Institute and Faculty of Actuaries

Sessional meeting: Climate models have a fatal flaw – actuarial risk management does not have to

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Mary Goldman
Michael Sher
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Climate, Biodiversity, Change, and Us

- **Climate change affects:**

- Our physical space
- Our financial and economic health
- Our quality of life
- BIODIVERSITY

Biodiversity affects:

- Our physical space
- Our financial and economic health
- Our quality of life
- THE IMPACTS OF CLIMATE CHANGE

BUT: current climate change models don't reflect this adequately

➢ **Decisions informed by these models are flawed**

What can we do about it?

➢ Improve biodiversity data
➢ Increase our modelling suites and tools, e.g. to include qualitative scenarios
➢ Encourage regulators, policy-makers and decision-takers to require inclusion of biodiversity

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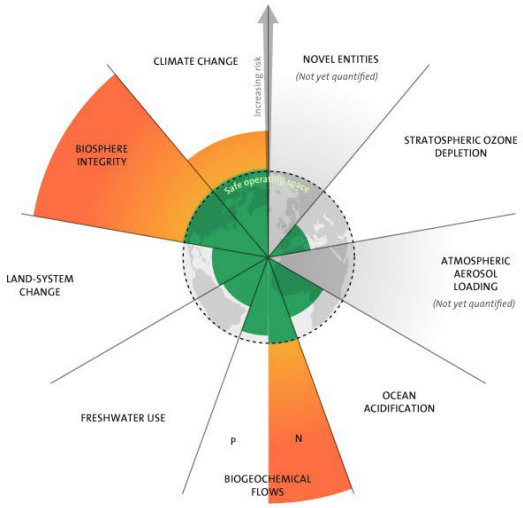
Nature risk rising: the case for systems thinking

Dr Jimena Alvarez

Photos by Aaron Burden (butterfly) and Leon Pauleikhoff (scorpion) on Unsplash

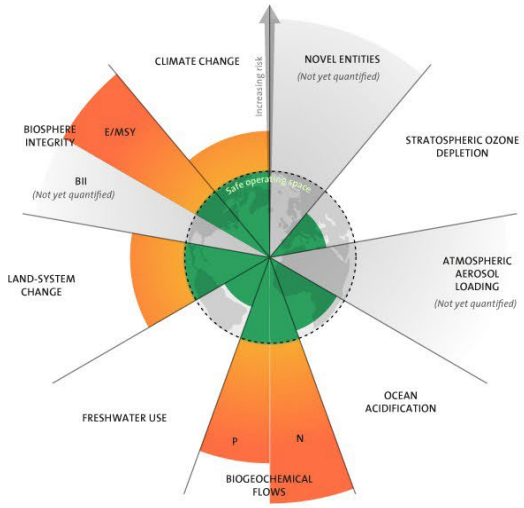
Seven of nine planetary boundaries have been breached

2009



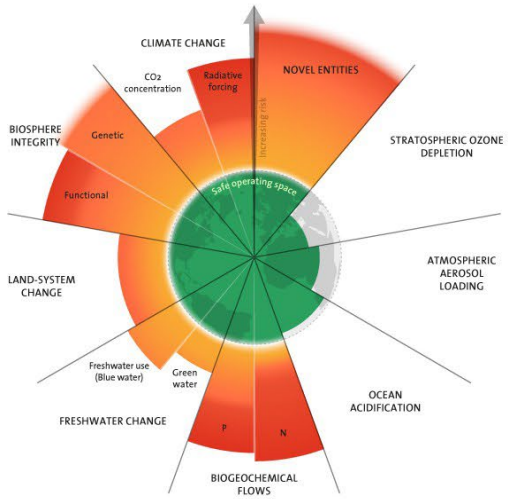
7 boundaries assessed,
3 crossed

2015



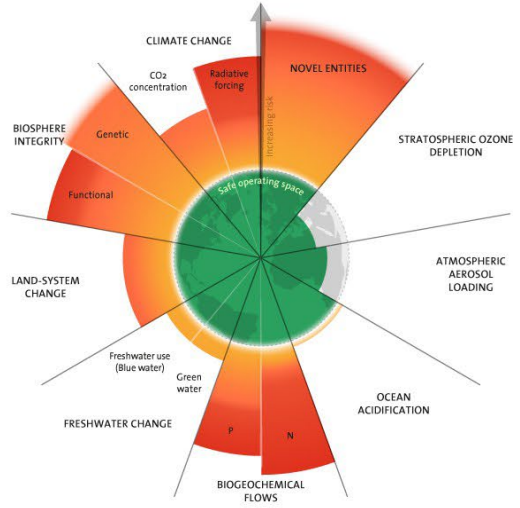
7 boundaries assessed,
4 crossed

2023



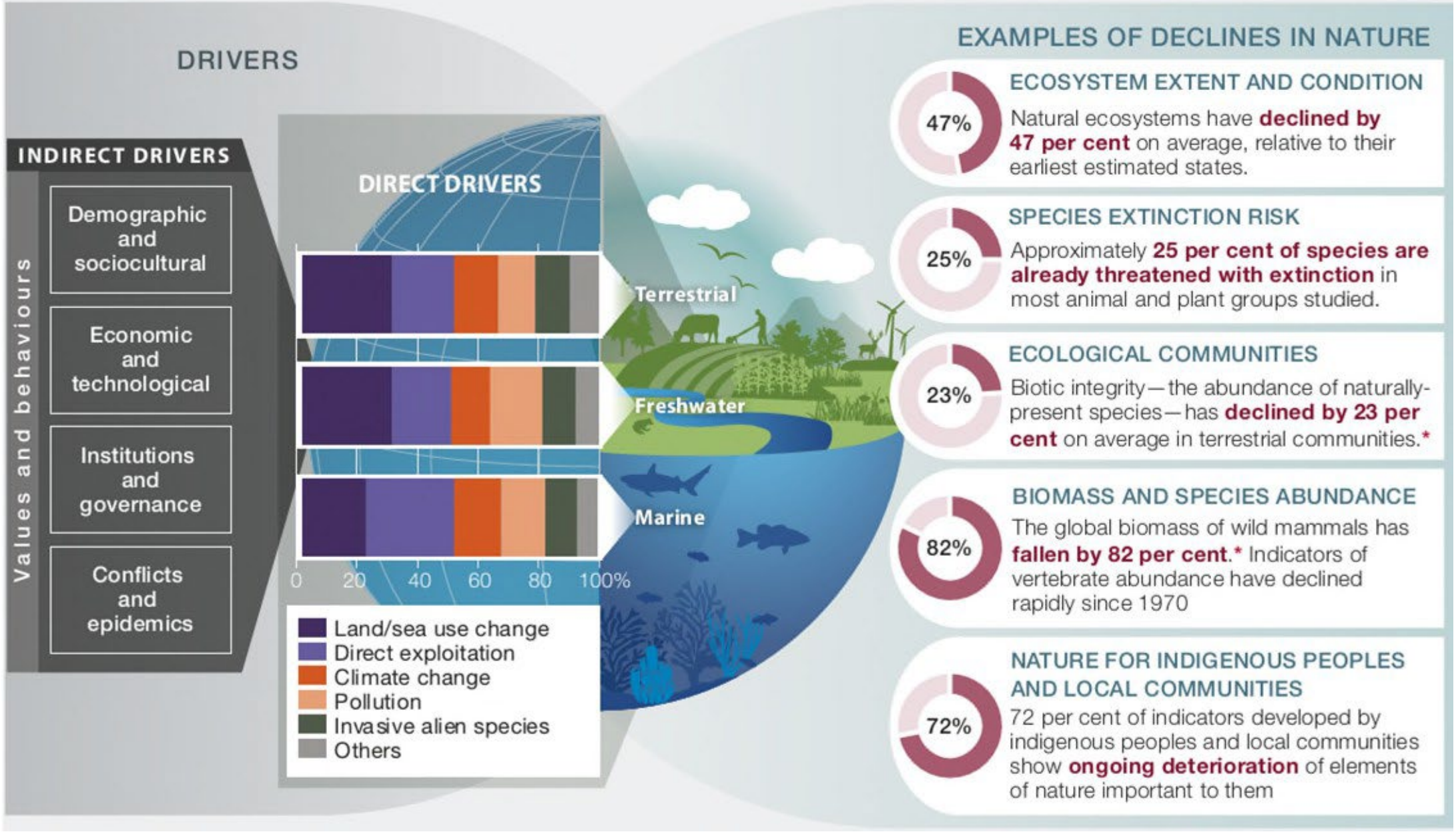
9 boundaries assessed,
6 crossed

2025

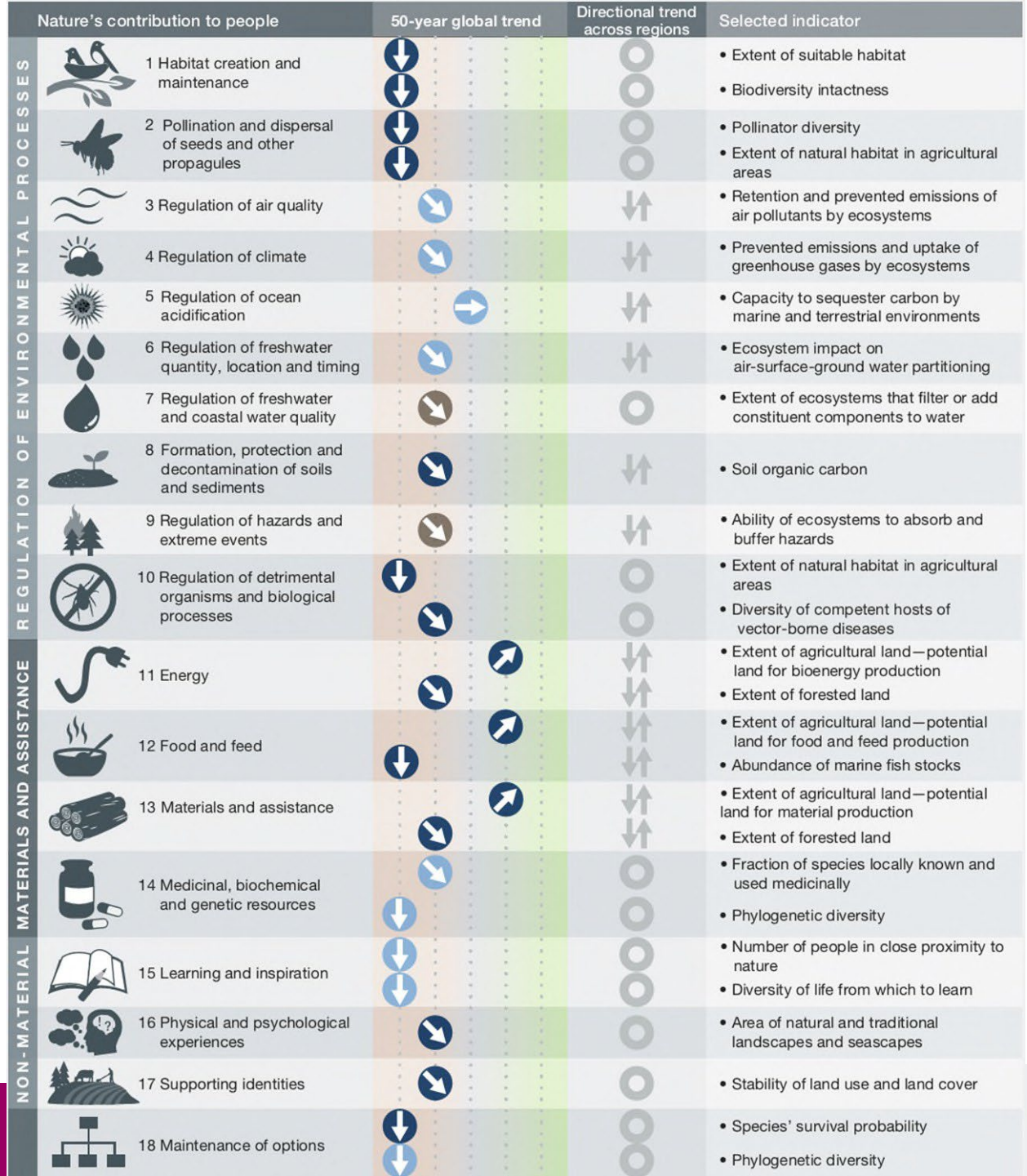


9 boundaries assessed,
7 crossed

Source: Azote for Stockholm Resilience Centre, Stockholm University. Based on Sakschewski and Caesar et al. 2025, Richardson et al. 2023, Steffen et al. 2015, and Rockström et al. 2009



Source: IPBES 2019



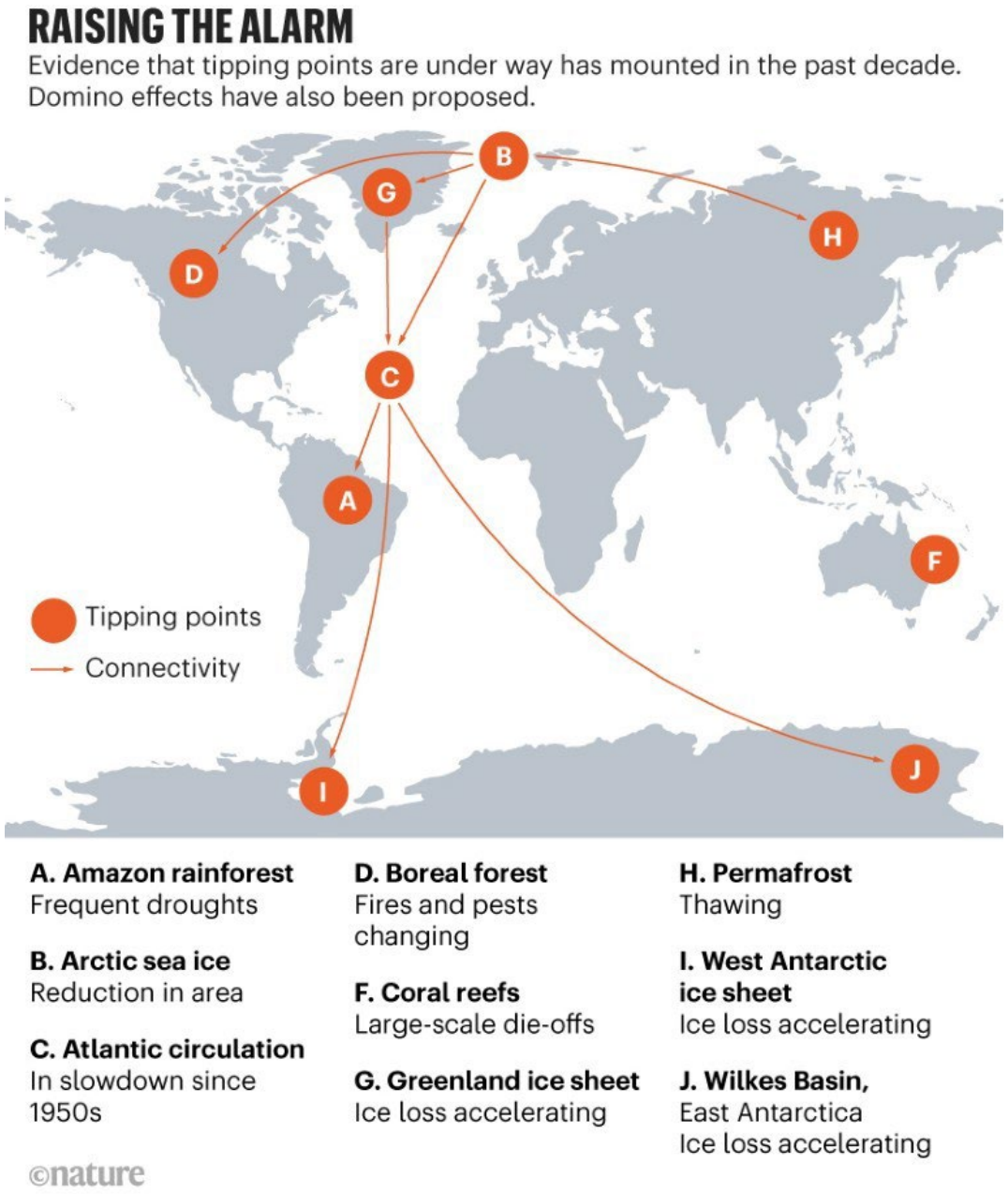
Five drivers of nature degradation

The 2019 Global Assessment Report of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) concluded that fourteen of Nature's contribution of people (NCP) that were assessed had declined since the 1970s, while outputs of food and other products had risen.

Trade-off between increase in food and materials at the expense of regulating NCPs

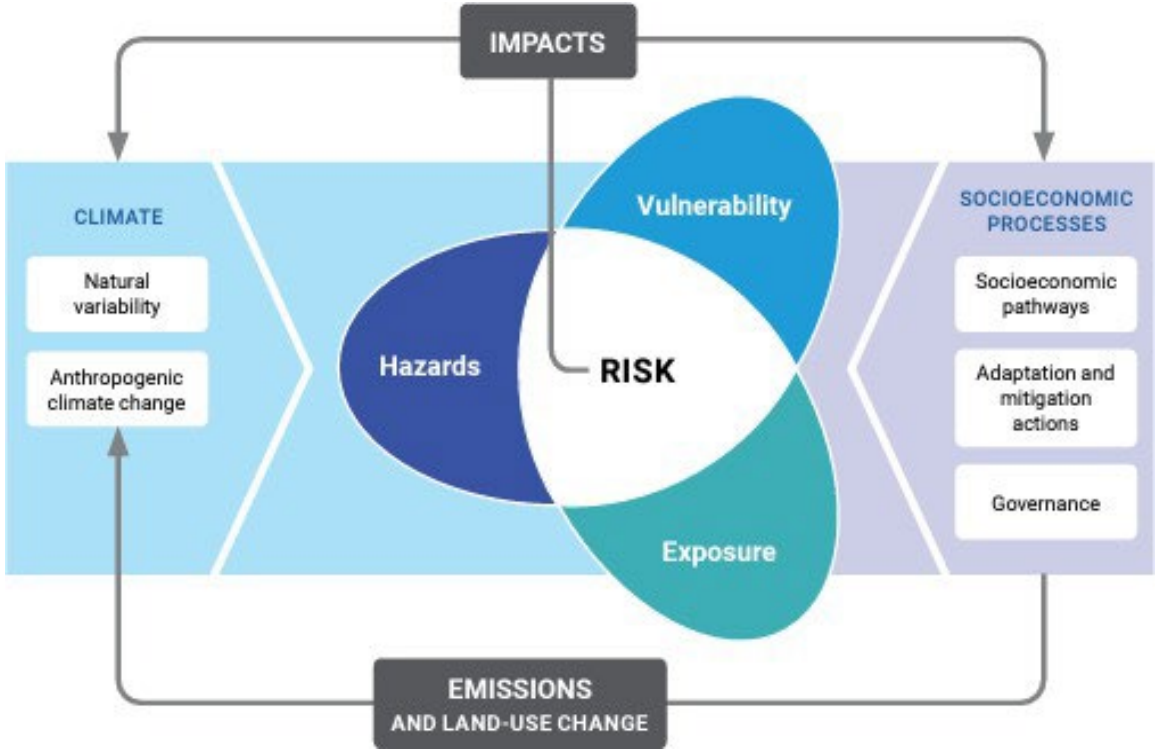
Source: IPBES 2019

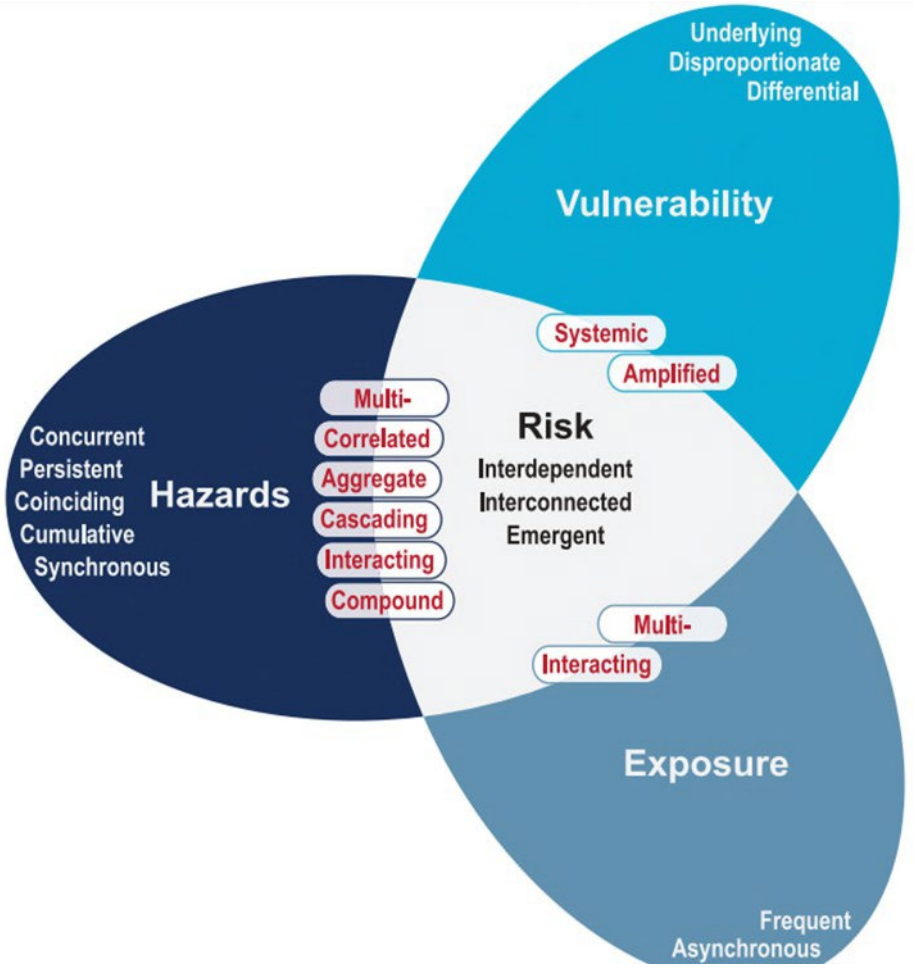
Tipping points & Connectivity



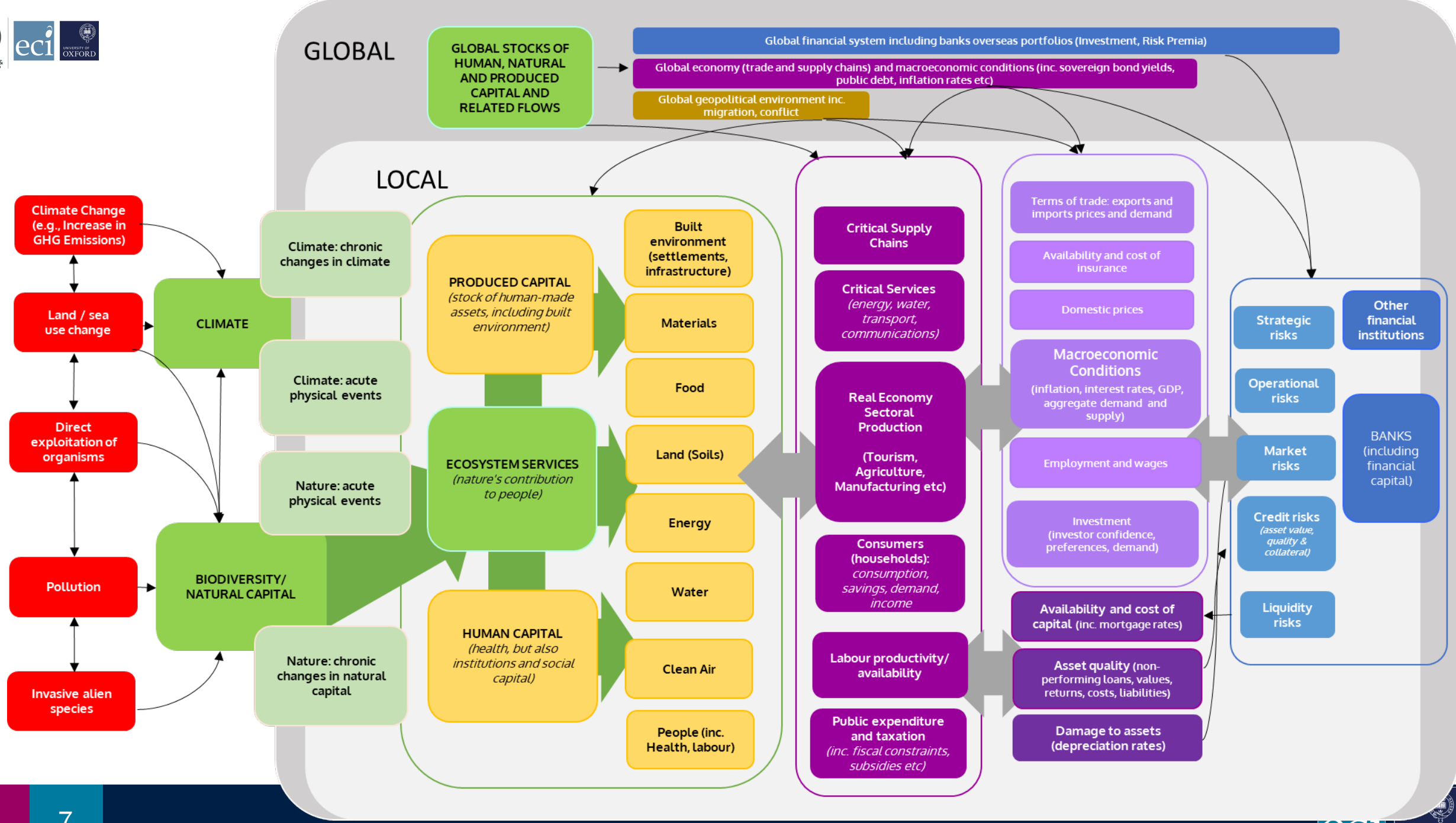
Source: Lenton et al. (2019)

Risk assessment approach



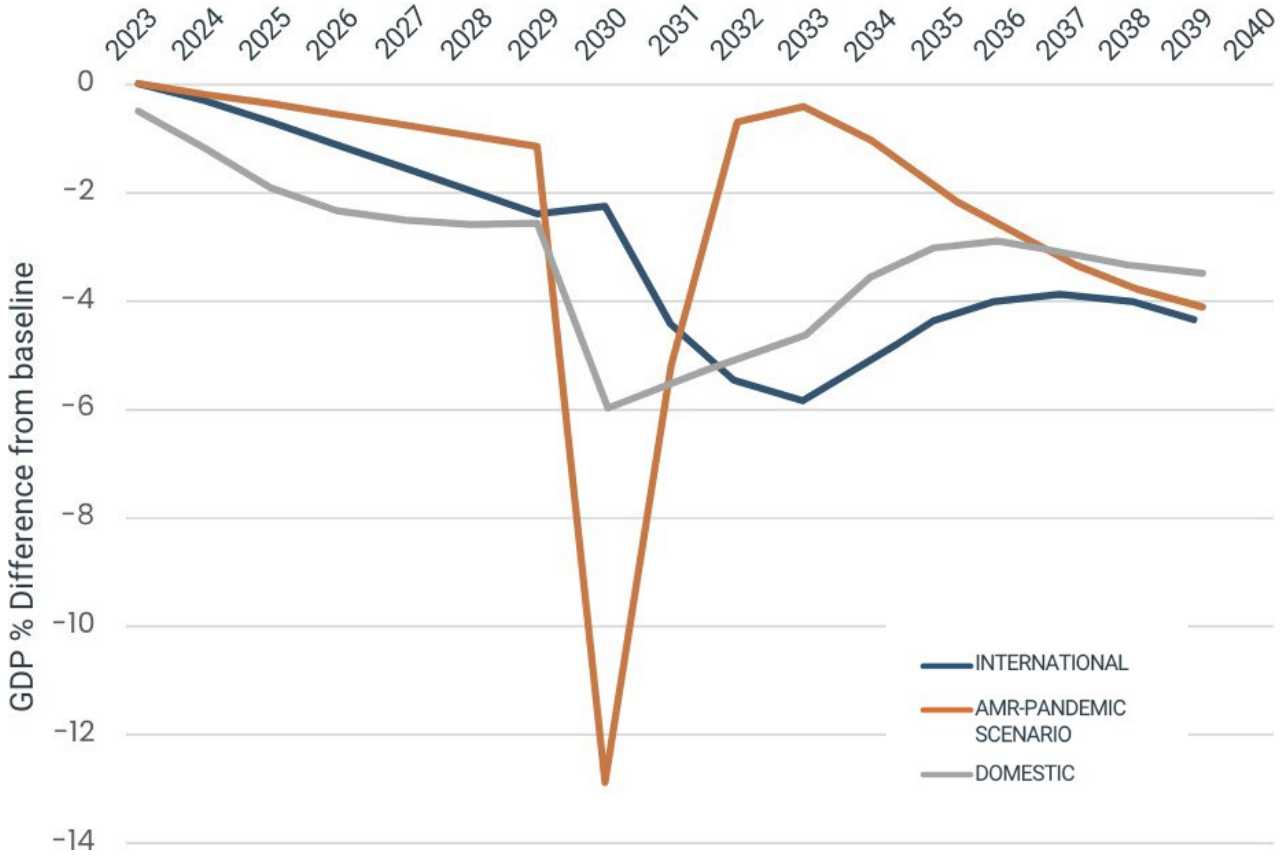


Source: Adapted from IPCC 2014 and Simpson et al (2021).



Source: Ranger et al. (2023)

Nature-related risks are macro-critical

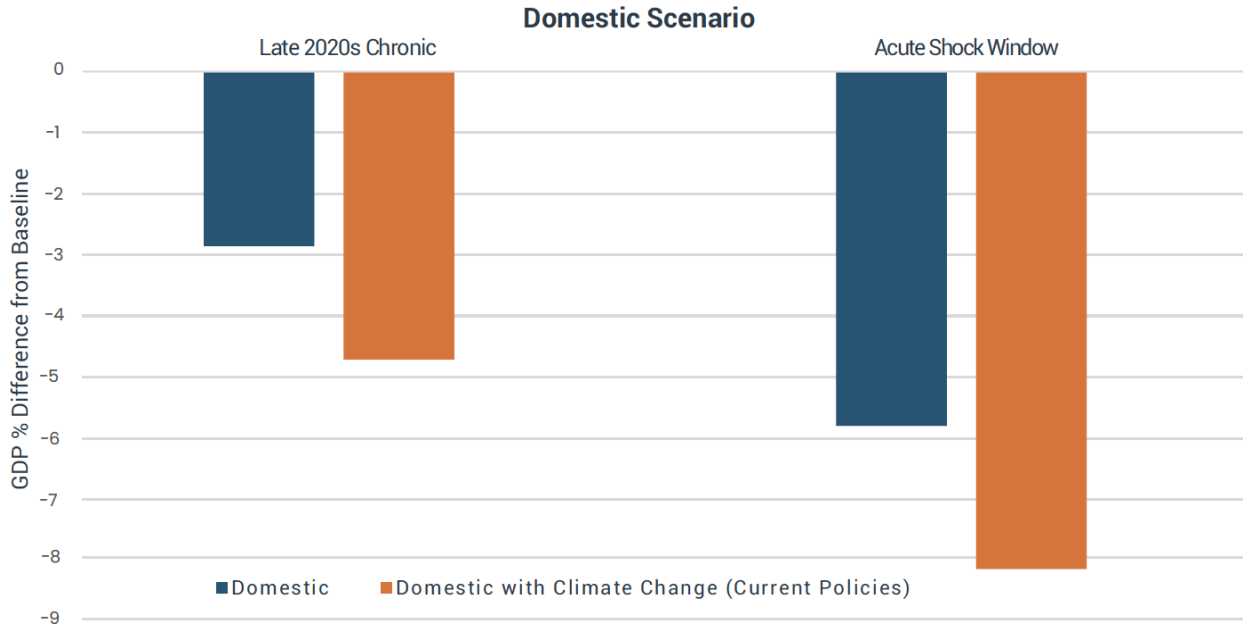


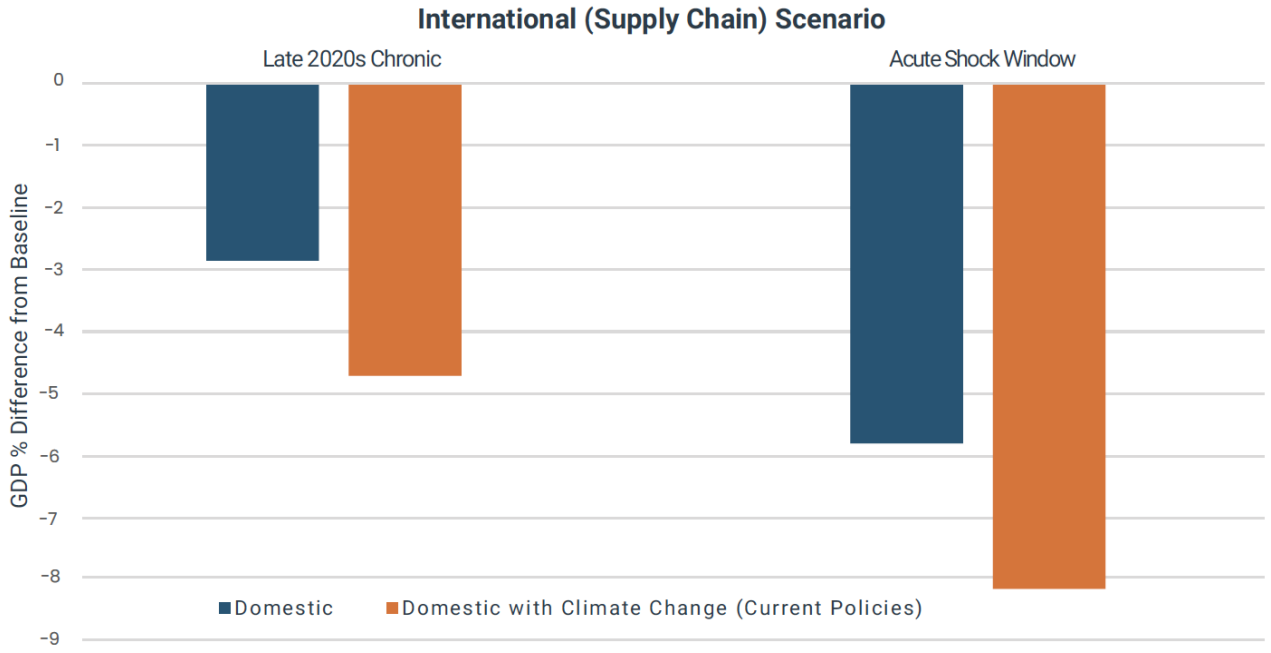
The deterioration of the natural environment in the UK and around the world could slow economic growth and lead to major shocks that could result in GDP being 6% lower than it would have been otherwise by the 2030s under two scenarios and 12% lower under an AMR-pandemic scenario

These are greater than the impact on GDP experienced in the Global Financial Crisis, (-4%-6% UK GDP) , and - for the AMR-pandemic scenario - greater than the GDP impact of the COVID-19 pandemic (-11% UK GDP).

Environmental degradation increases the chance and impacts of an acute climate or health shock, and the combined effect would have a very material impact on the economy

Source: Ranger et al. (2024)





Gradual (chronic) year-to year environmental degradation is as detrimental or more so than climate change; nature doubles climate losses

Nature-related risks amplify climate risks

Environmental degradation increases the severity and likelihood of acute shocks related to climate change

The compounding impacts of climate and nature are macro-critical

Implications for Adaptation:

- Adaptation and nature are aligned
- Consider nature-climate feedbacks in risk assessment and disclosure
- Don’t forget indirect risks!
- Integrate adaptation and nature within transition plans
- Engage with clients and investees
- Seek co-benefits from investments

Source: Ranger et al. (2024)

Nature risk: rising to the top

Source: Alvarez et al. (2025) based on World Economic Forum's Global risk reports

Sources and transmission channels of nature-related risks leading to different effects

Source: Alvarez, Postel- Vinay, Melis, McKenzie and Ranger (2025).

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Thank you

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