Michael Theurer: The environment and the banking sector - a new set of challenges from climate change and loss of biodiversity

Speech by Mr Michael Theurer, Member of the Executive Board of the Deutsche Bundesbank, at the Research Conference "Climate- and nature-related risks in the economic and financial system", jointly organized by the Deutsche Bundesbank and Bank of France, Paris, 12 March 2026.

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1 Introduction

Ladies and gentlemen,
distinguished colleagues,

dear hosts and partners from the Banque de France, the Paris School of Economics and the Toulouse School of Economics,

it is a great pleasure and an honour to open this Research Conference on Climate- and Nature-Related Risks in the Economic and Financial System here in Paris.

We meet at a time when the scientific evidence on climate change and environmental degradation is painting an ever more sobering picture. At the same time, new political realities and challenges have pushed the topic off many policymakers' agendas.

Both factors increase the expectations placed on the financial sector as a whole. Yet we should be careful about what we ask of central banks and supervisors in this context. The more they move beyond their core mandates – price stability and financial stability – and into areas that are the domain of elected governments and parliaments, the greater the risk that their independence will be called into question.

Our engagement on climate- and nature-related risks is therefore firmly grounded in our mandate: we act where these risks are relevant to price and financial stability, and we are mindful of the boundaries beyond which others must lead. This conference is therefore both timely and necessary.

I would like to structure my remarks today using three main points:

First, the Paris Agreement target of limiting global warming to 1.5 degrees Celsius is now, according to most current models, likely out of reach – and this has profound implications for our economies and financial systems.

In light of this and second, the costs of adaptation are moving further into focus, including their impact on banks' risk management and on financial stability – which is my second point.

Third, financial risks from environmental damage do not stem from climate change alone. The loss of biodiversity and ecosystem services might also pose financial risks that should be incorporated into risk management and supervisory frameworks.

Let's start by doing a stock take.

2 The 1.5-degree target: from ambition to reality

When the Paris Agreement entered into force 2016, the goal of limiting global warming to well below 2 degrees Celsius – and pursuing efforts to limit it to 1.5 degrees – was rightly hailed as a historic achievement. It provided a clear, quantitative anchor for climate policy, for corporate strategies and, increasingly, for financial market expectations.

Today, almost a decade later, the scientific consensus is sobering. Most current climate models and scenario analyses indicate that the 1.5-degree target is now virtually unattainable. Based on IPCC methodology[1] and current data, research suggests that the remaining carbon budget will be used up in three years at today's emission levels.[2]

This is not a cause for resignation. It is a cause for realism and action.

Realism means acknowledging that we are likely to face a world with more frequent and more severe physical impacts of climate change: more heatwaves, more droughts, more floods, more storms, and more gradual but profound changes such as rising sea-levels.

Realism also means recognising that the transition to a low-carbon economy is still indispensable. Every fraction of a degree of warming that we can avoid will reduce human suffering and economic damage. The difference between 1.5 and 2 degrees is substantial; the difference between 2 and 3 degrees is even greater. Mitigation remains essential.

But realism also implies that adaptation – in other words, preparing our economies, our societies and our financial systems for a warmer and more volatile climate – must become the focus of our attention.

For commercial banks, central banks and supervisors, this shift has important implications. It means that we must not only consider transition risks arising from climate policy and technological change, but also the physical risks that will materialise as the climate continues to change – and the adaptation measures that will be required in response.

The logic here is straightforward: the less we succeed in limiting man-made climate change through globally coordinated action, the greater and more material the physical risks become – for our economies, for financial stability, and for the institutions responsible for safeguarding it.

3 Adaptation costs and the financial system

If the 1.5-degree target is now, in most models, virtually out of reach, the question is no longer whether we will have to adapt, but by how much, how fast – and at what cost. This adaptation will also affect the financial sector.

The IPCC defines climate adaptation as "the adjustment of natural or human systems in response to actual or expected climate change." Effective adaptation can limit damage, support resilience and reduce economic spillovers – but there are always trade-offs between adaptation costs, benefits and the residual risks that remain.

These trade-offs are no longer abstract. Companies are already implementing concrete adaptation measures. Examples of these include flood protection for transformer stations in the energy sector, the reinforcement of network infrastructure in telecommunications, and insurance and retrocession solutions to hedge against loss peaks[3]. Such measures illustrate both the necessity and the complexity of adaptation.

At the same time, they reveal several dimensions of adaptation risk that are highly relevant for the financial system.

Some firms classify extreme weather events as "likely" and quantify potential losses as being in the hundreds of millions of euro, in some cases – yet they have still only undertaken limited protective investment measures. They consciously accept the remaining risks of outages and damages.

For banks, this means that even where risks are recognised, they may not be fully mitigated, and significant residual risks remain on bank's balance sheets.

Similarly, insurance cover can provide short-term relief, but it may prove deceptive if reinsurers raise risk premiums sharply or restrict coverage. Some firms are already reacting – for example, by modelling climate risks more intensively or by setting up their own insurance companies, called captives, to stabilise premiums. For banks, this raises the question of how sustainable current insurance solutions really are as a risk mitigant over the medium term.

What's more, many corporate risk assessments focus on individual sites. But climate shocks rarely stop at the factory gate. They affect employees, suppliers and shared infrastructure. Repeated events increase both the frequency and the correlation of losses. This undermines conventional point-in-time risk assumptions and can turn what appear to be isolated risks into system-wide stress.

In addition, future extreme climate events cannot simply be recognised as provisions under accounting standards. Provisions generally require a concrete obligation and a probability of occurrence of more than 50 per cent as at the reporting date. If companies do not establish dedicated investment programmes for adaptation, governance gaps can arise between the risks that are already recognised internally and the financial buffers actually in place. This is also relevant for banks' own balance sheets and for their assessment of clients.

From a macroeconomic perspective, adaptation is both a cost and a necessity. For low-income countries, extreme weather events linked to climate change are thought to have already reduced GDP by around 1 per cent per year on average between 2000 and 2019[4].

At the same time, the ECB notes that adaptation financing is severely underfunded compared with mitigation[5]. Only about 4 per cent of reported global climate financing currently goes into adaptation, and roughly 98 per cent of that comes from public sources.[6]

Private investment remains insufficient. The financial sector can play a crucial role in facilitating the financing of these private adaptation efforts. Instruments such as blended finance, catastrophe bonds and green bonds could be used here, but they are still at an early stage.

Whether adaptation investments are made to a sufficient extent will not be a marginal problem for central banks and supervisory authorities, as the resilience of the economy will also depend on it considering the physical risks stemming from climate change.

Research[7] suggests that almost one-third of euro area inflation volatility over the past few decades is attributable to climate-related harvest shocks.

Yet the financial sector is not sufficiently prepared. A recent study[8] that assessed 50 of the world's largest commercial banks across 17 indicators of climate adaptation maturity found that 88 per cent of these banks do not adequately address adaptation risks. Only seven institutions meet more than one-half of the criteria, and none meet them all. European banks tend to be ahead here, while many banks based in the United States and Australia are towards the bottom of the ranking.

Failing to act on adaptation therefore has direct implications for both price stability and financial stability.

For banks' risk management, the growing importance of adaptation means several things.

First, banks must understand physical climate risks – and the effectiveness of adaptation measures – at a much more granular level. This includes not only current hazards, but also how these will evolve over time, what residual risks will remain after adaptation, and how these risks aggregate across locations, sectors and value chains.

Second, they must help to finance adaptation. Banks, insurers, asset managers and capital markets will play a central role in mobilising and allocating capital for adaptation projects. This will create opportunities, but it also requires robust metrics, tools and disclosures to avoid mispricing and misallocation of capital.

Third, they must recognise that adaptation and innovation are two sides of the same coin. Climate change does not only create risks – it also drives demand for new technologies, business models and financial products. From climate-resilient

infrastructure to drought-resistant agriculture, from advanced early-warning systems to next-generation flood defences, the transition to a more resilient economy will require substantial investment in innovation. Estimates value the potential revenue opportunities for banks and financial institutions from financing the transition at 44 billion US-Dollar annually through 2030[9].

Fourth, the financial sector itself can be an enabler of green innovation beyond its traditional lending role. Novel instruments – such as sustainability-linked loans, blended finance structures, or dedicated climate-tech financing vehicles – can help close the funding gap that public sources alone cannot fill. Financial institutions that build this expertise early will manage their own transition risks more effectively and gain a genuine competitive advantage.

This means that the challenge of climate adaptation, while significant, also represents one of the most consequential investment and innovation opportunities of our time. A financial system that merely absorbs climate shocks is not enough – we need one that actively finances the solutions to them.

Regulatory and supervisory authorities, too, have work to do. Metrics and tools for measuring and disclosing adaptation should be improved. We also need to examine whether supervisory and regulatory frameworks need to be adapted.

At Bundesbank, we are working with our European and international partners to deepen our understanding, to develop methodologies for analysing physical and transition risks – including adaptation-related aspects – and to integrate them into our analytical and supervisory work.

We need to bridge the gap between the scale of the challenge and the current state of practice. Only then can the financial system remain resilient in a world where adaptation is no longer optional, but unavoidable.

4 Beyond climate: nature and ecosystem services

So far, I have focused mainly on climate change, but this is only one dimension of the broader environmental challenges we face. The loss of biodiversity and the degradation of ecosystems are equally pressing issues – and they, too, have significant implications for the economy and the financial system.

Ecosystems provide a wide range of services that underpin economic activity: pollination, water purification, soil fertility, flood protection, carbon trapping and storage, and many others. These services are often taken for granted and not priced in markets. But when they are degraded or lost, the economic consequences can be substantial.

For example, the decline of pollinators can affect agricultural yields and food prices. Deforestation can increase the risk of floods and landslides, damaging infrastructure and property. The degradation of wetlands can reduce natural flood protection and water filtration, creating costs to construct storm surge barriers and purify water. Overfishing and coral reef loss can undermine fisheries and tourism.

If certain ecosystem services are no longer available in future, or only to a limited extent, this may give rise to economic and financial risks. Such nature-related risks can be reflected in banks' loan portfolios and thus affect the stability of the banking sector.

It can therefore be sensible for banks to take the role of ecosystem services into account in their risk assessments and strategic planning.

Our experts at the Deutsche Bundesbank have recently produced an analysis examining to what extent German banks may be indirectly dependent on such ecosystem services through their lending to non-financial firms. Such analysis helps to deepen our understanding of financial risks arising from the degradation of natural resources. The study also investigates whether these dependencies differ across categories of banks.[10]

In this study, data on bank loans are combined with information on how dependent the borrowing non-financial firms are on nature-related dependencies, measuring the strength of the link between corporate lending and ecosystem services. In total, 1,200 banks in Germany are analysed, covering an aggregate loan volume to non-financial firms of around €1.7 trillion as of December 2025.

The findings show that roughly half of banks' corporate loan volume exhibits a high dependency on at least one ecosystem service, with water-based ecosystem services playing a particularly important role.

Almost all of this loan volume is characterised by a high dependency on at least one water-based ecosystem service. This underlines the central importance of water as a prerequisite for economic activity, for example, through its provision and regulation. According to the German Environment Agency, Germany is among the regions with the highest water loss worldwide, even though it is not classified as being under water stress by European standards.

Among the different categories of banks, credit cooperatives and savings banks show the largest shares of loan volumes with at least one high dependency, both with respect to all ecosystem services and specifically to water-based services. One reason is that they allocate a larger proportion of their lending to sectors with at least one high dependency, in particular real estate activities.

A last year's survey of German less significant institutions by Bundesbank and BaFin showed that the surveyed institutions are now examining how ESG risks shape their main risk categories, like credit risk, market risk and operational risk.[11] That is a positive development, especially compared to earlier surveys.

I would encourage banks to keep this positive momentum going and also to examine their individual dependency on ecosystem services, as well as to develop strategies to incorporate risks from a loss of biodiversity into their risk management.

5 Conclusion

And with that, I would like to bring my remarks to a close.

The reality that the 1.5-degree target is now virtually unattainable in most models is a stark reminder of the urgency and scale of the challenges we face. It means that adaptation to a warmer world is no longer optional; it is inevitable. The costs of adaptation – and the risks of insufficient adaptation – will increasingly shape our economies and our financial systems.

For banks and supervisors, this implies a dual task: to manage the risks arising from both the transition to a low-carbon economy and the physical impacts of climate change, and to recognise that environmental risks extend beyond climate to the loss of biodiversity and ecosystem services.

This also means being clear about the limits of our role. Central banks and supervisors that stray too far beyond their mandates risk undermining the very independence that makes them effective. Our commitment to addressing ESG risks is firm – but it is grounded in, and bounded by, our responsibility for price stability and financial stability.

Beyond managing risks, supervisors must also recognise that banks have a role that goes further – financing the solutions, and channelling capital towards the innovation and investment needed to build a more resilient and sustainable economy. Banks that embrace this dual mandate, as both risk managers and enablers of innovation, will be better positioned to navigate the challenges ahead.

At the same time, we must broaden our perspective to include nature-related risks and the loss of ecosystem services. These risks are real, they are growing, and they are interconnected with climate risks. They must be incorporated into risk management and supervisory frameworks.

None of this can be achieved by central banks and supervisors alone. It requires the engagement of the entire financial sector, of policymakers, of businesses and of civil society. The insights and contributions of the research community are also needed.

This conference is an important step in that direction. You will be discussing cutting-edge research, sharing experiences and exploring new ideas. I am confident that the discussions taking place here today will help us to better understand the risks we face and to develop more effective responses.

On behalf of the Deutsche Bundesbank, I would like to thank our partners – the Banque de France, the Paris School of Economics and the Toulouse School of Economics – for organising this conference, and all of you for your commitment to this crucial topic.

I wish you a stimulating and productive conference.

Thank you very much.

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[1] See: https://www.ipcc.ch/report/ar6/wg2/chapter/summary-for-policymakers/

[2] Forster, P. M. et al. (2025), Indicators of global climate change 2024: Annual update of key indicators of the state of the climate system and human influence, Earth System Science Data, Vol. 17(6), pp. 2641–2680.

[3] Krapp, C., and A. Lauterjung, (19 December 2025), Unterschätzte Klimarisiken, Handelsblatt.

[4] Newman, R., and I. Noy (2023), The global costs of extreme weather that are attributable to climate change, Nature Communications, Vol. 14, 6076.

[5] Mongelli F. P., Ceglar A. and Scheid B. A. (2024), Why do we need to strengthen climate adaptations? Scenarios and financial lines of defense, ECB Working Paper No. 3005, European Central Bank.

[6] Buchner, B. et al. (2023), Global landscape of climate finance, Climate Policy Initiative.

[7] Peersman, G. (2022), International food commodity prices and missing (dis)inflation in the euro area, The Review of Economics and Statistics, Vol. 104(1), pp. 85–100, MIT Press.

[8] Climate X (2024), Climate X research shows 88 per cent of top global banks unprepared for climate-related disruptions, https://www.climate-x.com/articles/press-releases/top-50-banks-tackling-climate-adaptation

[9] See: https://www.bain.com/about/media-center/press-releases/2024/banks-to-play-a-pivotal-role-in-the-low-carbon-transition-contributing-up-to-$600-billion-annually-through-2030--bain--company/

[10] Study to be published in the Deutsche Bundesbank's Monthly Report April 2026.

[11] Survey Results to be published in the Deutsche Bundesbank's Monthly Report April 2026.