Policy brief – February 2025

Nature degradation and price stability

Implications and research questions for monetary policy

This policy brief has been written by
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Summary

- Nature degradation continues at an alarming rate globally.
- Policy interest in linking nature degradation to price stability is growing. Emerging work on climate and inflation, and studies of ecosystem services and their price impacts, offer a starting point for exploring the link from nature degradation to price stability.
- Deforestation, a significant cause of nature degradation, is a major source of risk as the global economy and financial system rely on the ecosystem services provided by forests.
- Disruption to forests' ecosystem services triggers cascading effects that can reverberate across macroeconomic indicators, affecting the economy through output, employment, investment, consumption and the trade balance, ultimately impacting prices.
- Nature-related transition risks can also drive price volatility in the short term, for example through policies to conserve nature and manage deforestation-linked supply chains.
- These price impacts can challenge central banks' traditional monetary policy tools, which typically focus on demand-side factors.
- The link between nature degradation and price stability raises questions around the time horizon of shocks, the supply chain impacts and the different ways in which the interaction of nature and climate shocks can affect prices.
- More research is needed to better understand the implications of nature degradation for monetary policy.

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Introduction

Nature degradation can negatively affect output, investment, employment, consumption and trade, with potential implications for price stability. This policy brief examines how nature degradation affects key macroeconomic indicators, with a focus on deforestation. It argues that central banks should consider the impacts of nature degradation alongside climate-related factors in monetary policy.

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Nature degradation, including deforestation, continues at an alarming rate, despite decades of international efforts to curb its drivers (WRI, 2024a). We place the spotlight on the economic consequences of deforestation, given its significance as a cause of nature degradation (IPBES, 2018). Forest loss is often driven by pursuit of economic activity in the agriculture, forestry, mining and infrastructure sectors, but can also be caused by wildfires. The global economy and financial system rely on the ecosystem services provided by forests and their disruption through deforestation is thus a significant source of risk (Almeida et al., 2024; Boldrini et al., 2023). The Amazon rainforest, for example, provides critical ecosystem services supporting agriculture, forestry, mining and pharmaceuticals, while also regulating the water cycle, soil quality and the climate (NGFS, 2024a). The impacts of deforestation in the Amazon and elsewhere include soil erosion, pollinator decline, and disrupted water, climate and disease regulation.

Both the disruption to the provision of ecosystem services and efforts to halt and reverse nature degradation can reshape economic activities. These actions generate physical and transition risks that impact the economy and financial system (NGFS-INSPIRE, 2022). Physical risks arise from the tangible impacts of nature degradation, such as reduced agricultural productivity or access to clean water, and increased vulnerability to disasters and diseases. Transition risks stem from evolving policy, market and consumer responses to nature degradation, such as stricter regulation to protect biodiversity or restrictions on imports associated with a high risk of deforestation. These physical and transition risks become material for central banks through a variety of channels. For example, they affect households by compromising health and livelihoods; firms by disrupting production processes or requiring costly adaptations; the macroeconomy by disrupting the provision of goods and essential services; and the financial system through non-performing loans, asset devaluations and operational disruptions (Almeida et al., 2024).

Nature degradation can have significant macroeconomic impacts, necessitating an exploration of their implications for price stability and monetary policy. Central banks' primary mandate to maintain price stability is one cornerstone of a stable economy. While there is increasingly strong evidence and, consequently, growing policy attention on how climate change can impact prices and fuel inflation, the link between nature degradation and prices remains underexplored.

This policy brief aims to bridge this gap by exploring nature's relevance for monetary policy, focusing on its links to prices and price stability through an analysis of the transmission channels of deforestation. Understanding these mechanisms is critical for central banks and policymakers to anticipate and adapt to (dis)inflationary pressures stemming from nature-related risks. Central banks are already integrating the economic impacts of climate change into their monetary frameworks; it is now imperative to broaden the scope to include nature degradation, which is an equally if not more persistent driver of economic volatility. We conclude by proposing key research questions for further work to advance an understanding of nature degradation in the monetary policy domain.

Links between nature degradation and prices

Understanding the links between nature degradation and price stability relies on a growing yet fragmented literature spanning three areas: climate change and price stability, emerging evidence of the link between nature degradation and prices, and research examining the macroeconomic impact of specific (forest) ecosystem services.

The literature on climate change and monetary policy provides a critical foundation for exploring nature-related risks. On physical risks, studies such as Kotz et al. (2024) have demonstrated how natural disasters and temperature rise can generate inflationary pressures. Beirne et al. (2024) map the dynamics of climate-induced inflation in the eurozone and demonstrate how weather-related shocks propagate through the economy, impacting price levels across sectors. The Network for Greening the Financial System (NGFS, 2024b) highlights that climate-related physical risks increasingly disrupt supply chains, depress output and heighten inflation volatility. The increasing frequency, severity and persistence of climate-induced supply shocks may increasingly generate persistent inflationary pressures, challenging traditional monetary policy frameworks (Barmes et al., 2024).

Transition risks associated with the green transition also affect price stability, as the the structural adjustments of the green transition present central banks with complex trade-offs between short-term costs and long-term stability (NGFS, 2024b). In a scenario analysis, the Banque de France shows that the green transition can drive inflation in the short term due to abrupt regulatory changes, financial market disruptions or asset devaluations but become disinflationary in the medium-to-long-run as the economy adjusts and green investment boosts productivity (Allen et al., 2023). While these works offer valuable conceptual insights for examining the price impacts of nature degradation, their focus remains confined to climate change.

There is growing policy interest in linking nature degradation to price stability, but efforts remain in their infancy. The European Central Bank (ECB) has begun to explore this link and estimates that 72% of euro-area non-financial companies face significant challenges under nature degradation scenarios, highlighting economic vulnerabilities from dependencies on nature (Boldrini et al., 2023). Other ECB research outlines how pollinator declines and soil erosion create physical risks that raise production costs, increase consumer prices, and disrupt global supply chains. That study also highlights nature-related transition risks, showing that policy changes such as land use restrictions can interact with physical risks to have "major implications" for price stability (Ceglar et al., 2024). Frank Elderson, a Member of the ECB's Executive Board, has emphasised the link between nature and prices, stating, "nature degradation and climate change are both relevant to our mandate and our monetary policy strategy" (Elderson, 2024). In addition, scenario analysis by De Nederlandsche Bank to assess transition risks shows that sudden regulatory shifts may depress GDP and drive inflation in the short term, while over time a gradual transition towards nature-positive investments can stabilise prices and limit financial risks (Prodani et al., 2023). But while the theoretical understanding of nature's relevance to price stability is growing, empirical evidence is largely absent.

Targeted studies of ecosystem services and their price impacts offer a starting point for comprehensively linking nature degradation to price stability. These studies examine how the degradation of individual services such as pollination, water filtration and temperature regulation affects macroeconomic variables. Existing research demonstrates how the loss of these services can affect agricultural production, thus pushing up food prices and affecting economic output (Bauer and Wing, 2016; Arellano Gonzalez et al., 2023). These studies illustrate the multifaceted ways in which disruption to ecosystem services can influence price levels, but they stop short of addressing the systemic pathways linking these disruptions to price stability within monetary policy frameworks.

"ECB research outlines how pollinator declines and soil erosion create physical risks that raise production costs, increase consumer prices, and disrupt global supply chains."

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Transmission channels from deforestation to prices

Deforestation disrupts ecosystem services critical to economic productivity, triggering cascading effects that reverberate across macroeconomic indicators. These disruptions can affect the economy through output, employment, investment, consumption and the trade balance, ultimately impacting prices. Table 1 starts to explore how nature degradation through deforestation can impact macroeconomic indicators and, subsequently, prices, considering specific transmission channels.

Table 1. Transmission of nature degradation to macroeconomic indicators and prices (using the example of deforestation)

Macro-economic indicator	Initial ecological and economic impact	Second-round effects	Propogation channel	Impact on prices
Output	• Soil erosion, pollinator decline, and decline in water availability affect production and limit output, e.g. water scarcity disrupts agriculture and energy production. • Disrupted carbon cycle exacerbates extreme weather events, while the erosion of natural hazard protection reduces resilience against them.	• Firms face higher costs of production inputs like water, pesticides, energy - and potentially wages due to labour market disruption. • Transition risk: firms face regulatory compliance costs due to increased regulation of forest-risk products and need to shift to sustainable practices.	• Ecosystem degradation limits output, e.g. soil erosion leads to lower crop yields and increased fertilizer use and costs. Increased natural disasters, e.g. floods and fires, disrupt agricultural and industrial outputs, and output decline due to disruptions in production and damaged capital.	• Supply-side inflationary pressure on prices of commodities (food, energy) in sectors affected by declining output. • Pass-through of higher production costs leads to cost-push inflation.
Employment	• Rising temperatures, incidences of diseases, air pollution (e.g. haze) and water pollution reduce labour productivity, supply and hours worked.	• Second-round effects not identified.	• Labour is less productive and produces less output, increasing prices of labour-intensive goods. • Heat stress and diseases reduce work hours or productivity, which can raise wage pressures (or lead to loss of income).	• Supply-side inflationary pressure due to rising labour costs and rising prices of labour-intensive goods. If wages do not adjust, disinflationary effects could emerge via the consumption channel.
Consumption	• Increased disease incidence and air pollution raise public and private healthcare and emergency response spending. • Water scarcity: higher costs for water treatment and access.	• Rising food prices for households due to reduced agricultural output. • Reduced real wages if wages fail to adjust or income is lost due to disease.	• Reduced disposable income leads to lower aggregate demand for non-essential goods. • Increased public spending in response to impacts of nature degradation, e.g. disease incidence drives up fiscal expenditures.	• Demand-side disinflationary pressure in the non-essential goods sector (dependent on effect of wage pressures).
Investment	• Nature degradation can lead to natural capital destruction and reduces productive capacity, requiring firms to invest in adaptation strategies (e.g. irrigation, pest control, alternative crops). • Transition risk: new regulations shift capital allocation incentives.	• Public borrowing may increase to finance government responses to nature-related crises (e.g. adaptation infrastructure, water management, flood insurance and nature conservation).	• Short-term: firms demand capital for adaptation expenditure, and face regulatory compliance costs or uncertainty and stranded assets in industries reliant on ecosystem services (e.g. agriculture, forestry, mining). • Medium-to-long-term: capital reallocation into nature-positive business models to tackle nature-related risks.	• Short-term: increased volatility, with inflationary pressure as firms' capital demand rises to adjust to nature-related physical and transition risks, but potential disinflationary pressure as other investments are put on hold. • Medium-to-long-term: disinflationary effects as investments in nature resilience enhance productivity and efficiency.
Trade	• Supply chain disruptions due to the degradation of ecosystem services. • Declining output in ecosystem-dependent sectors (e.g. agriculture) leads to declining exports. • Increased import dependency for affected commodities (e.g. food, energy).	• Reduced export revenues and increased import dependency worsen the trade deficit, leading to pressures on currency stability and debt sustainability.	• Supply chain channel: output disruptions propagate through global supply chains. • Exchange rate channel: lower foreign exchange earnings lead to currency depreciation in free floating regimes.	• Supply chain channel: reduced supply of goods leads to price pressures both domestically and globally due to interconnected supply chains. • Exchange rate channel: inflationary press ures from currency depreciation, with potential secondary amplifying effects such as cost-push inflation and wage-price spiral risk.

Table 1 is a first exploration, highlighting how nature degradation can influence price stability through both supply- and demand-side channels, with a prominent channel being through supply-side pressures. Physical risks manifest through direct disruptions to ecosystem services essential for economic productivity. Deforestation disrupts ecosystem services, creates negative supply shocks, thus reducing output — such as lower crop yields due to soil erosion and pollinator decline — and forcing producers to adopt costlier adaptation strategies, such as increased fertilizer use, irrigation or alternative crops. Disease prevalence, air pollution and heat stress can lead to a reduction in labour supply through fewer hours worked and reduced labour productivity. Together, these pressures can decrease supply and elevate costs for producers, which are passed on to consumers as higher prices for essential goods including food and energy, which are systemically important in consumer spending baskets. This triggers inflationary pressures across the economy, amplified by cascading effects where price shocks propagate through interconnected industries and regions (Weber et al., 2024) across varying time horizons, further embedding inflation risks.

Nature degradation can also impact price dynamics via the demand-side. This can happen in the short term, as an increase in diseases impacts labour productivity and consumption and leads to disinflationary pressure, as was seen at the onset of the COVID-19 pandemic. However, over time, supply shocks can also extend into demand-side impacts, further influencing price dynamics. Higher prices for essential goods, such as food, water and healthcare, reduce disposable income, while disease-driven work absences and lost wages further constrain household spending. Wage pressure can rise and fuel inflation, while curtailed demand for non-essential goods risks disinflationary pressures in those sectors. Firms may demand more capital in the short term to counter physical risks by financing adaptation measures such as shifting to more resilient crops, expanding irrigation or mitigating soil degradation, while higher input costs and declining profit margins may constrain broader investment. Over time, capital reallocation into nature-resilient strategies may stabilise costs and support productivity. These channels underscore the importance of time horizon considerations in nature-related economic impacts.

Nature-related transition risks can drive price volatility in the short term, for example through policies to conserve nature or manage deforestation-linked supply chains. In the European Union, the EU Deforestation Regulation (EUDR) will come into effect on 30 December 2025, aimed at curbing deforestation by requiring companies to ensure deforestation-free supply chains for selected commodities.[1] The EUDR will have significant implications for exporters to the EU and introduces transition risks in the EU and beyond, as businesses and financial institutions will need to adapt to stricter compliance standards, potentially increasing operational costs and reducing market access for non-compliant firms.

While these types of policies can catalyse positive structural changes in the production of goods and through supply chains overtime, in the short term they can also interact with physical risks to affect prices of goods via a supply-side channel. Recent events show how transition and physical risks can interact to drive price volatility for commodities like coffee and cocoa (Savage, 2024): supply shortages from physical risks, combined with challenges in meeting EUDR standards, constrain supply and result in rising prices.

Globally, nature shocks cascade through supply chains, creating inflationary pressures across interconnected economies. Higher prices for essential goods such as food and energy ripple through global markets, inflating costs for downstream industries and consumers. Even advanced economies, while more resilient due to having more diversified export bases, are not immune to price shocks transmitted through interconnected global value chains (Gardes-Landolfini et al., 2024). For instance, poor crop yields as a result of ecosystem disruptions in one region can drive up commodity prices globally, as observed with recent spikes in coffee, cocoa and olive oil

Photo: Annie Spratt, Unsplash

"Over time, capital reallocation into nature-resilient strategies may stabilise costs and support productivity."

1. Namely cattle, cocoa, coffee, palm oil, rubber, soy and wood, along with products derived from them, such as chocolate, leather and furniture.

prices (Savage, 2024; Andurand, 2024). In addition, COVID-19 illustrates a worst-case scenario of how an increase in zoonotic diseases linked to nature degradation can propagate globally, disrupt supply chains and challenge economic resilience (Ranger et al., 2024; IPBES, 2018), including by driving inflationary pressures.

Trade-offs emerge as deforestation destabilises ecosystems, undermines local economic resilience, and risks long-term price stability for short-term gain. This trade-off is particularly stark in emerging markets and developing economies that are more directly dependent on forest or natural resources. Mining for critical minerals (needed for electric vehicle batteries, wind turbines and solar panels) provides an important example: while vital for the energy transition, extraction often occurs in biodiverse regions, damaging local ecosystems, long-term productive capacity and local livelihoods (WRI, 2024b). Broader macroeconomic trade-offs emerge for economies reliant on nature-dependent exports, where nature degradation can constrain export capacity and drive currency depreciation. While depreciation might typically enhance export competitiveness, this benefit is suppressed when ecosystem decline erodes productive capacity, amplifying inflationary pressures. At the fiscal level, governments facing rising expenditure to conserve nature or adapt to nature-related crises, whether through disaster relief, infrastructure repair and development or social spending, may see debt sustainability strained, limiting their ability to respond to future shocks (Kraemer and Volz, 2022). These dynamics create monetary-fiscal trade-offs, where price pressures stemming from nature degradation interact with fiscal constraints, complicating the policy response to nature degradation as well as price stability risks.

Nature and climate risks are deeply interconnected and neglecting this fact underestimates their price impacts. Climate risks, such as rising temperatures, are well-known threats to crop yields that can drive food inflation, and nature-related factors – altered water cycles, soil erosion, and pollinator decline – can amplify these pressures. In South America's Cerrado region, for example, deforestation has delayed the rainy season and reduced total rainfall, significantly reducing crop yields (Leite-Filho et al., 2024), which could drive food price inflation. Integrated nature–climate scenarios underscore that economic assessments that exclude nature risks fail to capture the full scope of economic consequences posed by environmental degradation (Stevanović et al., 2024).

In addition to existing climate-related factors, nature's price impacts add another layer to monetary policy challenges. Climate-related physical risks are already set to pose persistent inflationary pressures through supply shocks (Barmes et al., 2024). While nature degradation can affect prices through multiple channels, supply-side inflationary pressures appear prominent, compounding climate-driven inflation risks. This further complicates monetary policymaking amid a polycrisis. To safeguard price stability, climate and nature risks should be considered together, as siloed approaches fail to capture the full scope of compounding pressures and trade-offs.

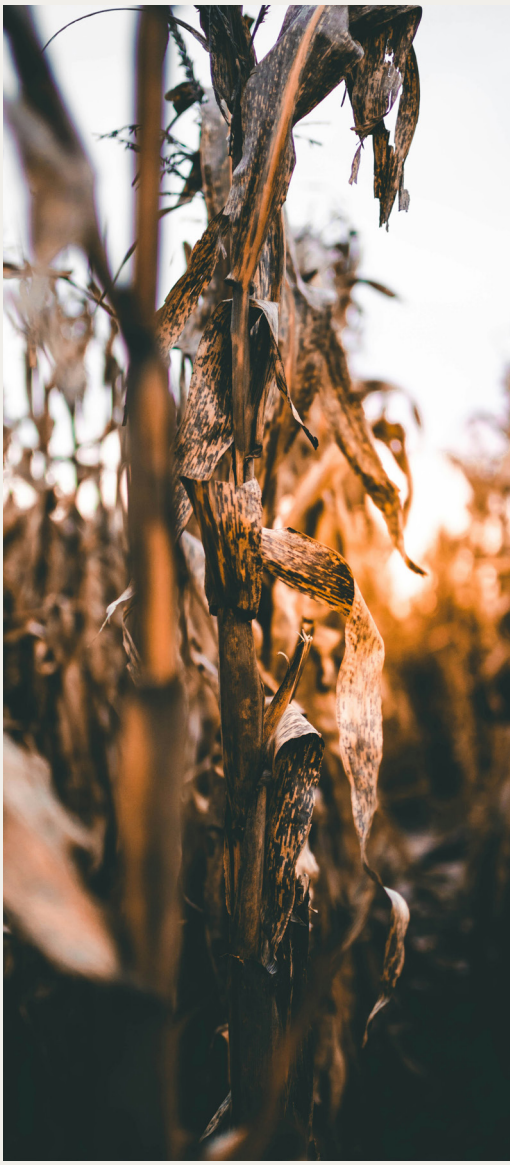
Questions for future research

This exploration of the link between nature degradation and price stability leads to emerging questions around the time horizon of shock transmission, the impacts of supply chain disruptions and the different ways in which nature and climate link to prices. Empirical evidence needs to be strengthened, to be able to better assess nature degradation's implications for monetary policy. We provide some initial questions below for further investigation.

Time horizon

Nature degradation can manifest acutely or chronically, creating uncertain time horizons for key macroeconomic variables. Understanding these temporal dynamics is essential for assessing the economic impacts of

"Empirical evidence needs to be strengthened, to be able to better assess nature degradation's implications for monetary policy."



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nature degradation. Additionally, nature-related supply shocks differ from other supply shocks (e.g. energy shocks), as they may result from long-term ecosystem disruptions or tipping points, which are harder to reverse or substitute.

- Over what time horizon do nature degradation events influence price dynamics, how persistent are these risks and do they dominate the supply- or demand-side?
- How can monetary policy frameworks account for the chronic way in which nature degradation can materialise, as it diverges from traditional, acute shocks?

Global interconnectivity

Nature degradation can lead to persistent supply disruptions with price impacts that can propagate globally through interconnected trade, production and financial networks.

- How do nature-related supply shocks propagate through interconnected supply chains and financial markets, and what are the implications for price stability?
- Which sectors, regions or countries are most vulnerable to cascading nature-related risks, through supply chains or financial interlinkages, and how can resilience be enhanced?

Differences between climate and nature shocks

Nature degradation is highly localised, with economic impacts concentrated in sectors most reliant on ecosystem services such as agriculture, forestry, energy, fisheries and tourism. Its persistence, irreversibility and limited substitutability add pressure to economic production.

- Do (dis)inflationary pressures from nature-related shocks differ from those driven by climate change? And how should monetary policy account for such differences?
- How can nature be integrated into existing methods to assess climate shocks and what does nature degradation reveal about the frequency and intensity of climate shocks?

Monetary policy

Nature degradation appears relevant for price stability but remains a novel concern for monetary policymakers. Central banks, traditionally focused on demand-driven inflation, may need to integrate nature-related supply shocks into their frameworks in tandem with current efforts on climate change to better manage environmental risks.

- When and how should nature-related shocks be incorporated into inflation assessments?
- How should central banks assess the persistence of nature-driven supply-side shocks and what are their implications for current approaches?
- How do nature-related disruptions influence debt sustainability and, in turn, the interaction between monetary and fiscal policy?
- Does monetary policy affect decisions to pursue economic activities that degrade nature (e.g. deforestation)? If so, is there a way to mitigate negative outcomes?

"Nature degradation appears relevant for price stability but remains a novel concern for monetary policymakers."

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Authors' declaration
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