Strengthening the Science-Policy Interface:
A gap analysis

Executive Summary

1. Context: why do we need an improved science-policy interface?

The world is increasingly faced with environmental challenges which are exacerbated by an absence of coordination among different actors around the globe. In a global political context where scientific evidence is not often understood or used by policy-makers, there is a growing disconnect that has emerged, which not only dismisses, but excludes opportunities for collaboration.

Science and policy are at a crossroads. The interface needs to be framed by an effective and efficient governance structure to promote better interaction between the two. This intersection can be facilitated by operational knowledge from non-state actors.

A dynamic science-policy interface can be a core instrument to support well informed decision making on the environment while also engaging the right actors in achieving the Sustainable Development Goals.

1.1 Mandate and scope for the report

United Nations Environment Programme Member States have long recognized the need for a stronger sciencepolicy interface and have pushed for addition guidance through the following decisions and resolutions:

United Nations Environment Programme Governing Council decision 27/2:

"Decides that the governing body of the United Nations Environment Programme will promote a strong science policy interface by reviewing the state of the environment…." and "requests the Executive Director to identify critical gaps and present a report, with recommendations, to the governing body" (United Nations Environment Programme 2014a p. 17).

United Nations Environment Assembly (UNEA) 1 resolution 1/ 4:

"reiterates the request to the Executive Director to submit a gap analysis report on environmental data, information and assessments as well as recommendations on policy instruments for a strengthened science-policy interface to the United Nations Environment Assembly at its second session" (United Nations Environment Programme 2014b).

In this context, this report aims to identify new ways to improve the science-policy interface by:

- Providing a summary of the characteristics of an effective science-policy interface.
- Identifying the gaps found in practice in science-policy interfaces.
- Providing practical steps that Member States and international organisations can take to fill these gaps.

2. What does a gap-free, effective science-policy interface look like?

Science-policy activity is evolving to meet the challenges of delivering impact and supporting the achievement of the environmental dimension of the Sustainable Development Goals. Identifying the key elements of an effective science-policy interface allows for the identification of the internal gaps that act as barriers to such processes, and which impact decisions. There are three key elements for an effective science-policy Interface:

a. Links in the chain: Motivated and capable individuals, able to utilise and exchange evidence and expertise to
b. influence decision outcomes
c. The right evidence: Availability of the appropriate data and expertise
d. Productive exchange: of this evidence between individuals in the pathways

2.1 Key challenges facing the science-policy interface and its evolution

Participants at the Member State Forum for Science, Technology and Innovation for the Sustainable Development Goals in 2016 recognised the implications of one of the new challenges facing science-policy activity. They concluded: *"Sustainable Development Goals are disruptive. They imply a radical departure from business as usual…. likely to require new ways to approach the science-policy interface"* (E/HLPF/2016/6 p. 2 and 3). In the environmental area, three challenges have driven an evolution in science-policy interface activities:

a. Achieving the Sustainable Development Goals: The achievement of the 2030 Agenda for Sustainable Development will require the co-operation of a multitude of decision-makers with divergent primary priorities, scientists from a wide-range of disciplines and a great degree of understanding of interactions between achievement of parallel goals. In the spirit of 'leaving no one behind' it is crucial that gender mainstreaming is adopted in all science-policy activities, failure of which might lead to policies that aggravate the existing unintended consequences that further intensify inequality (United Nations Environment Programme 2016a).

b. Supporting Policy Implementation at the regional and country level: To tackle continued environmental degradation, despite well-developed global environmental governance, science-policy activity is moving further towards supporting implementation of international environmental agreements in countries and regions.
c. Engaging with a 'post-normal' scientific context: The political context for science-policy work has changed: decisions are urgent, uncertainty is high and political will fluctuates rapidly.

Science-policy activities aim at more than the synthesis of scientific research. They are designed to influence policy where the existing availability of evidence alone has not influenced outcomes. These three challenges above have brought two additional hurdles to science-policy activities being effective in this mission:

a. Working with divergent viewpoints: Improved outcomes come from engaging policy-makers who hold significantly divergent viewpoints on the importance of the environment, but whose decisions influence environmental outcomes, for example officials in economics or agriculture ministries.
b. Dealing with complexity: Achieving the Sustainable Development Goals requires scientific advice on complex interactions between goals achievement, which are dynamic, non-linear and uncertain. Policy processes are also complex – with interactions of multiple parties producing uncertain outcomes.

These additional hurdles not easily fit into the movement through the data-information-knowledge-action chain, which requires processes that are predictable, include the right actors and that are designed to achieve impact.

2.2 Changes to the practice of science-policy activity

The response of science-policy organizations to these new challenges is an evolution of their activities, including moving away from highlighting the nature of problems towards providing solutions and assessing their implications, for example by improved scenario-building. The trends are illustrated by adaptations in practices by some of the major scientific assessments: the Intergovernmental Panel on Climate Change (IPCC); Intergovernmental Science- Policy Platform on Biodiversity and Ecosystem Services (IPBES), United Nations Environment Programme's Global Environment Outlook (GEO) Assessment process; and the International Resource Panel (IRP) – shown in the **table below**.

These changes have created strong interest from United Nations Environment Assembly Member States in understanding the full range of changes to science-policy activity needed to more effectively improve environmental outcomes, in the face of these challenges, and where gaps exist in current practices.

A wide range of organisations are active in the science-policy interface, and have the potential to reduce these gaps through several initiatives. These include: United Nations Environment Programme Integrated Environmental Assessments, interfaces linked to Multilateral Environmental Agreements, exchange and capacity building initiatives like the Science-Policy-Business Forum, and national and regional initiatives like national science academies.

Evolution	IPCC	IPBES	GEO	IRP
1. **From identifying problems to uptake of solutions**	Agreed outline of IPCC's next (AR6) assessment has an 'IPCC 2.0' concept - assessing the solutions that will improve people's lives" (Climate Centre 2017).	One of IPBES work mandates is policy support through provision of 'policyrelevant tools' and catalysing their use.	The logic behind GEO-6's Outlook and Scenarios section was based around 'How to' rather than 'What if'.	IRP aims to tackle environmental degradation through the uptake of resource efficient technologies.
2. **Dealing with wider audiences and divergent viewpoints**	IPCC AR5 develops shared socio-economic pathways.	IPBES nurtures input from indigenous and local knowledge and uses a multidisciplinary advisory board.	GEO-6 is guided by an Intergovernmental and Stakeholder advisory group, group, in addition to a Scientific Advisory Panel.	IRP reports include economic assessments of resource efficiency.
3. **Increase effective exchange of evidence**	IPCC partners with European Climate Foundation (ECF) to gain strategic communications expertise.	IPBES partners with UNEP, UNEP-WCMC and other relevant partners to gain their expertise in interaction with national and regional policy processes.	GEO-6 is a participatory process producing outputs tailored to local and thematic issues.	IRP partners with Systemiq to gain external expertise in engagement of policy and business stakeholders.

3. Remaining gaps in the Science-Policy Interface

The identification of the remaining gaps in any science-policy interface comes out of understanding the specific challenges and solutions in relation to altering any environmental problem or outcome. This depends on:

a. Who needs evidence to reach a changed policy outcome, what their current perspectives are;
b. What evidence needs they have; and
c. What the best pathways, intermediaries, content, processes or form are, for them to take-up and use evidence.

Gender equality in science-policy activities

There is a pressing need to effectively promote gender equality in science-policy activities in a bid to decrease existing gender gaps. Various governments have made commitments in support of gender equality and these commitments ought to be followed up and implemented. The following 'Transformative Actions' developed by the Gender Advisory Board of the United Nations Commission on Science and Technology for Development, provide useful suggestions to address gender-gaps in Science and Technology (Schiebinger 2010 p. 5-6) :

1. Establishing gender equity in science and technology education
2. Removing obstacles to women in scientific and technological careers
3. Making science responsive to the gender dimension
4. Making the science and technology decision-making process more gender aware
5. Relating better with local knowledge systems
6. Addressing ethical issues related to gender in science and technology
7. Improving the collection of gender-disaggregated data for policy-makers
8. Equal opportunity for entry and advancement into larger-scale science, technology, engineering, mathematics disciplines (STEM) and innovation systems (Schiebinger 2010 p. 5-6).

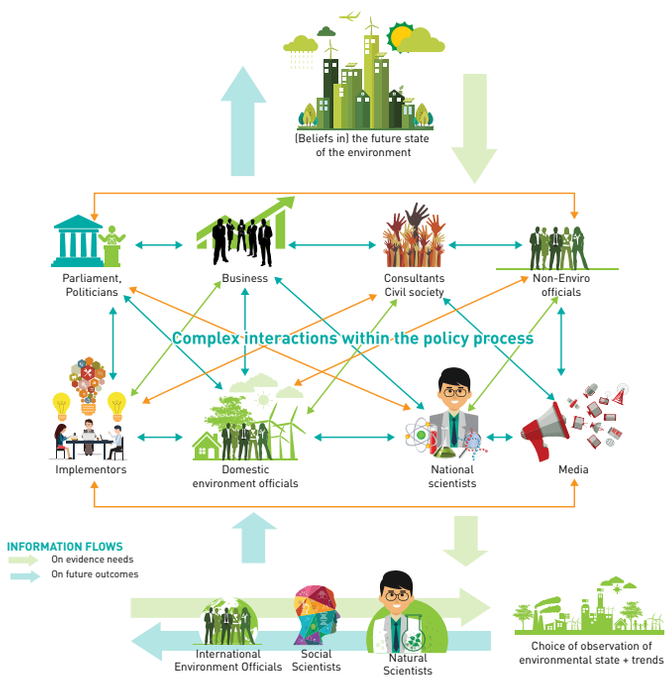
The answers to these questions are not always obvious. For example, evaluative research of sciencepolicy activities shows that personal exchange with the most relevant decision makers is the most frequent way to bring about use of evidence. The reasons for this are explained in the report.

The **figure next page** shows current thinking on the stylised information and evidence flows within participants in a science-policy interface, to help consideration of gaps and solutions.

Based on this understanding, gaps in any sciencepolicy interface can be identified, prioritised and tackled. Many organisations have completed or undertaken reviews to gain this understanding: e.g. The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) is starting an internal review process, and the International Resource Panel (IRP) discussed a new strategy to increase impact in November 2017.

Gaps can be found in three areas:

1) gaps in the chain of capable, motivated people exchanging evidence between scientists and final decision makers;
2) gaps in available evidence and 3) gaps in the effective transfer of evidence between the people in this chain.



4. Possible ways to address these gaps

Many gaps are persistent or recurring (United Nations Environment Programme 2014a), suggesting that existing practices in the science-policy interface are hard to change. Steps to change existing practices are needed to fill gaps, for example, by changing the governance frameworks of organizations involved in the science-policy interface.

The five categories below present ten steps which may be a helpful guide to action:

Step 1: Build your own understanding of gaps and capacities

- Seek to understand the links in the chains by which evidence could impact on the chosen environmental outcomes, determining which policy processes are relevant, who are the key players in those policy processes, what are their current viewpoints and their evidence needs. Build a more specific sketch of the pathways to impact – or 'theory of change'- for each intervention.
- Understand what information is missing about these pathways to your impact, and from whom and how you could find it. Learn through feedback from your own activities – through improved use of evaluation of impacts, and from the lessons and examples of other organizations.
- Prioritize your activities on these understandings. Dedicate resources to actions to build your capacity to engage with the new challenges – e.g. in skills, external expertise, networks or new decision processes. Build new partnerships to strengthen your capabilities.

Step 2: Build partnerships to grow your capacity to act

- Gain access to specific complementary expertise, sectoral and geographic networks and access to important decision makers by forming partnerships with external organizations with shared interests in improved policy outcomes.
- Use ongoing partnership activities to promote learning of new perspectives and process skills in your organization's officials and academic and governmental participants.

Steps 3 and 4: Fill gaps in available evidence

- **3.** Stimulate greater investment in monitoring and reporting of environmental states, particularly in those areas with clear links to welfare – like air quality. Fund long-term environmental monitoring to deliver trend data that can be openly accessed online by decision makers**.**
- **4.** Build statistical capacities, nationally and globally, to deliver reliable and timely statistics that can stimulate and inform policy debates. Promote the standardization of methods to allow comparability across countries.

Steps 5, 6 and 7: Build the capacities of other participants (or links in the chain to outcomes)

- **5.** Increase the professional rewards for scientific participants engaging in science-policy activity, through changes to national funding metrics. Build capacities to engage in trans-disciplinary, multi-stakeholder science-policy processes, e.g. placements and skills training.
- **6.** Promote changes to decision-making cultures and processes in nations and regions that move towards Evidence Based Policy Making, to give more incentives for individuals to apply evidence in policy.
- **7.** Design the participatory processes in science-policy interfaces in ways that increase the learning opportunities of all participants on ways to deliver more effective science-policy activity.

Steps 8, 9, 10: Create practices for the effective exchange of evidence

- **8.** Move away from 'dissemination' and 'outreach' to promoting productive exchange and learning by prioritized participants. Re-design science-policy participatory processes for more productive exchange between individual participants, planning activity around the needs of the relevant decision makers (or intermediaries).
- **9.** Put important assessment processes on a secure financial and structural footing to ensure that they can plan and adapt to future challenges.
- **10.** Create written outputs that fit participant's needs, tailoring form, frequency and content of outputs to different audiences in different contexts and potential use. Increase transparency of evidence and the processes to agree it, providing open-access to underlying data. Support legitimacy and trust in evidence through comprehensive review processes.

Conclusion

Gaps in evidence or between actors engaged in the science-policy interface mean that desired outcomes are unlikely to be achieved. As knowledge on effective science-policy work has grown over the last decades, it has driven an evolution in the practice of science-policy activity. This evolution reflects innovation and experimentation by the leading actors in sciencepolicy interfaces. Science-policy organisations require dedicated change processes to their governance models to have impact in the future, including providing information for achieving the Sustainable Development Goals. The evidence that they provide plays an essential role in creating the political will to develop policy. This report suggests to Member States, and to all key actors in the data-information-knowledge-action chain, different tools and methods in which gaps between science and policy can be filled, while providing encouragement for collaboration among these networks.

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