mariana Mazzucato, UCL Institute for Innovation and Public Purpose, and Ms. Valerie Hickey, World Bank Group

Professor Mazzucato and Ms. Hickey discussed how nature can move from being treated primarily as an environmental concern or financial risk towards becoming a routine part of economic and investment decision-making. While approaching the issue from different perspectives, both emphasized that better measurement of nature-related risks will not by itself change economic outcomes. The discussion focused instead on the institutions, incentives, financing structures and policy tools that determine how public and private investment is directed.

Professor Mazzucato argued that a fundamental constraint is the prevailing conception of the role of government. Public institutions are frequently trained and organized around correcting market failures, minimizing government failure and applying relatively static tools such as cost-benefit analysis. This can leave the public sector positioned principally as a fixer of problems after they arise rather than as an actor capable of shaping markets and directing investment towards public objectives. She argued for a shift from “market fixing” towards “market shaping”, in which governments establish clear objectives and use the full range of policy tools available to them to crowd in innovation and investment around those objectives.

She emphasized that this does not imply governments determining how businesses should innovate or operate. Rather, governments should be clearer about the outcomes they are seeking and then allow firms and other actors to develop different ways of achieving them. She used the Apollo programme as an example of outcomes-oriented public procurement: government defined the objective and the problems that needed to be solved, while a large ecosystem of private companies developed the technologies and solutions required to deliver it. The relevance for nature is that public institutions can similarly establish direction while preserving bottom-up experimentation and entrepreneurship.

Professor Mazzucato argued that many environmental challenges are poorly served by traditional sectoral approaches. Water, for example, should not simply be treated as a sector, but as a set of interconnected problems requiring agriculture, energy, industry, technology and other sectors to work together. She drew on the Global Commission on the Economics of Water, which she co-chaired, and its use of a mission-oriented approach. Its missions included transforming food systems, conserving and restoring ecosystems important to the water cycle, creating a circular water economy, reducing the water intensity of clean energy and artificial intelligence, and ensuring access to safe water. The Commission had documented potentially very large economic costs from water insecurity, but she stressed that demonstrating the costs of inaction was still insufficient: action requires institutions capable of shaping markets and coordinating investment around clearly defined objectives.

A central part of her argument concerned the relationship between the public and private sectors. Professor Mazzucato questioned approaches in which the role of public finance is principally to “de-risk” private investment. She argued that this can result in the public sector absorbing risks while private actors retain the rewards, without necessarily creating additional investment or changing the direction of economic activity. Instead, public-private relationships should be designed around greater reciprocity, with risks and rewards shared more symmetrically and public support linked to clear objectives and conditions. This would require reconsidering the role of public institutions from lenders of last resort towards, where appropriate, “investors of first resort”, capable of creating direction and supporting genuinely additional investment.

Professor Mazzucato stressed the importance of conditionality in making this approach operational. Public loans, subsidies, procurement and other forms of support can be linked to requirements for firms to invest, innovate or develop capabilities consistent with broader public objectives, without governments prescribing the specific technologies or business models used. She cited public lending to the steel sector as an example of how financial support can be linked to investment, innovation and training, rather than simply maintaining existing production structures.

She also highlighted public procurement as an underused market-shaping instrument. Procurement can create demand, establish markets and send signals that allow firms to invest and scale. The discussion referenced work in Brazil around school meals as an example of an outcome that can bring together agriculture, environment, health and finance, while using procurement to influence the behaviour of suppliers. Professor Mazzucato argued that supply-side instruments such as public loans may achieve relatively little without corresponding demand-side instruments capable of creating markets for new products and services.

Ms. Hickey approached the question from the perspective of translating nature into the existing machinery of economic, fiscal and financial decision-making. She argued that one important lesson from climate policy is that disclosure and greater awareness of risk do not automatically result in capital being reallocated. Understanding risks is important, but capital will not necessarily move unless the incentives, investment opportunities and financial structures facing governments, banks and investors also change. This creates a need to focus not only on the risks associated with nature loss, but also on the economic opportunities associated with natural capital.

A central theme of Ms. Hickey's intervention was the need to move the environmental agenda from an aid model towards an investment model. She highlighted the contradiction between recognizing that a substantial share of economic activity depends on natural capital while continuing to approach investment in nature principally through aid or philanthropy. Some natural assets generate substantial economic returns without generating commercial financial returns that can readily be captured by a private investor. In these cases, public investment remains necessary. The relevant question is therefore not simply whether an investment generates a commercial return, but what economic value it creates for the country and whether this is adequately reflected in public investment decisions.

This also requires looking beyond GDP towards total wealth. Ms. Hickey argued that governments need to understand whether economic activity is accumulating or depleting the different assets underpinning future prosperity, including natural, human, physical and financial capital. A country can generate current income while simultaneously “consuming its future” if it liquidates natural capital without converting that value into other productive assets. The objective should therefore not simply be to preserve natural capital untouched, but to understand how it can support sustainable increases in jobs, incomes, productive capacity and wider national wealth.

Ms. Hickey emphasized that this creates a significant economic opportunity agenda, particularly for developing economies. She used Africa's natural-resource base and the global wood-products market to illustrate the point: despite extensive forest resources, African economies capture only a small share of the value associated with wood products. With rapid urbanization creating substantial future demand for housing, infrastructure and furniture, greater domestic production and value addition could turn natural capital into jobs, revenues and human capital

rather than simply extracting or exporting resources with limited domestic benefits. The challenge is therefore to distinguish between the productive use of natural capital and its liquidation for private gain at the expense of public wealth.

Ms. Hickey also called for attention to the “plumbing” of financial and fiscal systems. Rather than creating entirely new structures for nature, she argued that nature needs to be incorporated into the institutions and rules through which capital already moves. She used Caribbean financial markets as an example, noting that banks can hold substantial liquidity while small businesses seeking to build economic activity around natural assets struggle to access capital. In such circumstances, the issue is not simply identifying nature-related risks but understanding whether financial regulations, liquidity requirements and other features of the financial system are inadvertently preventing domestic savings from being translated into productive investment. She argued that Ministries of Finance and central banks should examine these practical constraints if natural capital is to be converted into jobs, revenues and GDP.

The exchange between the two speakers also exposed an important difference in emphasis over whether policymakers should work primarily through existing economic structures or seek to change them. Ms. Hickey stressed the importance of understanding how existing fiscal and financial systems actually operate and then adjusting their rules and incentives so that nature can be incorporated into everyday decision-making. Professor Mazzucato pushed further, arguing that some of those structures themselves reflect an overly passive conception of the public sector and therefore need to be redesigned. In particular, she challenged the assumption that existing models of public-private partnership, blended finance and corporate governance should simply be accepted as given.

This led to a wider discussion of blended finance and commercial viability. Ms. Hickey cautioned against treating blended finance as a generic solution to the nature-finance gap. Concessional finance can help address specific barriers around investments that ultimately have underlying commercial returns, but it cannot make an activity commercially viable where no commercial return exists. Some forms of natural infrastructure will generate substantial economic and social value but will never produce a monetizable revenue stream for a private company. These require public investment rather than increasingly elaborate attempts to make every nature investment commercially bankable.

Professor Mazzucato responded that the definition of commercial viability itself depends partly on how value is understood and over what time horizon. Fiscal frameworks and investment appraisal can undervalue investments where their benefits emerge over longer periods or accrue broadly across the economy rather than directly to an individual investor. She argued that the public contribution should therefore be understood in terms of the value it creates, rather than simply as a cost or mechanism for attracting private capital. This connects to the broader question of public value: unless governments define clearly what public investment is intended to achieve, public-private contracts can socialize risks while privatizing rewards.

The discussion ultimately converged around the importance of changing the direction and quality of investment, rather than simply increasing its volume. Ms. Hickey emphasized moving nature from aid and conservation towards investment, jobs, revenues and economic development, while Professor Mazzucato emphasized ensuring that both public and private investment are directed towards clearly articulated public objectives. Both perspectives pointed to the importance of moving beyond measuring nature-related risks alone and examining the underlying economic institutions, incentives and financial structures that determine whether natural assets are depleted, maintained or used to generate broader and more durable prosperity.

Dr. Elías Albagli, Central Bank of Chile, and Dr. Sam Mugume Koojo, Ministry of Finance, Planning and Economic Development, Uganda

The session examined nature-related risks across the respective mandates of central banks and Ministries of Finance, with a particular focus on where their analytical and policy roles complement one another. Dr. Elías Albagli approached the discussion from the perspective of central banking and financial economics, while Dr. Sam Mugume Koojo focused on how Ministries of Finance can translate global analysis into economic and fiscal policy at country

level. Together, their interventions highlighted both the potential for collaboration and the differences in the levers available to each institution.

Dr. Albagli argued that the central challenge is not simply identifying nature-related risks, but understanding how investment in nature can generate sufficiently clear and predictable cash flows. He noted that financial markets can influence the cost of capital, but that this alone is unlikely to close the nature-finance gap. In his view, the more fundamental question is how policy can create the economic incentives and revenue streams that make investment in ecosystem protection or restoration financially viable.

He situated this challenge within a broader macroeconomic context. Economies are highly dependent on ecosystem services, while nature degradation can create potentially irreversible losses that differ fundamentally from conventional financial shocks. A severe financial crisis may eventually be repaired, whereas the collapse of a major ecosystem may not be reversible. He argued that this asymmetry increases the importance of acting before thresholds are crossed and strengthens the case for incorporating nature-related risks into macroeconomic and financial analysis.

Dr. Albagli stressed that public budgets alone cannot provide the scale of financing required. With governments already facing constrained fiscal space and high debt burdens, he argued that significantly greater private investment will be necessary. However, this requires investments in nature to generate returns. Central banks can influence financing conditions through their mandates, including through regulation, disclosure and, in some jurisdictions, asset allocation. But these interventions primarily affect the cost of capital, not the underlying cash flows from an investment.

Using a hypothetical ecosystem-restoration project, he illustrated the distinction. A central bank or financial regulator may be able to influence whether an investment is financed at a lower or higher interest rate, but it cannot by itself determine who ultimately pays for the ecosystem services being created. That question, he argued, sits primarily with fiscal and other government policy. The central problem is therefore not simply whether capital can be made cheaper, but how policy creates a revenue stream for activities that preserve or restore natural assets.

Dr. Albagli proposed that one possible avenue is to improve the pricing of ecosystem services and nature-related externalities. He noted that climate policy has at least developed concepts such as the social cost and price of carbon, whereas there is no similarly established equivalent for the destruction or restoration of a forest or other ecosystem. He pointed to methodologies that assign monetary values to ecosystem services including carbon sequestration, water regulation, sediment retention and cultural services. In one example presented from Chile, the combined estimated annual value of ecosystem services in a specific area was comparable in magnitude to the area's measured economic output.

He suggested that, conceptually, such valuation could underpin an incentive structure in which activities that restore ecosystem services are rewarded while activities that degrade them face a corresponding cost. This could create a fiscal mechanism in which payments for restoration are financed by charges on activities that damage nature, rather than relying entirely on general government expenditure. He was careful to frame this as a proposition rather than an established optimal policy, emphasizing that considerably more work is needed to understand what effective nature-pricing frameworks should look like.

Dr. Albagli also highlighted the role of central banks as analytical institutions with credibility. Even where their mandates do not allow them to directly steer capital towards particular activities, they can develop evidence on the macroeconomic and financial consequences of nature loss and communicate why these are not merely environmental or ethical concerns. He argued that credible central-bank analysis can help build broader support for the policy measures that ultimately sit with governments and Ministries of Finance.

Looking ahead, he outlined ongoing NGFS work to strengthen nature-related macroeconomic modelling. This includes developing foundations for nature-economy scenarios and model-comparison exercises, as well as building analytical capacity within central banks. He highlighted the potential to adapt existing climate-macroeconomic

capacity-building approaches so that central-bank modelling teams can incorporate ecosystem services, nature dependencies and the impacts of economic activity on natural systems into their analysis.

Dr. Sam Mugume Koojo emphasized that the central question for the Coalition is whether global research and analytical advances ultimately change what Ministries of Finance do at country level. He stressed that the Coalition is member-driven and that success should therefore be judged by whether ministries are able to use their existing economic and fiscal levers differently as a result of better understanding nature-related risks and opportunities. Peer learning and the exchange of practical experience were identified as central to accelerating this process.

Drawing on Uganda's experience, Dr. Mugume Koojo highlighted work within the macroeconomic policy function to incorporate natural capital information into economic modelling and national accounting. He emphasized that global estimates of the economic impacts of climate and nature loss are useful, but that Ministries of Finance need country-specific analysis to understand what those figures mean for their own economies, including productivity, employment, growth, public expenditure and social outcomes. The challenge is therefore to move from global evidence towards indicators and models that can directly inform national policy.

He stressed the importance of translating nature-related impacts into the language already used by Ministries of Finance. For Ministries of Finance, the relevant entry points include fiscal sustainability, public investment, revenue mobilization, sovereign risk management and financing. For central banks, the relevant considerations include price and financial stability, risk assessment and banking-sector resilience. Dr. Mugume Koojo argued that the value of collaboration lies in combining these perspectives so that decision-makers can understand the full economic implications of nature-related risks rather than viewing fiscal and financial channels in isolation.

He also emphasized that nature-related analysis needs to move beyond risk measurement towards policy implementation. The Coalition's work includes natural capital accounting, adjusted macroeconomic indicators, investment pathways and the role of private finance. Yet the critical question remains how this knowledge changes policy structures and day-to-day operations within Ministries of Finance. In his view, the success of the NGFS-CFMCA collaboration should ultimately be measured by whether countries adopt different policies, improve economic decision-making and mobilize greater flows towards resilience and nature-related investment.

The subsequent exchange underscored some of the practical and political difficulties involved in implementing nature-related pricing and investment policies. Dr. Albagli reiterated that a fiscally neutral mechanism could, in principle, charge activities that damage ecosystem services and use those revenues to reward activities that restore them. However, he acknowledged that such policies ultimately raise consumer prices and therefore face significant political-economy constraints. The issue is not only designing an economically coherent instrument, but sustaining public and political support for it.

Dr. Mugume Koojo added that these challenges are particularly acute for developing economies seeking to attract private investment. If one country internalizes environmental costs while neighbouring economies do not, this may affect perceived competitiveness and investment decisions. Ministries of Finance must therefore balance the need to improve environmental incentives with concerns around growth, investor attraction, domestic revenue mobilization, borrowing costs and limited fiscal space. He stressed that this strengthens the need for practical, context-specific approaches rather than assuming a single policy instrument will work uniformly across countries.

Overall, the session highlighted a clear division of comparative advantage. Central banks can deepen the analysis of macroeconomic and financial transmission channels, strengthen modelling and communicate the materiality of nature-related risks. Ministries of Finance have broader fiscal, investment and cross-government policy levers that can shape incentives and economic behaviour. The opportunity for the NGFS-CFMCA partnership is to connect these capabilities so that improved analysis translates into practical policy change at country level.

Elena Triebkorn, NGFS Expert Network on Data / Deutsche Bundesbank

Ms. Triebkorn presented the work of the NGFS Expert Network on Data on the practical challenges involved in obtaining and using nature-related data. The Expert Network has sought to identify common data needs across

different applications, including macroeconomic analysis, financial supervision and monetary policy, and to understand which metrics can be useful across several institutional mandates.

She highlighted significant gaps in the availability, quality and geographic coverage of nature-related data, particularly in the Global South. Biodiversity inventories tend to be stronger in more accessible locations, while heavily forested and remote areas can be substantially underrepresented. Monitoring in these locations is also more expensive. Other challenges include limited third-party verification of proprietary datasets, insufficient spatial resolution, infrequent updating and the additional complexity created by interactions between climate and nature-related risks.

Ms. Triebkorn stressed that these constraints should not prevent institutions from beginning analysis. She highlighted collaboration as an important part of the solution, including cooperation between central banks, governments, international institutions and the private sector. One example presented was work undertaken by Bank Negara Malaysia and the World Bank to assess nature-related financial risks, which identified the need for financial institutions to integrate nature into risk assessments, improve environmental data collection and monitoring, and develop more centralized environmental databases.

She also highlighted the potential for new technologies and approaches to close data gaps. Machine learning, deep learning, geospatial information and satellite data can all strengthen nature-related analysis, although they can be computationally intensive. Greater use of open-source data could reduce reliance on proprietary providers and improve transparency and accessibility. She emphasized that data should be findable, accessible, interoperable and reusable, and called for more systematic approaches to classifying data gaps, greater use of citizen science and local data, including non-English sources, and targeted investment in biodiversity monitoring in data-scarce regions.

Sjoerd van der Zwaag, De Nederlandsche Bank

Mr. van der Zwaag from De Nederlandsche Bank (DNB) reflected on DNB's practical experience of developing nature-related analysis, including its early dependency assessment, subsequent scenario work, development of indicators linking nature-related risks to credit and market risks, and a TNFD pilot. Rather than focusing primarily on the obstacles to undertaking this work, the intervention highlighted the institutional conditions that had enabled DNB to make progress.

A first lesson was the importance of creating space for experimentation. When DNB began its early work, it was not clear whether the available methodologies and data would be sufficient to construct meaningful scenarios or quantify risks. Allowing teams to experiment, even where the eventual outputs might be imperfect, enabled analytical capacity to develop over time. A second lesson was the value of publishing and communicating work despite its limitations. Making early analysis available allowed other institutions to build on it and contributed to wider methodological development.

The intervention also stressed that increasingly complex analysis is not necessarily more useful if decision-makers cannot understand it. DNB's more sophisticated recent work may be analytically stronger, but its earlier and simpler dependency study continues to generate greater engagement. This underlined the importance of translating nature-related analysis into concise and understandable messages that supervisors and other decision-makers can use.

Finally, the representative emphasized institutional collaboration. DNB's work had generated cooperation with environmental agencies, while greater collaboration with Ministries of Finance could similarly improve analysis. Ministries of Finance hold information that can be directly relevant to central-bank assessments, including expenditure reviews and analysis of environmentally harmful subsidies that may help identify transition risks. National biodiversity strategies, action plans and biodiversity finance plans were identified as another possible area where Ministries of Finance and central banks may need to better understand their respective roles and how their work intersects.

Karen Ellis, Chief Economist, WWF-UK

The WWF-UK presentation focused on the practical application of the **WWF Risk Filter Suite**, including the Biodiversity Risk Filter and Water Risk Filter. The freely available tools combine location-specific information on the state of nature with information on corporate activities to help companies, investors and financial institutions identify physical and reputational nature-related risks. The biodiversity tool includes more than 50 site-specific metrics and has been linked with geospatial data covering approximately two million corporate assets.

The presentation illustrated how granular geospatial information can translate broad nature-related concerns into specific economic and investment risks. Water stress, for example, can be overlaid with the location of water-intensive semiconductor facilities to identify places where future water constraints could affect commercial viability. Similar approaches can assess landslide exposure or identify agricultural areas where declining pollinator habitat may pose risks to future crop yields. The Risk Filter Suite has already been used by thousands of organizations globally.

The tools also have potential applications for Ministries of Finance, central banks and supervisors. These include identifying geographic concentrations of nature-related risk, assessing potential sources of food-price inflation, examining systemic risks where multiple firms compete for a threatened natural resource, reviewing the exposures of regulated financial institutions and assessing nature-related risks in central-bank collateral portfolios. The intervention therefore demonstrated how highly localized nature data can be aggregated and connected to macro-financial questions without losing the underlying spatial dimension of the risk.

Mario Iván Domínguez Rivas, Director of Public Debt Policy, Ministry of Finance, Mexico

Mr. Domínguez Rivas presented Mexico's approach to measuring and managing the fiscal consequences of natural disasters and climate-related risks. He organized the presentation around three dimensions: understanding the economic costs of disasters; tracking the financial resources allocated to prevention and response; and establishing indicators to measure progress towards longer-term climate and resilience objectives.

He emphasized that the economic consequences of disasters extend beyond the immediate value of damaged physical assets. Drawing on the experience of hurricanes affecting Acapulco, he noted that physical reconstruction costs can be estimated relatively directly, but disasters can also have longer-lasting effects on tourism, confidence and perceptions of safety. Faster and more credible recovery can therefore reduce future economic losses by restoring confidence in affected locations. This strengthens the economic case for preparedness and resilience investment before disasters occur.

Mr. Domínguez Rivas also outlined financial instruments used by the Mexican government to manage these risks. These include thematic sovereign issuance, where proceeds are linked to specified green and social expenditures, as well as catastrophe insurance and catastrophe bonds designed to provide financing following earthquakes, volcanic eruptions, floods, hurricanes and other natural disasters. These instruments form part of a broader approach to managing the fiscal consequences of climate and disaster risks rather than relying entirely on ex-post budget reallocations.

He further described the use of indicators within Mexico's National Development Plan to track objectives related to the clean-energy transition, water security and climate resilience, emissions reductions and environmental protection. The overall approach combines financial risk management with longer-term planning and measurable policy objectives.

Professor Josh Ryan-Collins, UCL Institute for Innovation and Public Purpose

Professor Ryan-Collins presented research examining the relationship between global financial flows and critical ecosystems approaching potential tipping points. He emphasized that ecological tipping points differ from conventional economic shocks because relatively small additional pressures can trigger abrupt and potentially irreversible changes in ecosystem functioning. The Amazon rainforest was used as a prominent example: beyond a critical threshold, degradation driven by climate change, deforestation and other pressures could produce a regime shift that could not realistically be reversed within an economically meaningful time horizon.

A central argument was that conventional macroeconomic and macro-financial models are poorly equipped to capture these dynamics. Such models often assume relatively smooth relationships and substantial substitutability between different inputs. These assumptions become problematic when applied to critical ecosystems, where losses can be nonlinear and natural systems cannot necessarily be replaced by additional capital, labour or technology. As a result, conventional modelling approaches may systematically underestimate the economic consequences of nature-related hazards.

Professor Ryan-Collins argued that this also creates difficulties for traditional financial-risk approaches. Attempting to estimate precisely the balance-sheet loss to an individual financial institution from the collapse of an ecosystem such as the Amazon may be both analytically difficult and conceptually too narrow. An alternative is to examine the financial flows supporting economic activities that contribute to ecosystem degradation. This shifts the analysis towards both the financial institution's exposure to ecosystem collapse and its contribution to increasing the probability of that collapse, bringing an impact or double-materiality perspective into macro-financial analysis.

The research examined financial flows connected to four critical ecosystems: the Amazon, Indonesian mangroves and tropical peatlands, and boreal forests in Canada and Russia. Because detailed firm-level data linking finance directly to individual instances of ecosystem degradation remain limited, the analysis used commodity sectors strongly associated with land-use change, including soy and beef production in Brazil, palm oil and shrimp in Indonesia and forestry in Canada and Russia. It then traced bank lending, syndicated loans, bond financing, underwriting and equity investment supporting companies operating in these sectors.

The results revealed important international dimensions. A substantial share of financing to firms associated with Amazon deforestation originated outside Brazil, particularly from financial institutions in the United States and Europe. Financing linked to Indonesian ecosystems showed a different pattern, with a larger share originating from Indonesian and other Asian financial institutions. Across the analysis, flows were relatively concentrated among a limited number of large financial institutions.

This concentration creates a potential regulatory entry point, but Professor Ryan-Collins highlighted an important materiality mismatch. Financing associated with ecosystem degradation may represent only a very small share of an individual global bank's balance sheet and therefore appear immaterial from a conventional microprudential perspective. Collectively, however, those flows can contribute to degradation of ecosystems whose collapse could have major macroeconomic and financial consequences. The research therefore points towards a potentially greater role for macroprudential policy, including consideration of systemic capital buffers, restrictions or limits on certain financing and underwriting activities, prudential transition plans and adjustments to collateral or asset-purchase frameworks.

Gerry Sulaiman, Ministry of Finance, Indonesia

Mr. Solomon reflected on Indonesia's experience of integrating climate and nature-related considerations across economic and financial institutions. He noted that much of the financing linked to environmentally sensitive sectors in Indonesia comes through domestic banks, including state-owned institutions, making coordination across government and financial authorities particularly important.

He highlighted Indonesia's Financial System Stability Committee, which brings together the Ministry of Finance, central bank and financial-services authority, as an important institutional mechanism for this coordination. Technical teams meet regularly to develop and calibrate data, macroeconomic models and financial-sector policies. This cooperation has included work on sustainable finance taxonomies and on developing green elements within macroprudential liquidity policy.

Mr. Solomon emphasized, however, that the challenge is not simply one of obtaining better data. Nature and climate remain difficult issues to mainstream among conventional macroeconomists and financial-sector officials. Building understanding across teams and incorporating these issues into established macroeconomic models therefore requires sustained institutional engagement, technical capacity and internal persuasion.

He also highlighted the importance of framing nature in terms of economic opportunities rather than risks alone. In his experience, risk-based arguments can be difficult to integrate into policy discussions dominated by growth, macroeconomic stability and financial-sector objectives. Presenting nature through the opportunities associated with investment, economic development and new sources of growth has proved more effective in gaining attention under the new administration. This suggested that successful mainstreaming depends not only on stronger data and models, but also on communicating the economic relevance of nature in terms that resonate with policymakers' existing priorities.

Norbert Holczinger, Head of Sustainable Finance Department, Central Bank of Hungary

Mr. Holczinger presented the Central Bank of Hungary's approach to assessing and integrating nature-related risks into financial supervision. He explained that this work forms part of a broader institutional commitment to sustainability. The Central Bank launched its Green Programme in 2019 to strengthen understanding of the relationship between environmental risks and the financial sector, received a green mandate in 2021, and subsequently reinforced this commitment through its supervisory strategy. The decision to develop dedicated work on biodiversity and nature-related risks therefore emerged from an established strategic and supervisory framework.

In 2022, the Central Bank launched a dedicated project in cooperation with the OECD and European Commission with two objectives: first, to develop a supervisory framework that could potentially be used by other central banks and supervisory authorities; and second, to assess nature-related risks within the Hungarian financial system. The project began by identifying relevant activities, metrics and data, before developing a supervisory framework and applying it to the domestic financial system. The methodology followed three broad steps: identifying nature-related risk factors and exposed sectors; assessing their potential impacts on the real economy; and examining how these impacts could subsequently transmit into the financial sector.

The analysis demonstrated substantial links between the Hungarian financial system and ecosystem services. Mr. Holczinger reported that nearly 80 percent of corporate loans were associated with activities with a high impact on ecosystem services, while around 40 percent were associated with activities highly dependent on ecosystem services. Agriculture and manufacturing were identified among the sectors with particularly significant exposure. The results were broadly consistent with the earlier ECB analysis presented during the workshop and demonstrated that nature-related dependencies and impacts are sufficiently widespread to be relevant to financial supervision.

Water emerged as a particularly important source of risk. Given its significance to the Hungarian economy, the Central Bank developed a drought stress test using scenarios differentiated by the duration of drought conditions. The exercise sought to trace the consequences of water stress through the real economy and into the financial system. The analysis suggested that severe drought scenarios could have significant effects on economic output, estimated at approximately 4 to 7 percent, while also affecting price stability through changes in agricultural prices.

The analysis then examined how these macroeconomic impacts could translate into credit risk. Under the drought scenarios, non-performing loan ratios increased materially, illustrating a concrete transmission channel from the degradation or disruption of an ecosystem service, through economic activity and prices, and ultimately onto financial-sector balance sheets. The exercise therefore moved beyond simply mapping financial-sector dependencies on nature towards quantifying how a specific physical risk could affect macroeconomic and financial outcomes.

Mr. Holczinger emphasized that the project was not treated as a one-off analytical exercise. Following its completion, the Central Bank continued to collect information and develop its nature-related work in line with the recommendations emerging from the project. It has introduced a dedicated nature chapter into its TCFD reporting and is working to develop indicators that can be used to monitor nature-related risks within the Hungarian financial system over time.

The experience illustrated a practical pathway for moving from an initial recognition of nature-related dependencies towards their integration into established supervisory processes: identifying dependencies and impacts, determining

the sectors most exposed, developing scenarios around specific ecosystem risks, assessing their macroeconomic and financial consequences, and ultimately establishing indicators through which those risks can be monitored on an ongoing basis.

Dr. Shah Abdul Saadi, Ministry of Finance, Bangladesh

Dr. Saadi emphasized the fundamental importance of nature to Bangladesh's economy, livelihoods and long-term development. He noted that agriculture formally accounts for around 11 percent of GDP and 44.5 percent of employment, but stressed that these figures significantly understate the wider dependence of the economy on land, water, biodiversity and ecosystem services, particularly through the informal economy and subsistence livelihoods. For a densely populated delta economy such as Bangladesh, natural systems are therefore not peripheral to economic activity but deeply embedded in production, employment and social welfare.

He highlighted the scale of environmental degradation already taking place, pointing to the loss of green cover in Dhaka and using this as an illustration of broader pressures associated with rapid urbanization and economic growth. His broader point was that the economic importance of nature is often difficult to measure precisely, even when the physical degradation is clearly visible. This creates an immediate challenge for policymakers seeking to reflect nature-related risks in economic and fiscal decision-making.

A central theme of Dr. Saadi's presentation was the complexity and fragmentation of the policy landscape. Bangladesh has multiple overlapping frameworks covering adaptation, nationally determined contributions, REDD+, land degradation neutrality, biodiversity, conservation and sustainable development. These frameworks sit across different international processes and domestic institutions, each with different mandates, priorities and interests. Dr. Saadi argued that stronger synergies are therefore essential. He cautioned that, without sufficient coordination and a clear evidence base, there is a risk of "policy on top of policy", with duplication and redundancy rather than coherent implementation.

He used the preparation of Bangladesh's forthcoming National Biodiversity Strategy and Action Plan as an example. In reviewing the draft, he had specifically looked for evidence on the status and degradation of biodiversity that would substantiate the policy direction, but found that the underlying data were not sufficiently clear. For Dr. Saadi, this illustrated a broader principle: policy needs to be informed by the data and evidence available, rather than becoming detached from the underlying diagnosis of the problem.

Turning to public finance, Dr. Saadi described Bangladesh's existing climate-finance architecture. The country has a Climate Fiscal Framework for the public sector, alongside policies and guidance for financial institutions intended to support green and sustainable financing. Climate-relevant ministries are identified within the budget, and their climate-related allocations are tracked and reported. For the current fiscal year referenced in the presentation, climate-related allocations represented around 11 percent of the combined budgets of 25 identified ministries, with the majority of financing coming from domestic resources and a substantial share directed towards adaptation.

At the same time, he stressed the size of the financing gap. Bangladesh faces very substantial annual requirements to implement its adaptation, mitigation and broader climate-development plans, while available resources fall far short of those needs. This gap is becoming harder to address as debt rises and fiscal space becomes increasingly constrained. Dr. Saadi therefore linked the nature and climate agenda directly to wider questions of fiscal sustainability and the ability of developing countries to finance structural transformation without further weakening their public finances.

This fiscal constraint reinforced what he described as the need to move from viewing climate and nature finance through a charity lens towards an investment perspective. Public finance alone cannot meet the scale of investment required, and private finance will therefore need to play a much larger role. For this to happen, countries need credible evidence showing both the costs of degradation and inaction and the returns from investment. He pointed to the growing role of private green finance in Bangladesh, including investment in energy efficiency, waste management, green buildings and climate-smart agriculture, and highlighted the importance of Bangladesh Bank's

policies in helping to direct financial flows towards activities linked to the natural-resource base underpinning economic development.

Dr. Saadi then turned to the limitations of existing macroeconomic modelling. Bangladesh already incorporates a number of shocks into its macroeconomic analysis, including oil-price shocks, revenue shortfalls, inflation and extreme flooding. However, the models still capture only a small part of the country's actual exposure. For example, an extreme flood may be modelled once over a ten-year period, while Bangladesh simultaneously faces recurrent heatwaves, droughts, cyclones and other hazards. These risks can also interact, creating compound and systemic effects that are not adequately captured when individual shocks are modelled separately.

He argued that responsibility for identifying these risks cannot sit with the Ministry of Finance alone. Sector ministries have the technical knowledge, research capacity and operational understanding required to assess vulnerabilities within agriculture and other productive sectors. Their role should be to identify the risks facing production, determine where vulnerabilities lie and define what greater resilience would require. Once these risks are translated into sectoral priorities, the Ministry of Finance can integrate them into fiscal planning through instruments such as the Medium-Term Budgetary Framework. This would allow sector-specific resilience needs to be reflected in multi-year revenue and expenditure planning rather than treated as isolated environmental concerns.

Dr. Saadi's final argument focused on governance and institutional capability. He suggested that the scientific case and much of the economic rationale for action are increasingly clear; the more difficult questions concern who is responsible for implementation and whether institutions have the capabilities required to deliver. Temporary projects can generate useful analysis and interventions, but once they end, underlying institutional structures may remain largely unchanged. Transformative change therefore requires addressing deeper structural and systemic barriers, strengthening skills and capabilities within public institutions, and moving from temporary projects towards permanent changes in how government operates.

For Dr. Saadi, this is ultimately a question of institutionalizing resilience. Nature-related risks need to move from being treated as discrete projects or external environmental concerns towards becoming part of the permanent machinery of economic planning, sector policy and fiscal decision-making. In that sense, the challenge is not only to improve data and modelling, but to build institutions capable of using that information systematically over time.

Maria Waaifort, CETEx

Ms. Waaifort examined the potential for greater coordination between Ministries of Finance and central banks on nature, focusing on where their respective mandates already interact, even when those interactions are not formally described as coordination. She noted that CETEx has been examining monetary and fiscal interactions on nature, including what Ministries of Finance and central banks are doing separately, where their mandates intersect, and where formal or informal coordination is already taking place. Her central argument was that these interactions already exist; the question is whether they are managed deliberately and systematically.

Her first example concerned nature-related financial supervision and corporate disclosure. Ms. Waaifort highlighted significant progress in the European Union, where banks are increasingly recognizing nature as material to their risk frameworks and prudential regulators and supervisors are strengthening their approaches to nature-related risks. However, the ability of supervisors to assess those risks depends heavily on the availability, quality and scope of nature-related data, which in turn depends partly on decisions made by governments about corporate disclosure requirements.

She illustrated this interaction through the European debate over scaling back Corporate Sustainability Reporting Directive disclosure requirements. The European Central Bank had raised concerns that reducing the number of required data points could impair its ability to conduct effective financial supervision. Ms. Waaifort argued that this provides a clear example of how a government decision in one policy area can have downstream consequences for the ability of a central bank or supervisor to fulfil its mandate. The ECB publicly identifying this connection was, in her view, an example of healthy institutional dialogue rather than overreach. However, she noted that such interactions currently tend to be reactive and episodic rather than structured and anticipatory.

Her second example focused on food systems, where nature degradation provides a particularly clear illustration of the intersection between monetary and fiscal policy. Degraded soils, water stress and declining pollination and biodiversity can erode the productive capacity of food systems, creating structural supply-side pressures. These pressures compound existing volatility associated with climate change and geopolitical developments and could contribute to a world of more frequent, severe and persistent food-price shocks.

These shocks cut directly across institutional mandates. Central banks face the consequences through price stability, while Ministries of Finance confront implications for household affordability and fiscal resilience, including pressure to provide fiscal support in response to rising prices. CETEx has therefore been examining historical policy responses to supply-side shocks to understand how different institutions respond and where greater coordination could potentially improve outcomes.

Ms. Waaifort highlighted what CETEx describes as a “temporality puzzle”: policy frameworks may contain a systemic bias towards responding to shocks after they occur rather than investing beforehand in prevention, adaptation and resilience. Governments may respond to a food-price shock with emergency fiscal measures while central banks respond through monetary tightening. These interventions can stabilize the immediate situation, but Ms. Waaifort stressed that post-shock stabilization should not be mistaken for resilience. If the degradation of soils, water systems, pollination or biodiversity that contributed to the shock remains unaddressed, the underlying structural vulnerability also remains.

This creates an important fiscal trade-off. In a context of increasingly frequent supply-side shocks and constrained fiscal space, crisis response and resilience investment can effectively compete for the same resources. Immediate crises naturally receive greater attention because their impacts are visible and politically urgent, while the returns from resilience investment tend to be longer-term and more diffuse. Existing policy frameworks may therefore systematically favour spending on the consequences of shocks over investments that could reduce vulnerability to future shocks.

Ms. Waaifort argued that neither institution necessarily has full visibility of this problem when pursuing its mandate in isolation. Central banks have analytical capabilities that can help identify supply-side vulnerabilities and make the longer-term trade-offs between crisis response and resilience visible. Ministries of Finance, meanwhile, have budgetary authority and cross-government coordination powers that allow them to influence the investments needed to address those vulnerabilities. Greater sharing of analytical capabilities and sustained dialogue between the two institutions could therefore help connect the diagnosis of structural risks with the fiscal and policy tools needed to address them.

She concluded that the nature dimension may make this challenge particularly important because nature degradation can accumulate over time and become increasingly difficult to reverse. The cost of capital can itself influence food-system transformation, land-use decisions and investment in ecosystem services, creating further interactions between monetary conditions and longer-term resilience. Ultimately, central banks require sufficiently stable supply-side conditions to maintain price stability over the medium term, while Ministries of Finance require resilient economies to maintain fiscal sustainability. Both objectives therefore depend partly on structural investments in resilience and natural assets that the current institutional architecture may not systematically make the case for.