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Navigating Nature and Climate Risks: An Integrated Framework for Economic Assessment

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Biodiversity loss and ecosystem degradation could pose a substantial threat to financial stability and the wider economy. Despite scientific evidence of the ongoing ecosystem degradation, methodological and data challenges have so far prevented a detailed assessment of the economic and financial risks. While progress has been made in assessing climate change related risks, our understanding of the linkages between the economy and ecosystem service degradation is still limited. Here we pioneer a nuanced approach to understanding the emerging financial risks of ecosystem change. Using the LPLmL-MAGPIE-SEALS modeling framework, we assess physical, transition and financial risks considering feedbacks from climate change, land use, and degrading ecosystem services. Focusing mainly on the EU, we also assess interconnectedness with other global regions where loss of ecosystem services is more pervasive. Our framework includes climate-sensitive spatially explicitly biophysical data within a partial equilibrium land-system model. Modelled land-use patterns are downscaled to derive fine-scale changes in ecosystem service supply and associated economic feedbacks. We assess various scenarios that build on the existing NGFS (Network for Greening the Financial System) framework. These scenarios range from a degraded world without policy interventions, to an integrated climate-nature scenario, with ambitious policies to mitigate both climate and ecosystem service change. The results indicate diverging biodiversity response based on varying climate and nature policy ambition, emphasizing the need to extend biodiversity safeguarding beyond exclusive reliance on climate mitigation policies. Financial risks are assessed through an analysis of sectoral dependencies on various ecosystem services, laying out the basis for a comprehensive framework that supports informed decision-making facing emerging climate and nature-related risks.