WEBINAR REPORT

The Potential of Rapid Evidence Synthesis for Environmental Action

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Webinar Report 'The Potential of Rapid Evidence Synthesis for Environmental Action'

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Introduction

On 26 June 2025, Science Europe and partner organisations – Climate Research Initiative Netherlands (KIN), the Portuguese Foundation for Science and Technology (FCT), the French National Research Agency (ANR), the Hungarian Research Network (HUN-REN), Lund University, the Research Council of Norway (RCN), and the University of Cambridge – organised a webinar on the 'Potential of Rapid Evidence Synthesis for Environmental Action'. The event featured prominent experts on science–policy interfaces, environment, and evidence synthesis for a timely discussion on how rapid/living approaches to synthesising scientific evidence may be useful for accelerating environmental action.

In May 2021, Science Europe adopted[1] the strategic priority to "strengthen the role and contribution of science in tackling societal challenges" for the period 2021–2026. Since then, it has developed guidance for improving science–policy interfaces, promoted the importance of research on sustainability, and developed a framework to support research organisations to improve the environmental sustainability of research itself.[2] This work has been driven by the Science Europe Working Group on Greening Research (formerly the Working Group on the Green and Digital Transition) and has often been undertaken in co-operation with external partners.

As stressed in Science Europe's Guidance on Science for Policy Activities,[3] science-based contributions can improve the quality, efficiency, and direction of policy makers. In fact, according to the 2024 OECD Survey on Drivers of Trust in Public Institutions, "the perceived capacity of governments to take decisions based on evidence appears as the second most powerful driver of trust in national governments."[4] Research organisations are well positioned to offer a collective and multidisciplinary approach by mobilising panels of experts; they have a unique role to play as intermediaries and facilitators of the bi-directional exchanges between the policy and research communities. According to Science Europe's 2023 survey,[5] 20 out of 23 SE Member Organisations that responded to the questionnaire either funded or performed science–policy interfaces, such as policy-oriented research studies, policy-oriented events, or policy briefings summarising scientific findings.

An important precondition for success in science–policy interfaces is ensuring that decision makers can obtain usable and actionable syntheses of research findings. **Usability**, in policy context, means not only a tailored approach to the relevant questions on the policy agenda, but also being able to provide scientific responses on time to inform the decisions. **Synthesis** is important as a way to integrate knowledge from multiple experts and multiple disciplines instead of relying on individual experts' contributions, offering a truly holistic approach to complex societal challenges such as sustainability.

1 Science Europe, Science Europe Strategy Plan 2021-2026 (2021), https://scienceeurope.org/our-resources/strategy-2021-2026/.

2 These resources are available on the Science Europe website.

3 Nicola Francesco Dotti, "Guidance on Science for Policy Activities," Science Europe, 2024, https://www.scienceeurope.org/our-resources/guidance-science-for-policy/.

4 As reported in A.-G. Keizer et al., 2025. *Evidence-Informed Policymaking: A Pathway to Increasing Trust in Democratic Institutions and Boosting Competitiveness* (Publications Office of the European Union): https://data.europa.eu/doi/10.2760/3905455.

5 Diana Potjomkina et al., Survey Report: Appraising Greenhouse Gas Emissions of Research Organisations (2024), https://www.scienceeurope.org/our-resources/survey-report-greenhouse-gas-emissions/.

As the world faces the triple planetary crisis[6] of climate change, pollution, and biodiversity loss, and our societies increasingly suffer from climate-related disasters, the urgency to identify solutions is greater than ever. This includes building a sound understanding of the effects that climate change has on ecosystems and communities around the globe, and opportunities for mitigation and adaptation.

A discussion is ongoing on how to improve science–policy interfaces in general, as well as specifically when it comes to the environment. The Evidence Synthesis Infrastructure Collaborative (ESIC) currently works on transforming the global evidence architecture based on the principles of living evidence.[7] The Global SDG Synthesis Coalition unites UN organisations that want to improve the use of existing studies that currently often remain unused.[8] The International Panel on Climate Change will organise a workshop on Methods of Assessment in March 2026.[9] Research communities and policy makers alike are addressing the use of AI for evidence synthesis and advancing science, including environmental science.[10]

It is in this context that Science Europe and partners decided to explore the potential of rapid evidence synthesis (RES) for environmental action, asking the following questions:

- What improvements are needed in the existing science–policy interfaces on climate, environmental pollution, and biodiversity?
- What are potential use cases for RES in environmental science?
- Can RES effectively support evidence-based policy action on the environment, and if yes, what would be the prerequisites for its successful deployment?
- What are the lessons learned from other fields in which RES has been used?
- What are the next possible steps for decision makers, research organisations and other stakeholders?

During the webinar, Professor Dr. Daniela Jacob (Director of Climate Service Center Germany (GERICS) and Honorary Professor at the School of Sustainability, LEUPHANA University Lüneburg) addressed the potential role of rapid evidence in science–policy interfaces in the field of environment. Dr. Ismael Kawooya (Senior Research Scientist and Head of Office at the Center for Rapid Evidence Synthesis (ACRES)) discussed the possible applications and preconditions for successful use of rapid evidence synthesis, while Prof. Dr. Emily Shuckburgh OBE (Director of Cambridge Zero and Professor of Environmental Data Science, University of Cambridge) and Dr. Jan Minx (Head of the Evidence for Climate Solutions Working Group at the Potsdam Institute for Climate Impact Research) shared their expertise on the use of AI for evidence synthesis. Dina Eparkhina (Senior Policy Officer at the European Global Ocean Observing System (EuroGOOS))

6 UNFCCC, "What Is the Triple Planetary Crisis?," accessed October 14, 2025, https://unfccc.int/news/what-is-the-triple-planetary-crisis.

7 The evidence we need now: A roadmap for the Evidence Synthesis Infrastructure Collaborative as a cornerstone of the global evidence architecture, DRAFT version 1, 13 June 2025, https://evidencesynthesis.atlassian.net/wiki/spaces/ESE/overview?mode=global

8 "Unearthing 'Hidden' Science Would Help to Tackle the World's Biggest Problems," Nature 633, no. 8030 (2024): 493–493, https://doi.org/10.1038/d41586-024-02991-5.

9 IPCC Calls for the Nomination of Participants to the Workshop on Engaging Diverse Knowledge Systems and the Workshop on Methods of Assessment — IPCC, n.d., accessed August 6, 2025, https://www.ipcc.ch/2025/06/13/calls-for-nominations-workshops-diverse-knowledge-systems-and-methods-of-assessment/.

10 See for example Global Research Council, Statement of Principles: Research Management in the Era of Artificial Intelligence, https://globalresearchcouncil.org/fileadmin//documents/GRC_Publications/SoP_2025_Research_Management_AI_EN.pdf

reflected on potential use of rapid evidence synthesis in ocean science. The webinar was moderated by Dr. Eldrid Herrington, Head of Academic Engagement at Centre for Climate Engagement, Hughes Hall, University of Cambridge. Dr. Lidia Borrell-Damián, Secretary General of Science Europe, introduced the event. An earlier short summary of this webinar was published by the Centre for Climate Engagement, Hughes Hall, University of Cambridge.[11]

Background Note: Rapid and Living Evidence Approaches

While systematic reviews remain the 'gold standard' for informing implementation initiatives,[12] they have certain disadvantages, such as longer synthesis time and a risk that the final product will not incorporate latest evidence produced in the meantime.[13] It has been calculated that in healthcare, it takes on average from 2.5 to 6.5 years for a primary study to be incorporated in systematic review, and an average of 17 years for research to reach clinical practice.[14] In turn, policy makers often have just days or weeks to make a decision, and need evidence support that can work at their speed.[15]

In the era of generative AI tools such as ChatGPT, science is facing its "major competitor in synthesis"[16] with the risk that policy makers may rely on potentially inaccurate syntheses generated by general-use AI models instead of sound scientific evidence.[17] In this context, rapid or living evidence approaches may present a viable alternative, helping bring evidence to decision makers and other relevant stakeholders at a much faster pace, while maintaining a high standard of scientific rigour. This background note is intended to give readers a first insight into rapid and living evidence approaches.

1. **Definition.** Rapid Evidence Synthesis (RES) has been defined as "a series of methods that adapts systematic review methods for shorter timelines than for a full systematic review."[18] There are various forms and approaches, including for example evidence summaries or rapid response

11 https://climatehughes.org/event-summary-rapid-evidence-synthesis/

12 "Rapid Evidence Synthesis," Implementation Science Methods, accessed August 6, 2025, https://impscimethods.org/index.php/toolkits/rapid-evidence-synthesis-toolkit.

13 "Future Evidence Foundation," accessed August 6, 2025, https://www.futureevidence.org/.

14 Sabine M Allida et al., 2025. "A Practical Guide to Living Evidence: Reducing the Knowledge-to-Practice Gap," *European Journal of Cardiovascular Nursing* 24, no. 1: 165–75, https://doi.org/10.1093/eurjcn/zvae048.

15 Jonathan Breckon et al., 2023. *Rapid Evidence Assessments: A Guide for Commissioners, Funders, and Policymakers* (CAPE, University College London): https://theippo.co.uk/wp-content/uploads/2023/10/FINAL-IPPO-POST-CAPE-rapid-evidence-assessments_V61.pdf; John N. Lavis et al., 2024. "SHOW ME the Evidence: Features of an Approach to Reliably Deliver Research Evidence to Those Who Need It," *Clinical and Public Health Guidelines* 1, no. 5: https://doi.org/10.1002/gin2.70006.

16 Cape Town Consensus Meeting–Day 2 Daily Digest," ESIC - Evidence Synthesis Infrastructure Collaborative, June 25, 2025, https://evidencesynthesis.atlassian.net/wiki/pages/viewpageattachments.action?pageId=268730376&preview=%2F268730376%2F287440902%2FCape%20Town%20Consensus%20meeting_Day%202%20Daily%20Digest.pdf

17 The evidence we need now: A roadmap for the Evidence Synthesis Infrastructure Collaborative as a cornerstone of the global evidence architecture, DRAFT version 1, 13 June 2025, https://evidencesynthesis.atlassian.net/wiki/spaces/ESE/overview?mode=global

18 Implementation Science Methods, "Rapid Evidence Synthesis."

briefs.[19] RES is possible in cases where there is very limited evidence or in which complex interventions are being implemented.[20] According to Norman et al. (2022), "a standardised process of rapid evidence synthesis has not yet been presented to inform decision-making around accelerating access to beneficial innovation adoption," although various guidelines exist.[21] In turn, living evidence (see also living reviews) refers to "continually updated, systematically appraised summaries of research evidence," which may include systematic reviews, evidence briefs or guidelines.[22] There are logical links between both approaches: for Chakraborty et al., living evidence is a "method of rapid evidence gathering, appraisal and synthesis,"[23] while Allida et al. describe it as supporting rapid evidence synthesis, notably "without compromising the rigorous, gold-standard methods for conducting SRs [systemic reviews] or guideline development."[24] Even in cases where the rapid review is not systematic, it seems to be generally accepted that RES is a valid method and can provide "good-enough" results, that are rigorous, replicable, and transparent.[25]

2. **Use case.** Rapid and living reviews can:

- help researchers effectively build on existing knowledge, identify knowledge gaps and collaborate;
- maximise effective use of existing research and assist with navigating a rapidly growing body of literature, while considering different experts' views in a balanced manner;
- support collaboration between researchers, policy makers and other stakeholders;
- enable flexible responses to specific policy problems and support rapid implementation of latest available evidence in policy and practice, minimising the "evidence–practice gap."[26]

The Alliance for Living Evidence puts this in stark terms:

"How our society works increasingly lags behind the evidence of what works. Existing approaches to synthesizing science into actionable insights are slow, incomplete or expensive resulting in decisions

19 Gill Norman et al., 2022. "Rapid Evidence Synthesis to Enable Innovation and Adoption in Health and Social Care", *Systematic Reviews* 11, no. 1: 250, https://doi.org/10.1186/s13643-022-02106-z; Andrea C. Tricco et al., 2022. "Rapid Reviews and the Methodological Rigor of Evidence Synthesis: A JBI Position Statement," *JBI Evidence Synthesis* 20, no. 4: 944, https://doi.org/10.11124/JBIES-21-00371.

20 Norman et al., "Rapid Evidence Synthesis to Enable Innovation and Adoption in Health and Social Care."

21 Norman et al., "Rapid Evidence Synthesis to Enable Innovation and Adoption in Health and Social Care"; Implementation Science Methods, "Rapid Evidence Synthesis."

22 Allida et al., "A Practical Guide to Living Evidence"; Samantha P Chakraborty et al., 2024. "Living Evidence Syntheses: The Emerging Opportunity to Increase Evidence-informed Health Policy in Australia," *Medical Journal of Australia* 221, no. 3: 122–25, https://doi.org/10.5694/mja2.52368

23 Chakraborty et al., "Living Evidence Syntheses"

24 Allida et al., "A Practical Guide to Living Evidence"

25 Norman et al., "Rapid Evidence Synthesis to Enable Innovation and Adoption in Health and Social Care"; Implementation Science Methods, "Rapid Evidence Synthesis"

26 Allida et al., "A Practical Guide to Living Evidence"; Chakraborty et al., "Living Evidence Syntheses"; Julian Elliott et al., 2021. "Decision Makers Need Constantly Updated Evidence Synthesis," *Nature* 600, no. 7889: 383–85, https://doi.org/10.1038/d41586-021-03690-1; Lavis et al., "SHOW ME the Evidence"; Norman et al., "Rapid Evidence Synthesis to Enable Innovation and Adoption in Health and Social Care"; Implementation Science Methods, "Rapid Evidence Synthesis"; Breckon et al., Rapid Evidence Assessments: A Guide for Commissioners, Funders, and Policymakers.

based on out-of-date, inaccurate or insufficient evidence. This must change if society is to address its many challenges."[27]

3. **Examples.** There are several examples in which RES or living evidence synthesis is already being used:

a. In the UK, the Parliament piloted Rapid Evidence Assessments in 2023[28]. Moreover, the English National Health Service (NHS) uses a rapid process "to support the identification and adoption of high-value innovations."[29]
b. Rapid evidence synthesis was used to produce a report on climate-proofing Small and Medium Enterprises (SMEs) for COP29, supporting a UN Climate Change High Level Champions' campaign which is run by the United Nations Framework Convention on Climate Change and partners.[30]
c. In Australia, living evidence is used to update clinical guidelines on treating stroke patients every 3–4 months instead of every 5–7 years, leading to "greater trust and use of the guidelines."[31]
d. Rapid evidence reviews were widely used during the COVID-19 pandemic, worldwide.[32]
e. There are also examples of application in education,[33] built environment,[34] greenhouse gas emissions in transport,[35] crime studies, and other fields.[36]

Overall, there seems to be a growing consensus that rapid and living evidence approaches may be productively used to assist with the implementation of the Sustainable Development Goals.[37] In climate and environmental science, rapid and living reviews can provide insights on how different climate solutions work in different contexts and which of them are most effective:

"Consider climate policy. The Intergovernmental Panel on Climate Change (IPCC) has been very effective in synthesizing evidence on the anthropogenic causes of climate change, its impacts and the potential effects of long-term emission-reduction strategies. But there is no comparable culture of

27 "Alive: Alliance for Living Evidence," accessed August 6, 2025, https://www.aliveevidence.org/

28 "Rapid Evidence Assessment Pilot," POST, n.d., accessed September 3, 2025, https://post.parliament.uk/rapid-evidence-assessments/

29 Norman et al., "Rapid Evidence Synthesis to Enable Innovation and Adoption in Health and Social Care"

30 Centre for Climate Engagement, Hughes Hall, University of Cambridge, Call out for Academic Experts for COP30 Climate Proofing SMEs Campaign, July 30, 2025, https://climatehughes.org/sme-cop30-call/

31 Elliott et al., "Decision Makers Need Constantly Updated Evidence Synthesis"

32 See for example European Parliamentary Research Service, 2023. "The European Public Health Response to the COVID-19 Pandemic: Lessons for Future Cross Border Health Threats": https://www.europarl.europa.eu/thinktank/en/document/EPRS_STU(2023)740218; Esther McSween-Cadieux et al., 2024. "Production and Use of Rapid Responses during the COVID-19 Pandemic in Quebec (Canada): Perspectives from Evidence Synthesis Producers and Decision Makers," *Health Research Policy and Systems* 22, no. 1: 22, https://doi.org/10.1186/s12961-024-01105-x

33 Sabine Wollscheid and Janice Tripney, 2021. "Rapid Reviews as an Emerging Approach to Evidence Synthesis in Education", *London Review of Education* 19, no. 1: https://eric.ed.gov/?id=EJ1318977

34 Malgorzata Lagisz et al., 2022. "Rapid Systematic Reviews for Synthesizing Research on Built Environment," *Environmental Development* 43: 100730, https://doi.org/10.1016/j.envdev.2022.100730

35 Ellie Nelson and Jiaxin Liu, 2025. "A Rapid Evidence Synthesis of Policy Mechanisms to Reduce Greenhouse Gases from Transport in Rural Areas," SSRN Scholarly Paper no. 5155975: https://doi.org/10.2139/ssrn.5155975

36 Breckon et al., Rapid Evidence Assessments: A Guide for Commissioners, Funders, and Policymakers

37 "Unearthing 'Hidden' Science Would Help to Tackle the World's Biggest Problems."

evidence synthesis on the effectiveness of climate-change mitigation or adaptation. Living evidence could help to firmly establish this capacity to ensure that the thousands of decisions needed to achieve net-zero emissions are supported by reliable and up-to-date scientific evidence."[38]

4. **Caveats.** Rapid evidence approaches have potential downsides which need to be considered and managed, such as the risk of bias and errors due to the use of methodological shortcuts, or additional difficulties in deploying such approaches to social policy questions.[39]

5. **AI and the future of evidence synthesis.** AI can potentially be used for accelerating evidence synthesis while maintaining a high degree of quality, although dedicated efforts to ensure that quality,[40] although dedicated efforts to ensure that quality must be must be undertaken.[41] In one example, the DESTINY project (Digital Evidence Synthesis Tool INnovation for Yielding Improvements in Climate & Health) aims to "demonstrate that the scientific knowledge needed for health-centred climate action can be synthesised and provided almost instantly."[42] There are also multiple other initiatives using AI for environmental action.[43]

6. **The role of research organisations.** While rapid and living evidence approaches are already being successfully deployed, they represent an innovative approach compared to some standard scientific practices, such as heavy reliance on publishing scientific articles. They will require adjustments from research funding and research performing organisations alike.

   Elliott et al. (2021) have the following to say on the importance of living evidence for research funders:

   "Living evidence is particularly relevant for research funders. To direct resources to important questions, funders must identify current knowledge gaps. Living evidence reveals these gaps by mapping published and ongoing research and by keeping up to date with new research. Investments in living evidence can therefore benefit society twice — directly by funding synthesis efforts, and indirectly by enhancing research investments. Funders should invest in systems, tools and partnerships that will build overall capacities beyond any specific project."[44]

   When it comes to research performing organisations, questions that need to be addressed include the need to develop methodology for conducting rapid evidence synthesis, as well as the need to ensure its recognition as a valid scientific output.[45]

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38 Elliott et al., "Decision Makers Need Constantly Updated Evidence Synthesis"

39 Breckon et al., Rapid Evidence Assessments: A Guide for Commissioners, Funders, and Policymakers.

40 European Centre for Disease Prevention and Control, 2022. "Use and Impact of New Technologies for Evidence Synthesis - Literature Review and Qualitative Data Collection": https://www.ecdc.europa.eu/en/publications-data/use-and-impact-new-technologies-evidence; Breckon et al., Rapid Evidence Assessments: A Guide for Commissioners, Funders, and Policymakers.

41 Nicola Francesco Dotti, 2024. "Guidance on Science for Policy Activities", Science Europe: https://www.scienceeurope.org/our-resources/guidance-science-for-policy/

42 "Stopping Climate Change Protects Human Health – a Major Project Helps to Pool the Knowledge," Potsdam Institute for Climate Impact Research, May 12, 2024, https://www.pik-potsdam.de/en/institute/departments/climate-economics-and-policy/mcc-archive/mcc-news-3255.

43 Victoria Masterson, 2024. "9 Ways AI Is Helping Tackle Climate Change," World Economic Forum: https://www.weforum.org/stories/2024/02/ai-combat-climate-change/.

44 Elliott et al., "Decision Makers Need Constantly Updated Evidence Synthesis."

45 Elliott et al., "Decision Makers Need Constantly Updated Evidence Synthesis."

7. **Comments.** While RES is not the 'golden standard' in evidence synthesis, it is highly suited for informing decision making and enabling actual uptake of innovations in the economy and the society. When considering the science–policy nexus, Science Europe's previous report has already recognised that evidence needs to be delivered to policy makers in appropriate timeframes and formats, responding to specific questions that policy makers have.[46] As such, RES and living evidence can facilitate evidence-based decision making. As mentioned above, it can also increase trust in science. Despite its limitations, RES is already frequently used in healthcare – a highly sensitive field.

Rapid Evidence and Science–Policy Dialogue

Professor Dr. Daniela Jacob, Director of Climate Service Center Germany (GERICS) and Honorary Professor at the School of Sustainability, LEUPHANA University Lüneburg, began the discussion by reflecting on the state of science–policy dialogue as it refers to climate.

Development of science–policy dialogue

Science–policy dialogues exist to produce and disseminate scientifically sound knowledge relevant to political decision-making processes. For successful scientific policy advice, essential requirements are **credibility** (scientific quality and validity), **relevance** (political usefulness and connectivity), and **legitimacy** (acceptance and trust of the actors involved in the process and the result). The interaction between scientists and policy makers is based on a 'push–pull' dynamic, wherein scientists 'push' what they want to communicate, and policy makers 'pull' scientific advice by inviting scientists to contribute to hearings, bodies, committees and other similar settings.

While in practice the relationship between science and policy is often complex and tense, its development over the last decades overall has been successful, notably when it comes to inter- and transdisciplinarity, transparency, and running iterative processes with sufficient resources. In the field of climate, the International Panel on Climate Change (IPCC) has ensured scientific rigour and objectivity, and built trust.

Rapid evidence synthesis in science–policy dialogue

According to Professor Jacob, rapid evidence has a significant potential as an addition to other evidence synthesis methods, notably by complementing time- and resource-intensive systematic reviews. In turn, living evidence can assist with tracking the progress and results of environmental action and modelling 'what-if' scenarios. While climate and climate change operate on a long-term timeline, the question is whether RES can support and accelerate the much-needed implementation of climate action and adaptation plans. This would be subject to making sure that RES relies on robust, transparent and standardised processes and ensures trustworthiness despite the short timelines.

Using AI for Evidence Synthesis

Professor Dr. Emily Shuckburgh OBE, Director, Cambridge Zero, and Professor of Environmental Data Science, University of Cambridge, addressed the ways in which new technologies can assist

46 Dotti, "Guidance on Science for Policy Activities."

with evidence synthesis. As decision making often has short timelines, rapid evidence synthesis is of relevance.

Tailored and well-communicated evidence

When it comes to science–policy dialogue, evidence synthesis is a small part of a broader process of co-creating knowledge and developing actionable insights. To be genuinely effective, synthesis must start with defining the scope and the relevant policy questions, and this must happen in dialogue between scientists and policy makers. Moreover, evidence synthesis needs to be framed as clearly and as impartially as possible, communicating different forms of scientific uncertainty and building a shared understanding of what the evidence means in practice.

AI for evidence synthesis

Professor Shuckburgh agreed that the increasingly important adaptation and resilience agenda is one area of climate science where rapid or bespoke evidence syntheses have a clear 'use case' to address particular challenges.

Artificial intelligence can be used to accelerate evidence synthesis, with the following caveats:

- The need to integrate justice issues into the evidence synthesis process from the inception, to ensure that resulting recommendations are ethical. This includes, among other things, making sure that evidence is sourced and shared equitably.
- Incorporating human oversight instead of relying on a purely AI-powered approach.
- Being conscious of the environmental footprint of using AI.
- Considering the technical challenges associated with AI approaches producing hallucinations.

An ongoing project at the University of Cambridge, "Conservation CoPilot", uses AI to assist with the synthesis of evidence on nature conservation, including actionable solutions. The project includes both a human assessment of this evidence base, and an AI that allows natural language interrogation of the evidence base.[47] According to Professor Shuckburgh, this type of evidence pipeline could become more widespread across a wide range of policy-related topics.

Rapid Response Model

Dr. Ismael Kawooya, Senior Research Scientist and Head of Office at the Center for Rapid Evidence Synthesis (ACRES), shared insights on how rapid evidence synthesis can be used for the benefit of policy makers. ACRES is a knowledge brokering institution, working with decision makers at different levels of governance: from regional to national to the UN Secretary General's Advisory Board. Its goal is to improve access to and availability of evidence, and to facilitate the ability to use this evidence in a timely manner in urgent situations.

Rapid evidence tailored to policy makers' needs

In agreement with other speakers, Dr. Kawooya pointed out that rapid evidence synthesis must be developed in response to policy makers' needs. It must be relevant, reliable, and credible; provide the best evidence that is available, even in situations of urgency; and, be accessible and

47 ai@cam, "AI-Driven Conservation CoPilot: Revolutionising Biodiversity Solutions," AI for Climate & Nature, August 12, 2024, https://ai.conservation.cam.ac.uk/projects/ai-driven-conservation-copilot-revolutionising-biodiversity-solutions/.

helpful to policy makers. We also need to consider that in practice, scientific evidence is just one of many inputs into policy making.

Policy makers expect that scientific evidence will help reduce the uncertainties they face when they need to take a decision, even if scientific evidence is not always certain. It is important to assess whether there are important uncertainties that need to be addressed, and what elements must be reflected in the evidence synthesis. Some topics, such as major investments, may require different types of evidence synthesis; for example, systematic reviews or an evidence gap map. In other cases, such as day-to-day decisions and in case of crises, it may be more sensible to reduce the uncertainty for policy makers and promptly come forward with better decisions with the help of rapid evidence synthesis. It can also help with identifying corrective actions in case policies do not bring envisaged results, or support continuation if everything is going as planned.

Methodologically rigorous rapid evidence

RES can be applied across disciplines, whenever evidence can be synthesised and inform decisions; for example, in health, energy, youth, or gender policy. Rapid responses provided by ACRES apply to situations in which decisions need to be made within 28 days, and sometimes as little as 48 hours.

Producing high-quality rapid evidence involves:

- Having a search strategy aligned with policy makers' needs.
- Careful consideration of relevant sources of evidence, including peer-reviewed databases as well as 'grey' literature.
- Ensuring sufficient analytical capacity to process the best available evidence, as well as relevant expertise for the topic being addressed.
- Use of available technology tools to accelerate the process.
- Appraising, contextualising, and summarising the evidence, whilst ensuring that it is methodologically rigorous and relevant to the context.

The Role of AI in Rapid and Living Evidence

Professor Dr. Jan Minx, Head of the Evidence for Climate Solutions Working Group at the Potsdam Institute for Climate Impact Research, discussed in his intervention how artificial intelligence can be used to accelerate and scale evidence synthesis for evidence-based climate policy and science assessments.

The case for living evidence

Not having a culture of evidence synthesis can be highly problematic, as primary evidence is often biased and sometimes wrong (due to differences in underlying methods, data, and so on). This is evidenced by sometimes contradictory conclusions of scientific studies. This explains why the entire body of evidence needs to be considered. In the climate and environmental community, literature reviews and evidence syntheses are not very widespread, and a robust methodological base for synthesis is also often lacking.

Living evidence involves generating consistently reliable access to evidence, whereby high-quality systematic maps and reviews are updated in 1–3 month-long cycles, in contrast to the conventional model in which evidence is updated every 3–5 years and becomes outdated towards the end of the cycle. It can provide policy makers with the best and most recent evidence, addressing the fundamental disconnect between the need and the delivery of evidence in the

science–policy interfaces: on the one hand, narrow windows of opportunity for policy makers to make decisions, and on the other, traditionally lengthy timelines for scientific research and synthesis, as well as the exponentially increasing number of academic publications and the challenges this poses for rigorous assessments of knowledge. For example, in the period when the IPCC prepared its 6th assessment report, 400,000 new studies were published on Web of Science mentioning the keyword 'climate' – and if grey literature and studies on adjoining topics were added, this number may reach into the millions.

Use of AI for living evidence

Recent advances in AI, and particularly large language models, can help navigate the ever-increasing amount of scientific evidence in much less time. While AI tools that claim to provide effective and fully automated reviews are rapidly proliferating – and there is indeed good potential for automation – this process needs to remain scientific and have human oversight, as previous speakers mentioned.

One response to this challenge from the scientific community is the Responsible AI in Evidence Synthesis (RAISE) Guidelines, which include three papers:

- **Responsible AI in Evidence Synthesis 1:** Recommendations for Practice
- **Responsible AI in Evidence Synthesis 2:** Building and Evaluating Evidence SynthesisTools
- **Responsible AI in Evidence Synthesis 3:** Selecting and Using Evidence Synthesis Tools

The Digital Evidence Synthesis Tool Innovation Yielding Improvements in Climate & Health (DESTINY) Project will co-develop a new generation of digital evidence synthesis tools (DESTs). These aim to deliver rigorous living evidence to policy makers and other end users, and to do so faster and cheaper. The project prioritises safe and responsible use of AI tools without eroding methodological standards.

AI can also be helpful to expand scientific evidence and address gaps in knowledge: one example is a recent study that mapped studies on observed climate impacts and on climate change attribution, concluding that climate impacts can be observed and are documented for 80% of the world's land surface, affecting 85% of the world population.[48] As it is AI-driven, this study can easily be updated at any time.

Rapid Evidence Synthesis and Ocean Science

Dina Eparkhina, Senior Policy and Communications Officer at EuroGOOS, European Global Ocean Observing System, discussed the potential applicability of RES methodologies in global ocean observations.

Rapid evidence in ocean science

The ocean is a vast and dynamic system that is vital to solving climate, biodiversity, and pollution crises, but is also largely unknown. Furthermore, observation data do not always equal understanding of the phenomena observed, and understanding does not always equal actionable knowledge. Rapid evidence synthesis frameworks can help the ocean-observing and -forecasting community shorten the timeframes for providing responses to the end users of

48 Max Callaghan et al., 2021. "Machine-Learning-Based Evidence and Attribution Mapping of 100,000 Climate Impact Studies", ***Nature Climate Change*** 11, no. 11: 966–72, https://doi.org/10.1038/s41558-021-01168-6

scientific observations, and reframe how observations are matched to decisions. EuroGOOS is currently examining how to co-construct the knowledge with the end users, creating a shared baseline of understanding and integrating climate and socio-economic considerations. The new European Union Ocean Pact will require considerable synthesis to address how different policy instruments of the European Commission with regards to the environment and the marine environment can be addressed in a synergetic way. Rapid evidence is a mindset, not a method, and it offers new exciting opportunities for ocean science.

Practical considerations in the use of rapid evidence

There are several practical considerations when it comes to considering the use of rapid evidence in ocean science in the EU. One consideration is the need for sovereign and sustained ocean observing systems at a time when over 50% of the world's ocean observations are carried out by the United States, as well as the need for open and findable, accessible, interoperable and reusable (FAIR) data. Other considerations include the need for system integration between observing governance, marine science funding platforms, modelling and policy needs, and the need to build trust in data and in systems.

AI has a very strong potential in ocean observing, with examples such as the European Centre for Medium Range Weather Forecast using AI to improve their model capacity and model production forecasting. However, ensuring that AI is trained on high-quality data and has human oversight is essential. It is also important to strengthen the interdisciplinary connection between ocean and data science. Finally, it is vital to involve society and stakeholders in building a shared understanding of the ocean and promoting both ocean and broader environmental literacy.

Open Discussion

Questions addressed during the open discussion included:

- **'Translating' scientific evidence to stakeholders:** It was noted that policy makers do in some cases prefer talking to scientists directly, while broader science–policy interfaces may be preferable to share scientific evidence. Deliberative dialogue and co-production of research questions between scientists and policy makers (with the condition that scientific integrity is maintained) may be helpful to both parties as well as to other involved stakeholders, including the people whose lived experience is affected by certain policy measures.

- **Integrating proactive foresight approaches into reactive evidence synthesis systems:** Proactive foresight approaches are essential to enable rapid evidence synthesis, and 'horizon scanning' of new and emergent trends is helpful in responding to policy makers' needs. It should be noted that when it comes to RES, there may often be conflicting imperatives at play, such as the need to bring in a transdisciplinary perspective and to appropriately consider all relevant stakeholders' perspectives on the one hand, and timeliness on the other. For these reasons, the time in which evidence is delivered may form part of the negotiations with decision makers. Overall, it may be sufficient to provide the best available evidence to support decision making.

- **Ways for research organisations to support rapid evidence synthesis approaches:** Firstly, research organisations can treat the methodology behind rapid evidence synthesis as an academic endeavour, advancing work on optimal use of rapid evidence, including how AI is used in the process. Secondly, scientific funding is currently mostly provided for medium- to long-term horizon studies, not for rapid responses. In these cases, preparing a rapid response

is conditional on using pre-existing resources and potentially putting on hold other funded research projects for the time that a rapid response is being developed. The need to integrate a multidisciplinary and systemic view further complicates the task of providing a rapid response. Thirdly, successful rapid evidence synthesis hinges on a baseline of consistently supported scientific observations and research capacity.

Next Steps

The speakers agreed that rapid evidence and living evidence approaches have exciting potential for environmental action, notably when it comes to processing large amounts of data; exploring practical solutions; and agile delivery of evidence to policy makers, especially when the decision-making process operates on tight timelines.

Preconditions for successful use of rapid and living evidence include methodological rigour and maintaining the integrity of the scientific endeavour; ensuring sufficient capacity and a baseline of academic research and observations to draw on; dialogue amongst policy makers, scientists from different disciplines, and other interested stakeholders; ensuring that evidence is accessible and helpful to policy makers; and integrating proactive foresight approaches. Artificial intelligence opens new technological possibilities in this realm, and its application can be highly successful if approached in a scientifically rigorous manner, with human oversight.

Science Europe and its partners intend to continue this discussion, notably when it comes to exploring possible roles for research funding and research performing organisations.

Annex: Programme

All times are in CEST.

14.00–14.10 **Welcome and Introduction**

- **Dr. Lidia Borrell-Damián**, Secretary General, Science Europe
- **Dr. Eldrid Herrington**, Head of Academic Engagement at Centre for Climate Engagement, Hughes Hall, University of Cambridge

14.10–15.00 **Panel discussion: Potential of Rapid Evidence Synthesis for Environmental Action**

- **Dina Eparkhina**, Senior Policy and Communications Officer at EuroGOOS, European Global Ocean Observing System
- **Professor Dr. Daniela Jacob**, Director of Climate Service Center Germany (GERICS) and Honorary Professor at the School of Sustainability, LEUPHANA University Lüneburg
- **Dr. Ismael Kawooya**, Senior Research Scientist and Head of Office at the Center for Rapid Evidence Synthesis (ACRES)
- **Professor Dr. Emily Shuckburgh**, Director, Cambridge ZMero, and Professor of Environmental Data Science, University of Cambridge
- **Dr Jan C. Minx**, Head of the Evidence for Climate Solutions Working Group at PIK

Discussion moderated by **Dr. Eldrid Herrington**, Head of Academic Engagement at Centre for Climate Engagement, Hughes Hall, University of Cambridge

15.00–15.30 **Q&A with the audience**

Moderator: **Dr. Eldrid Herrington**, Head of Academic Engagement at Centre for Climate Engagement, Hughes Hall, University of Cambridge