OECD ENVIRONMENTAL OUTLOOK

EXPERT WORKSHOP ON

MODELLING THE TRIPLE PLANETARY CRISIS:

IMPACTS AND POLICIES

9h30-18h

19 February 2024

OECD, Paris

Agenda

Key contacts

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This workshop is organised by the OECD, with financial support from the European Union.

Background

Climate change, biodiversity loss, and pollution are closely interlinked, as they share common drivers and affect each other in various ways at the local, national, and supra-national scale. An improved understanding of these interlinkages can inform policy design in leveraging synergies and balancing trade-offs across the different scales and dimensions. For this reason, the next Environmental Outlook will study **the triple planetary crisis of climate change, biodiversity, and pollution**.

Building on the work that will set out a conceptual framework and a stocktake of policies, the **OECD Environmental Outlook** will develop an environment-economy modelling framework to develop quantitative pathways of sectoral and regional drivers of environmental change under current policies and their corresponding consequences for the state of the environment across the three issues.

In addition, the Environmental Outlook will focus on policy scenarios and the implications of policy action, highlighting synergies and trade-offs across the three environmental issues. Scenarios will illustrate how policy action in one domain creates spillovers for the other domains, paving the way for an integrated policy scenario that achieves progress towards international targets for climate change, biodiversity loss, and pollution simultaneously, also taking into account key cross-cutting issues such as water and material resource availability and constraints.

The workshop contains **three thematic sessions** that reflect this structure of the work plan. The first session on *Impact pathways and interactions* deals with modelling approaches to quantify future pathways of the state of the environment and the interlinkages between biophysical and economic impacts of climate change, biodiversity, and pollution. The second session on *Thematic policy action and spillovers* zooms in on the design and consequences of policy measures that aim to tackle one of three challenges and the potential synergies and trade-offs. The third session on *Integrated policies for the triple planetary crisis* then reflects on modelling approaches that can strengthen the scientific underpinnings for enhancing policy coordination across domains.

Aim of the workshop

This OECD technical workshop brings together leading experts on economic, biophysical, and integrated assessment modelling of the interactions between climate change, biodiversity loss, and pollution. The workshop takes stock of ongoing modelling efforts to develop quantitative pathways to study the drivers and impacts of the triple planetary crisis, and the policies to address it. The aim is to identify robust modelling approaches to inform the work for the upcoming OECD Environmental Outlook.

The workshop provides a multi-disciplinary platform for open technical discussion to facilitate knowledge-sharing across modelling teams. In addition, the workshop is organised back-to-back with the meeting of the Working Party on Integrating Environmental and Economic Policies to enable interaction between policymakers and the modelling community.

The workshop aims at addressing the following questions:

- What are the key drivers behind the triple planetary crisis, and how can their future evolution be appropriately captured in quantitative pathways?
- Which interactions between climate change, biodiversity loss, and pollution can be quantified, and where do current modelling approaches fall short?
- What are the key biophysical risks of the triple planetary crisis, and how do they translate to economic outcomes?
- Which policies are needed to address climate change, biodiversity loss, and pollution, and how can modelling efforts quantify the corresponding synergies and trade-offs?
- How can model-based assessments inform the design of integrated policy packages?
- How can models from different disciplines be combined to provide more robust and comprehensive insights?

MODELLING THE TRIPLE PLANETARY CRISIS: IMPACTS AND POLICIES

Environmental Outlook workshop agenda

All times are expressed in CET – Central European Time (Paris)

Location: Room CC2 in the OECD Conference Centre at La Muette

Monday 19 February 2024

9h00-9h30 9h30-9h45	Welcome and coffee **Introduction to the workshop** *The opening session sets the scene by clarifying the aims and objectives of the workshop, and by providing the context of the upcoming Environmental Outlook on the triple planetary crisis of climate change, biodiversity loss, and pollution.* • The OECD Environmental Outlook Shardul Agrawala (OECD) • Research gaps for integrated policymaking Stephen White (European Commission)
9h45-10h00	• Framing the triple planetary crisis: impact, economic, and policy interlinkages Anil Markandya (BC3)
Session 1 10-12h	**Impact pathways and interactions** *The three crises of climate change, biodiversity loss, and pollution are intricately intertwined as they affect each other and share common underlying drivers. This session discusses modelling approaches to explore future socio-economic pathways and their impacts on the environment and the economy.* Moderator: Ruben Bibas (OECD) • The biodiversity nexus across multiple drivers: research and modelling landscape HyeJin Kim, Simon Smart (UK Centre for Ecology & Hydrology, UKCEH) • Biodiversity modelling in AIM (Asia-pacific Integrated Model) Shinichiro Fujimori (Kyoto University) • Physical and economic risks of climate change Laurent Drouet (RFF-CMCC EIEE)
12h-13h15	*Lunch break*

Session 2 13h15-15h15	**Thematic policy action and spillovers** *Many countries have implemented policies to limit climate change, biodiversity loss, and pollution. Often, these measures are designed separately, aiming to address only one of the three challenges without considering the broader implications. This session presents model-based research on the impact of thematic policies, revealing trade-offs and synergies for other domains.* Moderator: Rob Dellink (OECD) • Implementing nitrogen pollution control pathways in the GAINS model Wilfried Winiwarter (IIASA) • Modelling environmental and socio-economic impacts of cropland expansion and conservation policies Ruth Delzeit (University of Basel) • Identifying trade-offs and searching for synergies: modelling sustainability targets in the water-land-climate nexus Astrid Bos (PBL Netherlands)
15h15 – 15h40	*Coffee break*
15h40 – 15h50	• Insights from the Global Environmental Outlook 7 Pierre Boileau (UNEP; online)

Session 3 15h50-17h50	**Integrated policies for the triple planetary crisis** *Integrated policy design attempts to leverage synergies and balance trade-offs to ensure effective progress across the three domains. This session explores how multi-disciplinary modelling work and scenario assessment can provide scientific underpinnings for integrated policy design, and how integrated policies can be implemented in quantitative modelling frameworks.* Moderator: Cecilia Bellora (OECD) • Assessing synergies and trade-offs for health and sustainable development Jon Sampedro (BC3) • Water, land, and ecosystems services in economic modelling Thomas Hertel (Purdue University; online) • Integrated modelling for interrelated crises Detlef van Vuuren (PBL Netherlands, Utrecht University)
17h50-18h00	• Concluding remarks Toon Vandyck (OECD)
18-19h	**Reception**

Key takeaways

Impact pathways and interactions

1. Modelling all impact channels is challenging, but the research and modelling community has done a great deal of work on which the OECD can build further.
2. The representation of land in economic models requires more attention, as it is a key channel for various impacts and interactions.
3. Interactions across impacts of climate change, biodiversity loss, and pollution are particularly challenging to quantify; this is a promising avenue for future work. Compound risks (amplification vs double counting) require careful treatment in models.
4. Areas for further work include capturing short-term (acute) impacts such as extreme events in long-term equilibrium models, which is important but not obvious. Furthermore, more work can be done on pollution (e.g. OECD plastics work)

Thematic policy action and spillovers

1. The presentations illustrated many potential synergies of policy action across the different domains (e.g. via demand reduction), but also some trade-offs and unintended consequences (e.g. biodiversity impacts of land-based climate mitigation measures). Importantly, details of the policy implementation will be crucial in leveraging synergies and balancing trade-offs.
2. Different types of models can be used for different purposes, and modelling work can be relevant at different scales (local-to-global) and at different stages of policy-making (target-setting, policy design, implementation, evaluation).
3. The discussion stressed the relevance of quantifying policy-relevant scenarios, accounting for political acceptability and equity. Models are incomplete if they cannot capture the different steps from policies to behavioural/technological change to impacts. Capturing the step from actual policies to changes is challenging and more collaboration between biophysical, economic, and social sciences could be envisaged. However, several presentations illustrated how modelling can also inform policies by revealing trade-offs and by comparing cost-effectiveness of different policy packages (e.g. for nitrogen in US and EU).
4. In the effort to model policies and interactions at different scales, a trade-off between breadth and depth of the assessment is likely to emerge, and issues with data availability have to be overcome. Situation-specific considerations will have to guide corresponding modelling choices.

Integrated policies for the triple planetary crisis

1. Models provide a useful skeleton to structure different channels and interactions, but the skeleton cannot be disjointed. The research presented in the workshop illustrated several 'modelling frameworks' and 'modelling ecosystems' that typically consist of several specialised sub-components. The breadth of the triple planetary crisis and the complexity of the interactions calls for integrated modelling systems that help steer away from 'crisis competition' and foster progress towards systemic change through a broad (nitrogen, SDG, or triple planetary crisis) lens.
2. To inform integrated policy design, models must combine elements from different modules and disciplines: mixed methods including biophysical, economic, governance and social science. Several presenters gave examples of initially being 'lost in translation' in interdisciplinary collaborations, highlighting the need for stronger dialogue across communities as envisaged in the workshop.
3. The discussions highlighted successful model collaborations and suggested opportunities to facilitate positive spill-overs to the research community. Reduced-form approaches, for instance for climate and air pollution modelling (MAGICC, TM5-FASST), have proven effective in broadening the scope of research, and more efforts along these lines could be envisaged.
4. In addition to combining models, it is also relevant to compare models to enable learning and to enhance robustness of results. Furthermore, some harmonisation could also be envisaged when multiple modelling teams conduct similar analyses (e.g. which indicators to reflect progress on SDG targets or planetary boundaries).