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Assessment of options for strengthening the science-policy interface at the international level for the sound management of chemicals and waste

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Disclaimer

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List of Abbreviations and Acronyms

BRS	Basel, Rotterdam and Stockholm Conventions
CBD	Convention on Biological Diversity
COI	Conflict of interest
COP	Conference of the Parties
CRC	Chemicals Review Committee
EEAP	Environmental Effects Assessment Panel
FAO	Food and Agriculture Organization of the United Nations
GCO-II	Second Global Chemicals Outlook
GWMO	Global Waste Management Outlook
GEF	Global Environment Facility
GEO	Global Environment Outlook
GESAMP	Group of Experts on the Scientific Aspects of Marine Environmental Protection
IAASTD	Intergovernmental Assessment of Agricultural Science and Technology for Development
IAP	Inter Academy Partnership
ICCM	International Conference on Chemicals Management
IGO	Intergovernmental organization
ILO	International Labour Organization
IOMC	Inter-Organization Programme for the Sound Management of Chemicals
IPCC	Intergovernmental Panel on Climate Change
IPBES	Intergovernmental Science-Policy Platform for Biodiversity and Ecosystem Services
ISWA	International Solid Waste Association
MBTOC	Methyl Bromide Technical Options Committee
MEA	Multilateral environmental Agreement
MOU	Memorandum of understanding
NGO	Non-governmental organization
OECD	Organisation for Economic Cooperation and Development
OEWG	Open-ended Working Group
POPs	Persistent organic pollutants
POPRC	Persistent Organic Pollutant's Review Committee
SAICM	Strategic Approach to International Chemicals Management
SAP	Scientific Assessment Pane
SBSTA	Subsidiary Body for Scientific and Technological Advice
SPI	Science-Policy Interface
TEAP	Technology and Economic Assessment Panel
TOCS	Technical Options Committees
UNDP	United Nations Development Programme
UNEA	United Nations Environment Assembly of the United Nations Environment Programme
UNEP	United Nations Development Programme
UNFCC	UN Framework Convention on Climat Change
UNIDO	United Nations Industrial Development Organization
UNITAR	United Nations Institute for Training and Research
UNDP	UN Development Programme
UK NEA	The **UK** National Ecosystem Assessment
WHA	World Health Assembly
WHO	World Health Organization
WMO	World Meteorological Organization

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EXECUTIVE SUMMARY

UNEA Resolution 4/8[1] on the sound management of chemicals and waste stresses, in the preamble, "the urgent need to strengthen the science-policy interface at all levels to support and promote science-based local, national, regional and global action on sound management of chemicals and waste beyond 2020; use of science in monitoring progress; priority setting and policy making throughout the life cycle of chemicals and waste, taking into account the gaps and scientific information in developing countries."

The resolution, adopted at the fourth meeting of the United Nations Environment Assembly (UNEA4) (Nairobi, Kenya, 11-15 March 2019), also requests the UNEP Executive Director, "subject to the availability of resources and, where appropriate, in cooperation with the member organizations of the Inter-Organisation Programme for the Sound Management of Chemicals (IOMC)" to "prepare an assessment of options for strengthening the science-policy interface at the international level for the sound management of chemicals and waste, taking into account existing mechanisms, including under UNEP, and relevant examples in other areas, in order to maximise cost-effectiveness, make best use of new technologies, track progress and improve implementation of relevant multilateral environmental agreements at the national level, and to make it available for consideration by all stakeholders prior to International Conference on Chemicals Management (ICCM-5)."[2]

The resolution further "encourages the involvement of all relevant stakeholders, including industry, in strengthening the science-policy evidence in this area, including consideration of relevant socioeconomic aspects"[3] and calls on governments and all other relevant stakeholders including United Nations agencies as appropriate, industry and the private sector, civil society and the scientific and academic communities to "support relevant science-policy interface platforms, including input from academia, and to enhance cooperation in the environment and health areas; and consider at the Strategic Approach to International Chemicals Management (SAICM) Open-ended Working Group (OEWG3) and at the intersessional process on the sound management of chemicals and waste beyond 2020 ways of strengthening science-policy interface, including its relevance for implementation of multilateral environmental agreements at the national level."[4]

Impact of a Strengthened Science-Policy Interface platform

[1] UNEP/EA.4/RES.8 p.1

[2] UNEP/EA.4/RES.8 Paragraph 14 and 14 (g)

[3] UNEP/EA.4/RES.8 Paragraph 9

[4] UNEP/EA.4/RES.8 Paragraph 12 (g)

The success of a Science-Policy (SPI) platform can be measured by its impact in a given issue area. Whether through convening expert groups, conducting assessments, preparing guidelines, or assessing particular actions, SPI platforms can facilitate policy design and decision-making by bodies such as the Conferences of Parties to Multilateral Environment Agreements (MEAs), the UN governing bodies and/or the (ICCM)[5] as such or after decision at ICCM5 in its new form. SPI platforms can also influence a broad range of stakeholders and institutions as they contribute to the design and implementation of policies relevant to their organizations' mandates. SPI platforms can also support national agencies and other groups with awareness-raising activities, capacity-building, access and development of policy tools, and implementation of actions related to sound management of chemicals and waste. Outputs from SPI platforms, such as the Intergovernmental Panel on Climate Change (IPCC) and the Intergovernmental Science-Policy Platform for Biodiversity and Ecosystem Services (IPBES), have been used by stakeholders including:

- national governments,
- multilateral environmental agreements (for example, IPCC assessment provided the evidence base for the Kyoto Protocol and the Paris climate agreement, and the recent IPBES assessments are providing the evidence base for the post 2020 biodiversity framework and targets),
- global financial institutions and development agencies,
- UNEA and other UN governing bodies,
- the private sector, and
- civil society.

The global mercury assessment informed the development of the Minamata Convention on Mercury, and the assessments mandated by the Montreal Protocol have significantly influenced adjustments and amendments to the Montreal Protocol.

Such outputs have also been widely communicated to the public via both social media and mass media coverage and have been used in community organizing, awareness-raising, policymaking, mobilization of financial resources and judicial decision-making at a variety of scales in many countries.

Outputs from a Strengthened Science Policy Interface

SPI platforms can inform different stages of the policy-making process, depending on needs. It is worth emphasizing that policy processes are rarely linear, and are more accurately represented as several iterative phases that feed into and shape one another; this is a key and valuable characteristic of science-policy interfaces, which allows science to provide the evidence needed for policy formulation and implementation, and policy needs to spur gathering of relevant scientific data and new research endeavours. However, it is useful to specify the key stages of the policymaking process and the ways in in which SPI platforms can link scientific knowledge/evidence with policymakers at each stage of the policy process.

[5] ICCM is the multi-sectoral and multi-stakeholder governing body of the Strategic Approach to International Chemicals Management (SAICM). Adopted in 2006, SAICM's overall objective is "to achieve the sound management of chemicals throughout their life-cycle so that, by 2020, chemicals are used and produced in ways that lead to the minimization of significant adverse effects on human health and the environment." At its fourth meeting in 2015, ICCM initiated an intersessional process for considering SAICM and the sound management of chemicals and waste beyond 2020. To date, three meetings of the intersessional process have taken place. IP4 was planned to be held from 23-27 March 2020 in Bucharest, Romania, new dates to be defined. ICCM5 will take place from 5-9 October 2020.

Agenda setting: SPI platforms can be used for horizon scanning. They can also identify and define problems that require action on a national, regional or global scale by undertaking scientific assessments, conducting literature reviews, producing reports on the nature and scale of a problem, and how an issue may evolve in the future. They can also play a significant role in raising public awareness.

Policy formulation: SPI platforms can generate inputs that inform all actors, both in the negotiation of instruments designed to respond to a problem, and in developing specific policies designed for implementation at the global, regional or national scale.

Policy implementation: SPI platforms can provide critical information about the potential impacts of regulatory action, e.g., data or evidence related to benefits, costs, feasibility, and likely efficacy of proposed actions.

Policy evaluation: SPI platforms can provide critical input on the impacts of policies and strategies on a given problem, drawing out lessons to support increased effectiveness in future actions.

At the time of defining characteristics of a SPI platform, several elements need to be considered. Table 1 summarizes some key questions that need to be addressed for a science-policy interface platform. The rest of the paper addresses each of these issues.

TABLE 1: GUIDING QUESTIONS FOR A SCIENCE-POLICY INTERFACE PLATFORM

I. SCIENCE POLICY INTERFACE PLATFORM

1. Can existing interfaces be expanded to address the needs?
2. How should the institutional arrangements be structured?
   - Should the SPI be intergovernmental or non-governmental?
   - Should the SPI be a standalone independent body or be subsidiary to an existing body?
3. How should decisions be made?
   - Should there be a plenary?
     - If there is a plenary and it is an intergovernmental process, would only governments be members and allowed to make decisions, and would stakeholders be observers?
     - Should the plenary be the decision-making body?
     - Should the plenary set the agenda and select assessment topics, approve the overall budget and approve assessment reports?
       - What process should be used to set the agenda, e.g., who can suggest assessment topics?
   - Should the platform have advisory body(s), such as a Bureau and/or a scientific advisory body?
     - If there is a bureau should it be composed of government representatives only? or should it be comprised of government representatives and other stakeholders? And what should the status of the stakeholders be? - the same as the government representatives or only observer status?
4. Should the platform receive funds from governments, UN bodies, GEF, intergovernmental organizations, private sector and foundations, and should a UN organization manage the funds?
5. Should the secretariat be hosted in a UN organization, or as a joint secretariat between 2 organizations, or be independent?

II. OUTPUTS

1. General questions related to output
   - Should the platform reports be of a global nature, or also regional/national?
   - What kind of information should the platform produce (e.g., assessed knowledge, policy options, guidelines)
   - Should the platform measure its impact on how it has influenced the S-P interface?
2. Process for drafting reviewing assessment reports
   - Should the assessments review existing journal and grey literature only, or also request data generation?
   - Should assessments be prepared by experts from within permanent working groups, through using the existing networks of experts, or nominated/selected depending on the issue(s) being assessed?
   - Should the external reviewers be open to anybody with relevant academic expertise, i.e., selected on a report by report basis, or be nominated by the SPI?
3. Functions
   - Should the platform communicate its outputs, or should another body do so?
   - Should the platform go beyond assessment reports? for example could the platform:
     - Provide capacity building, how?
     - Develop or assist in accessing policy tools

Institutional design

To deliver authoritative outputs that are policy relevant but not policy prescriptive the procedures through which an SPI platform works, whether formal or informal, must contribute to the credibility, legitimacy, relevance, and transparency of the platform. SPI platforms needs to be iterative, which is crucial to an institution’s flexibility, and inclusive, ensuring appropriate contributions from a broad range of experts with different disciplinary expertise, geographic/regional balance and ways of knowing (i.e., different world views), and from experts from different stakeholder groups, while avoiding conflicts of interest[6]. SPI platforms may be intergovernmental (e.g., IPCC or IPBES) or non-governmental (e.g., the International Panel on Chemical Pollution); this and other design choices could affect the perceived legitimacy of an SPI platform, as would the composition, representativeness, and participation of stakeholders in its work.

The existing landscape of SPI platforms working on aspects of sound management of chemicals and waste includes several subsidiary advisory bodies that are tasked with recommending actions to support implementation of an MEA (e.g., the Stockholm Convention's Persistent Organic Pollutant's Review Committee (POPRC) and the Rotterdam Convention's Chemical Review Committee). Examples from outside the field of environment include the joint Food and Agriculture Organization (FAO)/World Health Organization (WHO) panels subsidiary to the Codex Alimentarius Commission, as well as other expert bodies that established by UN Specialized Organizations. IPCC and IPBES, which are tangentially involved in this issue area, have no analogue in the chemicals and waste arena, but provide potential models in that they are independent but highly responsive to the needs of the conventions on climate and biodiversity, respectively.

Several challenges will need to be addressed in order to effectively strengthen an international-level science interface for sound management of chemicals and waste. As desired qualities, a SPI should be able to: engage in horizon scanning; identify emerging issues of concern; monitor trends; identify, assess and communicate the environmental and human health issues associated with chemicals and waste; evaluate and refine response options (e.g., practices, policies and technologies); and potentially stimulate the negotiation and enactment of new policy approaches. Furthermore, it will be critical to consider issues including, but not limited to, the extent to which chemical identities remain publicly unknown; the financial implications for the private sector of sharing proprietary information; technical challenges of identifying and tracking chemicals in products, humans and the environment; different approaches to precaution, and risk-based versus hazard-based chemicals management (Geiser 2015).

Options for strengthening the SPI at the international level for sound management of chemicals and waste

This report outlines options for strengthening the science-policy interface, including the anticipated strengths and weaknesses of each option. It is also possible to develop an option by combining different characteristics from the following options, taking account of the questions in Table 1 to guide the decision making. Any new science-policy interface would need to be designed to strengthen and complement existing science-policy interfaces. Appendix I to this report includes a list of the SPI platforms reviewed in preparing this report.

Option A: An independent platform

Under this option, which is most analogous to the IPCC and IPBES models, new platform would produce authoritative assessments, engage in horizon scanning, and identify emerging issues. As with IPBES, it could also build capacity in particular to address special needs of developing

[6] This does not mean that stakeholders need to be represented on the expert body, but different stakeholders do have useful knowledge. Stakeholder input to expert bodies can also be achieved by hearings, submissions, public review of drafts. This is a means to manage potential conflicts of interest.

countries, catalyse knowledge generation, and develop policy tools. This body would not be subsidiary to an existing institution and would thus not be overseen by an existing political process. But it would need to have close ties to relevant decision-making bodies. There are several options for structure and membership, each of which carries specific advantages and limitations.

This independent platform could become the overarching, authoritative science-policy interface, in part because it would be positioned to tackle cross-cutting issues that none of the current SPI platforms are able to address due to their more focused mandates. A potential weakness is that it may not be best suited to rapid response scientific advice, as the infrastructure and systematic production, review and adoption processes for IPCC and IPBES assessments have typically taken several years from framing to completion (although IPBES has developed a fast-track process). Additional strengths and weaknesses are set out in the full report.

Option B: Institutionalizing the Global Chemicals Outlook (GCO) and Global Waste Management Outlook (GWMO) processes

This option[7] would institutionalize the production of the GCO and of the GWMO so that they are not contingent on a UNEA resolution or prioritization in the context of a crowded, UNEP-wide work programme. A key strength of this option is that it could be implemented relatively rapidly; it could also bring heightened visibility to outputs of existing SPI platforms. This option would be less costly than an independent intergovernmental platform, *à la* IPCC and IPBES, if the indicative budget of GCOII is taken as the baseline; however, this depends on how critical issues such as membership and geographic representation are built into the institutional design.

A potential weakness of this option, like many of the options, is that the GCO and GWMO may not be best suited to horizon scanning or rapid production of science advice, as the schedule might lock in several years from initiation to output. Furthermore, although conclusions would be agreed by a broadly representative steering committee, they would not be formally adopted inter-governmentally and therefore may not carry as much weight.

Option C: Thematic subsidiary panels with specialized task forces

This option would be analogous to the SPI arrangements under the Vienna Convention and Montreal Protocol on the ozone layer, in which parties are advised by three panels comprised of independent experts. This option would entail establishment of thematic panels subsidiary to a decision-making body such as UNEA, or by the WHO, which comprises the inter-governmental World Health Assembly (WHA) and a technical secretariat headed by a Director General responsible for convening expert bodies) or the relevant governing body of the Beyond 2020 framework. Panels could be established as needed, time-limited, and supplemented by task forces responsible for cross-cutting work. Joint panels could also be established in accordance with the rules of the relevant UN bodies.

Such an SPI could: be highly responsive to the body or bodies to which it reports; facilitate exchanges among experts who would be unlikely to interact in the current arrangement of SPIs; and create a space for scientific and technical discussions that do not have a forum in the current structure, or have not been established to date in the current structure. This option would be less costly than an independent intergovernmental platform, *à la* IPCC and IPBES.

[7] Another science-policy interface that has some features of the Global Chemical Outlook is the International Resource Panel

If subsidiary to UNEA and/or the WHO, a potential weakness could be that such an SPI platform risks overloading an already crowded agenda (under which the sound management of chemicals and waste is just one of several areas of concern). Some government representatives who normally deal with environmental issues in international settings, rather than health issues, might be concerned that the reports are not approved through an intergovernmental process, *ala* IPCC and IPBES[8], even though it is acknowledged that UNEA and WHO are the authoritative international sources of environment and health information. A science policy interface jointly administered by UNEA and WHO would avoid duplication of effort and potential inconsistencies.

[8] An intergovernmental process approving a technical assessment would not be appropriate for the WHO. Technical products such as norms, standards and guidelines are approved by the Director General, not the WHA. This separation of technical work from the supreme decision-making body was a desired feature of the States that developed the treaty that established WHO. The view in the paper that acceptance of expert advice is strengthened by governmental participation in the expert process does not reflect the experience of the WHO, which is in contrast to experiences of science-policy interfaces for environmental issues, ala IPCC and IPBES.

1. Introduction

1.1 Background

UNEA Resolution 4/89 on the sound management of chemicals and waste stresses, in the preamble, "the urgent need to strengthen the science-policy interface at all levels to support and promote science-based local, national, regional and global action on sound management of chemicals and waste beyond 2020; use of science in monitoring progress; priority setting and policy making throughout the life cycle of chemicals and waste, taking into account the gaps and scientific information in developing countries." The Resolution, adopted at the fourth meeting of the United Nations Environment Assembly (UNEA4) (Nairobi, Kenya, 11-15 March 2019), also requests the UNEP Executive Director, "subject to the availability of resources and, where appropriate, in cooperation with the member organizations of the Inter-Organisation Programme for the Sound Management of Chemicals (IOMC)" to "prepare an assessment of options for strengthening the science-policy interface at the international level for the sound management of chemicals and waste, taking into account existing mechanisms, including under UNEP, and relevant examples in other areas, in order to maximise cost-effectiveness, make best use of new technologies, track progress and improve implementation of relevant multilateral environmental agreements at the national level, and to make it available for consideration by all stakeholders prior to ICCM-5."10 The resolution further "encourages the involvement of all relevant stakeholders, including industry, in strengthening the science-policy evidence in this area, including consideration of relevant socioeconomic aspects"[11] and calls on governments and all other relevant stakeholders including United Nations agencies as appropriate, industry and the private sector, civil society and the scientific and academic communities to "support relevant science-policy interface platforms, including input from academia, and to enhance cooperation in the environment and health areas; and consider at the SAICM OEWG3 and at the intersessional process on the sound management of chemicals and waste beyond 2020 ways of strengthening science-policy interface, including its relevance for implementation of multilateral environmental agreements at the national level."[12]

The conferences of the parties of the Basel, Rotterdam and Stockholm conventions adopted decisions[13] entitled 'from science to action', in which, among others, the Secretariat was requested to cooperate and coordinate, as appropriate with UNEP in the preparation of the assessment of options for strengthening the science-policy interface, particularly with regard to possible synergies and opportunities between the existing mechanisms under the Basel, Rotterdam and Stockholm conventions and the science-policy interface for the wider sound management of chemicals and waste. The decisions also took note of the road map for further engaging Parties and other stakeholders in informed dialogue for enhanced science-based action in the implementation of the three conventions[14].

9 UNEP/EA.4/RES.8 p.1

10 UNEP/EA.4/RES.8 Paragraph 14 and 14 (g)

11 UNEP/EA.4/RES.8 Paragraph 9

12 UNEP/EA.4/RES.8 Paragraph 12 (g)

13 BC-14/25, RC-9/13, SC-9/23

14 UNEP/CHW.14/INF/40; UNEP/FAO/RC/COP.9/INF/35; UNEP/POPS/COP.9/INF/44

The topic is also being discussed in other relevant international fora. Potential strategies to strengthen the science-policy interface were also prominently discussed at a side event at the third meeting of the OEWG3 of the ICCM (Montevideo, Uruguay, 1-4 April 2019). In addition, an international workshop was convened by the International Panel on Chemical Pollution (IPCP) (Geneva, Switzerland, November 2018) to support the ongoing dialogue on this topic.

As explored in a report prepared by WHO, UNEP, the Basel, Rotterdam and Stockholm (BRS) Secretariat and the Organisation for Economic Cooperation and Development (OECD) in 2018 (SAICM/IP.2/INF.12), a number of international bodies and mechanisms that bring together scientists and policy-makers have been established to ensure that policy-making on sound management of chemicals and waste is informed by the latest scientific evidence. Meanwhile, the need for strengthened engagement by scientists and a stronger role for scientific research has been emphasized by various stakeholders.

The Global Chemicals Outlook II (GCO-II), released in 2019 identified continued challenges in creating a coherent global knowledge base for decision-making and highlights prevailing barriers in ensuring effective two-way communication between academia and policymakers. The GCO-II provides several options for action to strengthen the science-policy interface and use of science in monitoring progress, priority settings (e.g. for emerging issues), and policy making throughout the life cycle of chemicals and waste. Lessons from GCOII are discussed in detail in Section 4 of this report. Important to note is the fragmentation level that exists and the need to have a platform that support cohesiveness and coherence in the narrative.

1.2 Mandate and objective

The mandate for this report is set out in the UNEA resolution described above. It will be presented to UNEA5. It is expected to be considered at the fourth meeting of the intersessional process for considering SAICM and the sound management of chemicals and waste beyond 2020 (IP4) and may inform deliberations at ICCM5. This report seeks to facilitate and inform discussions on strengthening the science-policy interface for chemicals and waste management and thus support and promote science-based local, national, regional and global action on sound management of chemicals and waste beyond 2020. It also aims to provide elements for bringing agendas together, and how science-policy platforms need to interact and inform each other.

2. Science-Policy Interfaces: Purpose, Design and Assessment

2.1 Purpose

SPI platforms have proliferated in the last decades as means of overcoming, whether in a national context or at a regional and global scale, what can sometimes seem to be a chasm between the realms of scientific research and of elaborating and implementing policies. Thus, in their most basic form, SPI platforms are designed to facilitate experts' provision of evidence to support policymakers.

Certain SPI platforms are designed to facilitate the delivery of messages about needs and/or priorities from policymaking forums to communities of scientists. Others emphasize feedback in the other direction, creating opportunities for the science community to inform the policymaking arena. Some platforms seek to foster exchanges in both directions, in some cases by creating a setting in which members from the science and policymaking communities can collaborate in producing outputs (these are sometimes called "boundary organizations"). Others have broadened their scope beyond the dichotomy of scientists vs. policymakers, working instead to "knit together existing multiscale networks of scientific, policy, and stakeholder communities" (Hulme et al. 2011). IPCC and the IPBES can both be considered boundary organizations where the scientific and policy communities co-design and co-produce the assessments.

One key feature of an assessment is providing a consensus assessment of the evidence for international policy formulation, i.e. speaking with a single voice. Presenting assessments as unified and authoritative is essential as it limits the extent to which policymakers may elect to only rely on the elements of scientific evidence that support their preferred policy option. Assessments such as IPCC and IPBES, assess the robustness of the information and provide policymakers with confidence levels for each key finding, using a framework that is based on the quantity and quality of evidence, and the level of agreement among different studies.

Taken collectively, the constellation of platforms designed to deliver on some aspect of bridging the gap that can arise between science and policy in this issue area can be understood to constitute "the science-policy interface at the international level for the sound management of chemicals and waste" that is the target of the request in Resolution UNEA4/8 14(g).

2.2 Design Features

Prior to reviewing the existing science-policy interface, with the aim of assessing options for its eventual strengthening, it is necessary to understand the design and operation of these platforms and the ways in which they relate to each other.

2.2.1 Target Audiences

Whether a science-policy interface is considered a success is largely dependent on the level of uptake by the target policy arena, whose participants can also be thought of as the central "customer" for the platform's output.

Many of the existing science-policy interface platforms concerned with the sound management of chemicals and waste, have been established as subsidiary expert bodies under a global treaty, and the Conference of the Parties (COP) can be understood to be the principal target of a platform's outputs. Building on the output delivered to them by the SPI platform, parties can make policy and legally binding decisions, albeit within the constraint of their specific mandate.

UN governing bodies and ICCM stand out as being the two most broad-reaching policy-making settings that could make impactful use of the outputs of a strengthened science-policy interface. Among other things, they can convene expert groups, prepare guidelines, commission assessments, or urge countries or other stakeholder to take specific actions. Furthermore, UNEA and other UN governing bodies have the authority to convene Intergovernmental Negotiating Committees to prepare legally binding instruments. In all of these activities, a strong SPI platform has the potential to support and enhance the work of these bodies.

Of course, the reach of a science policy interface can and should extend far beyond the stakeholders delineated above. Indeed, outputs from IPCC and IPBES have been used by national governments, other multilateral environmental agreements (MEAs) (e.g., on climate, biodiversity and combatting desertification), the private sector (the recent IPBES global assessment was heavily cited in recent World Economic Forum reports), global financial institutions, development agencies, and Non-governmental organization (NGOs). These outputs are communicated to the public through a variety of mass media and social media avenues, and are used in community organizing, awareness raising, policymaking and judicial rulings at a variety of scales in developed and developing countries.

2.2.2 Outputs

In addition to considering the target audience(s) for a SPI platform, it is necessary to differentiate among the stages of the policymaking process a platform may be aiming to inform as this will often entail a different kind of output. The policy-making process is commonly understood to consist of four phases: agenda setting, policy formulation, implementation, and evaluation. These four distinct phases are commonly misunderstood as following a linear path, where one phase feeds into, and is clearly separate from, the next stage. In practice, the interaction among these phases of the policy making process is more complicated, with several iterative loops connecting each phase to all the others. Nevertheless, it is helpful to consider the role of science, and of existing science-policy interface platforms in particular, in the context of the phase of the policy making process they are designed to influence.

Agenda setting: When it comes to agenda setting for the sound management of chemicals and waste at the international level, science-policy interfaces may first focus on horizon scanning, i.e., identification of emerging issues, and then on defining a problem that might need to be addressed by policymakers on a regional or global scale. In such circumstances, science-policy interfaces will commonly undertake assessments, or systematic reviews of existing literature, to convey the nature and the scale of the problem as it has been defined in state-of-the-art scientific publications (i.e., in peer-reviewed journals and grey literature). The institutional home of such a science-policy interface will often reflect particularities of the problem and the setting of some of the earlier policy initiatives on the question. For example, the Arctic Monitoring Assessment Programme's work on Persistent Organic Pollutants in 1998 contributed to the basis for the negotiation of the 2001 Stockholm Convention on Persistent organic pollutants (POPs) (earlier assessments also informed the negotiations leading to the 1998 Aarhus Protocol on POPs under the UN/ECE Convention on the Long-Range Transboundary Air Pollution). The 1985 stratospheric ozone assessments led to the Vienna Convention for the Protection of the Ozone Layer and the First IPCC assessments in 1991 led to the creation of the UN Framework Convention on Climate Change (UNFCCC) in 1992.

In addition to conveying the state of available data and contributing to the definition of problems, science-policy interfaces may also enhance public awareness of a problem by generating powerful visuals and attracting media coverage of their outputs. Thus, the science-policy interface has the potential to feed into awareness-raising campaigns aimed at encouraging governments, private sector, or regions, to tackle a particular problem.

Policy formulation: When it comes to policy formulation, one of the most common situations at the global scale involves the science-policy interface generating assessed knowledge that informs the negotiation of an eventual binding or non-binding instrument, norm, standard or guideline that addresses the problem. Of course, science-policy interface platforms at the international level can also inform policy formulation at the national level. The stratospheric ozone assessments led to the Montreal Protocol on Substances that Deplete the Ozone Layer, and graphical representations of the Antarctic ozone hole incorporated into early international assessments of the depletion of the ozone layer proved powerful in bringing the issue to public attention and led to a strengthening of the Montreal Protocol. The Global Mercury Assessments (undertaken by UNEP) helped establish the need for and the scope of the Minamata Convention. The second, third, fourth and fifth IPCC assessments provided the scientific evidence that led to the Kyoto Protocol and Paris climate agreements, and the recent IPBES reports are being used as the scientific basis for negotiating the post 2020 biodiversity framework and targets. Indeed, the launch of conversations around a problem within a policy arena can cause scientists, and science-policy interfaces, to shift their deliverables beyond a common framing of a problem to bring it to the attention of the public and governments, in order to fulfill what are broadly understood to be decision-making needs. There is a great deal of variation as to how explicitly policymakers convey their need for such additional information.

Policy formulation is not limited to the period during which a treaty text is under negotiation; parties and stakeholders are continuously engaging in policy formulation as they negotiate protocols or delineate specific policies to allow the implementation of treaty goals. Although some science-policy interfaces have been established on a time-limited basis specifically for the formulation stage (for example the Criteria Expert Group reviewing candidate POPs for listing under the Stockholm Convention prior to its adoption), many treaties are designed to be dynamic and able to address problems over time, as problems evolve, and new information arises. For example, the Stockholm Convention was intended to be a 'living MEA' that could add new POPs to its annexes, following review by its subsidiary expert institution, the POPs Review Committee.

Policy implementation: When policymakers turn to the work of implementation, their requirements or expectations of a science-policy interface may change. In the agenda setting and policy formulation phase, policymakers may seek state-of-the-art understandings of the fundamental characteristics of the problem and its drivers. In contrast, decision-making needs at the implementation phase may require targeted input on a carefully delineated question, or advice on the range of policy options suited to the nature of the defined problem, trade-offs they might entail, and cost-effectiveness, feasibility and efficacy implications of their deployment. In many instances this constitutes a significant shift in the types of knowledge, and the scientific disciplines underpinning them.

Policy evaluation: At the evaluation stage of the policymaking process, appropriate deliverables from a science-policy interface often echo strategies employed in early assessments. Science-policy interface platforms may be established to guide a monitoring study that best allows drawing conclusions on the extent to which implemented policies are meeting their goals. The Stockholm and Minamata conventions, for example, contain explicit requirements for periodic evaluations of the effectiveness of the conventions. (The Stockholm Convention the Effectiveness Evaluation Committee is a science-policy interface platform). Also, the recent IPBES regional and global assessments evaluated the degree to which the twenty global Convention on Biological Diversity (CBD) Aichi targets were being met. Unfortunately, the assessments concluded that none of the targets were likely to be met, although progress was being made on many of them.

As a result of this broad variation of policy-making needs and the broad range of outputs that can meet these needs, some venues have opted to establish smaller and/or more focused science-policy interface platforms with clearly delineated mandates, while in other instances the platform itself may have a broad mandate and may turn to sub-entities to carry out more specialized activities.

2.2.3 Institutional Set-up and Membership[15]

Structural form and membership vary widely among science-policy interface platforms. One can first distinguish between those that are intergovernmental and those that are non-governmental (for the purpose of this report focus has been kept on global interfaces of either type).

Intergovernmental platforms can be independent organizations of which governments are members (e.g., IPCC or IPBES), or subsidiary to an intergovernmental treaty (e.g., the Persistent Organic Pollutants Review Committee to the Stockholm Convention) or to an intergovernmental organization.

Non-governmental science-policy interface platforms can emerge under the auspices of an international organization, e.g., the stratospheric ozone assessments under UNEP and World Meteorological Organization (WMO), and the Millennium Ecosystem Assessment under UNEP. They can also emerge under an umbrella of organizations of science societies or academies (e.g. the Scientific Committee on Problems of the Environment- SCOPE under ICSU until 2009 when it opened its membership to governmental and intergovernmental organizations). In other cases, a coalition of stakeholders (commonly academics) may identify a gap in science advice and organize into an independent platform (e.g., International Panel on Chemical Pollution).

Another model is that of the WHO, comprised of an intergovernmental supreme decision-making body (the World Health Assembly, which has representatives from all Member States) and a technical secretariat headed by a Director General who has the mandate to convene expert bodies. A further example is joint expert panels such as the FAO/WHO panels that advise the intergovernmental Codex Alimentarius Commission. This paper does not develop these types of mechanism in detail. These assessment processes are non-governmental but feed intergovernmental decision-making processes.

The intergovernmental or non-governmental nature of a mechanism is particularly relevant for how the “interface” and information exchange aspects of the mechanism are met. An intergovernmental organization includes among its members a key target audience for any generated science knowledge, i.e., national governments and MEAs, e.g., the IPCC informs the UNFCCC and IPBES informs the CBD and other biodiversity-related conventions. But these assessments also inform and influence the behavior of other stakeholders, e.g., the private sector, NGOs and the public. Thus, it is possible that the outputs of an intergovernmental science policy interface may be the most relevant to national and international decision-making needs. Some governments may also perceive the output from such a mechanism to more legitimate because they were involved in its production[16]. Conversely, the governmental nature of such mechanisms can be perceived by some stakeholders as giving a few governments opportunities to control outcomes, thus affecting the interface’s legitimacy. However, as the following sections detail, the careful setting of institutional rules of procedure can counter these concerns arising from the governmental or non-governmental nature of a mechanism.

[15] This section is significantly influenced by the focus on the types of assessments used in the environment sector. It does not cover the UN specialized organization model represented by WHO where there is a complete separation of the expert and intergovernmental bodies.

[16] As noted earlier, the WHO model purposefully separates the assessment of knowledge from any government involvement, and in their opinion it makes it more credible. On the other hand, IPCC and IPBES have found that government involvement in the assessment process results in governments taking more ownership of the fndings

In addition to the implications arising from whether a platform is independent or subsidiary to another entity, and whether it is intergovernmental or non-governmental in membership, the size of the platform (the number of participants it routinely involves in its work) is also a significant design choice. It has far-reaching implications regarding cost and effectiveness, but also regarding the ways in which the membership may be understood to be representative along a range of dimensions (e.g., geographic, gender, disciplinary expertise, etc.). Furthermore, there is a broad variation in the size of platforms that make up the science policy interface at the international level for the sound management of chemicals and waste and for other issues: ranging from small number of experts involved in each of the Montreal Protocol Technical Options Committees (TOCS) to the IPCC's 195 member countries, and hundreds of authors and thousands of reviewers contributing to the completion and release of each of its assessment reports.

2.2.4 Procedures

To be successful, and in order to yield authoritative outputs, a science-policy interface should be credible, relevant, legitimate, and transparent (Cash et al. 2003, Hilgartner 2000, Kohler 2020). The procedures governing how a platform's work is conducted, whether tacit or formalized via rules of procedure, play a significant role in whether these goals are attained.

Credibility: While credibility reflects the reputation of the experts serving on the science-policy interface platform, it is enhanced when the experts are chosen using transparent nomination and selection processes, and when rigorous peer-review of outputs is conducted in advance of their release. Such procedures are used by IPCC and IPBES. However, credibility can be hindered if peer-review is deployed in such a way that it excludes certain types of knowledge (e.g., indigenous or local knowledge that might not have been published in peer-reviewed sources). IPBES has developed procedures for the inclusion of indigenous or local knowledge, recognizing that such knowledge is rarely published in peer-reviewed journals. It is equally important to have strict criteria to guide the use of grey literature.

Relevance is a function of whether the platform's outputs are meeting the needs of decision-makers. This characteristic is closely tied to the procedures used for agenda setting. One of the potential strengths of an independent platform is that it can set its own agenda, which can enhance its credibility; however, to be relevant the platform must be responsive to the needs of decision-makers. This is achieved in IPCC, IPBES and the Montreal Protocol assessments by governments, MEAs and other stakeholders suggesting what topics are of greatest importance for decision-making, and the work program being approved in plenary meetings of the government members. Each of these assessments is policy-relevant but not policy prescriptive. Some platforms have been set up to fulfill carefully delineated needs and their agendas are triggered by national actions (for example, the POPRC has a narrowly defined mandate to review chemicals nominated for listing, while the Rotterdam Convention's Chemical Review Committee process is triggered by parties taking national regulatory actions). Conversely, platforms that are subsidiary to a COP may have an agenda prescribed for them that precludes their being able to raise the alarm regarding emerging concerns, thus hindering early warnings.

Legitimacy is conferred upon a SPI platform when its outputs are perceived to be representative of the different values, beliefs and worldviews of stakeholders, and when its processes are perceived to be fair and respectful of divergent views. Legitimacy can be enhanced by ensuring broad participation, cooperation, building of trust among participants, creation of opportunities for stakeholders to learn from one another, and establishment of procedures to manage conflict (Sarkki et al. 2015).

Transparency regarding the procedures being employed by a platform is a key factor in shaping its legitimacy. Rules of procedure play a key role in ensuring broad ownership of the science-policy interface, *à la* IPCC and IPBES. Transparency can be achieved in a variety of ways, and it can be strategically managed so that the platform's publics can understand by whom, on what basis, and through what processes or procedures (e.g., Delphi technique) outputs were produced. One example of transparency is that IPCC and IPBES publish the names of all experts involved in preparing and peer-reviewing their assessments, and all expert and government peer-review comments are put online along with a note of how each comment has been dealt with. Also, both IPCC and IPBES allow accredited observers to attend plenary sessions. Another example is that in the last decade the Methyl Bromide Technical Options Committee under the Montreal Protocol has built up its legitimacy by making available, in addition to its reports, the following information on the treaty website:

- schedule of upcoming meetings,
- the names, titles, nationalities and institutional affiliations of members of the Committee,
- the procedures followed in elaborating recommendations, and,
- conflict of interest declarations for each member updated annually.

Other platforms may opt for less transparency in documentation, but still attain legitimacy by opening their proceedings to a wide array of stakeholders. The review of science policy interface platforms conducted for this report demonstrated that there is significant variability in the extent to which platforms make readily available documentation on procedures that might govern their work. Addressing such lacunae in transparency is one avenue for strengthening the legitimacy of their work, and indeed transparency (even though it may be deployed in a variety of ways) is now broadly understood as a fourth key element for a successful science-policy interface.

Two more criteria, also strongly shaped by procedures, have increasingly been added to those of credibility, relevance, legitimacy and transparency: these are iterativity (Sarkki et al. 2015) and inclusiveness (Diaz-Reviriego et al. 2019). The first is a reflection of the institution's flexibility and reflexivity and can be fostered by procedures to take stock of processes and identify opportunities to strengthen the platform. For example, IPBES conducted internal and independent external reviews of their procedures at the end of their first work program with the aim of further strengthening the platform. The second is a testament to the importance of broad inclusion, e.g., by ensuring disciplinary diversity (inclusion of experts from the social sciences, humanities, and indigenous and local knowledge), stakeholder diversity, and incorporating different world views (this led IPBES to develop a conceptual framework that embodied a western view of science and a Mother-Earth view), as well as by broadening the ways of knowing, which can inform the platform's work. Furthermore, the concept of policy relevant but not policy prescriptive model of IPBES and IPCC is to be highlighted.

2.3 Assessing the Science Policy Interface

As detailed above, a strong science-policy interface should yield authoritative outputs through a credible, relevant, legitimate, transparent, iterative and inclusive process (The list of detailed Science-Policy interface criteria is provided in Appendix 2). Yet each of these criteria can be very difficult to assess unless relevant information is made publicly available. For the purpose of this report, several SPI platforms were reviewed to guide the assessment of options for strengthening at the international level the science-policy interface for the sound management of chemicals and waste. The list of science-policy interface platforms encompassed by this review is provided in Appendix 1.

There are myriad challenges to assessing impact, not least because impacts are often distant in time and space from any one output or activity undertaken by a science policy interface platform. Defining impact can be subjective, e.g., it could include influencing national and international policy formulation and implementation, raising awareness among governments, private sector and the public, fulfilling science needs of developing countries, aiding in capacity building, and/or influencing research agendas.

Therefore, impact might be understood as being a factor of:

- the type of output, whether an assessment, a summary for policymakers, a quick guide, a recommendation, an identification of response options to achieve a particular desired outcome or to avoid an adverse outcome, or other formal outcome;
- the ability to identify emerging issues;
- whether proposed options/measures result in intended impacts;
- whether scientific evidence supports national policy formulation and implementation needs;
- the extent to which the findings are taken up by national stakeholders (does it shape campaigns? legislation?)
- the extent to which scientific outputs support international decision-making
- the extent to which the work of the platform is taken up by social media, the press or the public in general.

In terms of evaluating cost-effectiveness across different SPIs, it is important to acknowledge the limitations of such a ratio. A mechanism with a small budget and a small impact may be judged to be just as cost-effective as a mechanism with a large budget and a large impact. Given the difficulty of evaluating cost-effectiveness, this section focuses on means of assessing the costs and impacts associated with SPI platforms.

The primary costs of an SPI platform include:

- secretariat staffing and infrastructure costs;
- size of the work program, i.e., number and scale of activities;
- number of experts needed to implement the work program (travel costs are normally covered for experts from developing countries, but not from developed countries, although that is a decision from the decision-making body);
- frequency and location of meetings, especially if there are large plenary meetings of the platform (travel costs are normally covered for government representatives from developing countries);
- interpretation and translation costs, where applicable; and
- publication and communication costs, where applicable.

These costs are normally supported via:

- a trust fund, funded from either voluntary contributions (normal practice for IPCC, and IPBES) or assessed contributions from governments[17]. Private sector, foundations and other entities could contribute to a trust fund, subject to a set of conditions set out in the rules of

[17] One might interpret the work of existing SPI platforms that are subsidiary to a COP as being supported by assessed contributions (since their work is part of the overall convention budget) but even in those cases there are often aspects of the subsidiary platform's work that are supported by voluntary grants from governments.

procedure, which ensure that non-government contributions do not constitute a conflict of interest (e.g., those outlined in the IPBES rules of procedure).

- in-kind support
  - a sponsoring organization of an assessment may provide some secretariat support;
  - some governments second staff into the secretariat;
  - experts normally provide their time and expert knowledge without financial compensation even though it may require weeks and months of their time (the IPBES external review noted "in-kind contributions from stakeholder organizations through the time investment of their experts is substantial, and in effect the backbone of IPBES", although in principle some work could be paid for[18];
  - governments and other stakeholders may organize and pay for meeting facilities
  - governments and other stakeholders may pay for technical support units to support specific work program activities, e.g., an assessment.

3. Existing Science-Policy Interfaces

3.1 Key Features of the Science-Policy Interface at the International Level for the Sound Management of Chemicals and Waste

The landscape of existing science-policy interface platforms at the international level for the sound management of chemicals and waste is characterized by the absence of an overarching process undertaking multi-year assessments or engaging in horizon scanning to identify emerging issues. Rather, notably in the environmental realm, the science-policy interface includes several smaller subsidiary platforms that have in general been geared at generating recommendations to inform the implementation of a treaty or to contribute to a treaty's effectiveness evaluation. Thus, one avenue for strengthening the science-policy interface would be to consider establishing an independent platform that could engage in this former area of work (see option A in section 6).

The arena of sound management of chemicals and waste involves the broad engagement of Intergovernmental organization (IGOs) in this issue area, which is perhaps most evident through IOMC. IOMC was established in 1995 as a means of coordinating and strengthening the chemicals work of the Participating Organizations.[19] As such, the IOMC plays a coordinating role in this landscape. In itself it is not an entity or a science-policy interface (it is a coordinating mechanism established by an MOU); however, a number of its Participating Organizations are or have SPIs. The Participating Organizations and their members participating in initiatives are relevant stakeholders who might play a triple role within an SPI platform:

- they bring expertise of their own to the table,
- they have the inherent mandate and are well placed to help disseminate platform outputs back to their home agencies, and
- they may be able to point to complementary information or help in identifying eventual duplicative or counterproductive initiatives.

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[18] WHO noted that foundational work, such as systematic reviews of evidence can be commissioned and paid for in order to guarantee timely and quality product, that is then reviewed by the SPI. Some foundation work requires significant time, e.g., months, and experts are not always able to work free-of-charge.

[19] The participating organizations of the IOMC are: FAO, (ILO), UNDP, UNEP, UNIDO, UNITAR, WHO, World Bank and OECD.

Additionally, the joint Secretariat of the Basel, Rotterdam and Stockholm Convention facilitates enhanced interactions among the SPI platforms of the conventions; for example, since 2013, annual meetings of the Rotterdam Chemical Review Committee and the Stockholm POPRC have been held back to back in Rome. These platforms stand out from those in other issue areas (notably climate change and biodiversity) for the important role of private sector expertise, with many private sector experts actively participating in meetings as observers and intersessionally as members of working groups on specific issues. This is a long-standing feature that reflects some of the characteristics of this sector in general (these are discussed in more detail in section 5). This prominent role of the private sector in the work of the platforms, as well as the economic interests of the states who nominate experts to participate in these bodies, has led many of these platforms to establish strong conflict of interest procedures. There is extensive variation in the ways in which conflicts of interest are disclosed and managed, ranging from POPRC where the conflict of interest discussion is one of the few instances where the committee members meet behind closed doors, to the Methyl Bromide Technical Options Committee (MBTOC) where each member posts online, at least once a year, their response to a questionnaire detailing any potential conflicts incurred by them or their close family members (the questionnaire also asks them to disclose how they pay for their participation in MBTOC meetings).

3.2 Key Features of the Science-Policy Interface in other issue areas

Both IPCC and IPBES are at least tangentially part of the science-policy interface for the sound management of chemicals and waste (for example, IPBES dealt with neonicotinoid pesticides in its assessment report on pollinators, pollination and food production). Yet these two independent platforms, which have brought significant attention to the issues of climate change and loss of biodiversity among varied constituencies (governments, private sector and the public), do not have a clear analogue for the issue of sound chemicals and waste management.

The stature and importance of IPCC and IPBES within the science-policy interface for climate and biodiversity is primarily due to the high-quality of their policy relevant assessments, which are responsive to the needs of the UNFCCC and CBD and other biodiversity-related conventions, but may also be due in part to the fact that subsidiary bodies which had been designed to serve as science-policy interfaces failed to deliver on their envisioned mandates. Many have argued that these subsidiary bodies have become secondary policy-negotiation arenas instead (this is especially the case with the UNFCCC's Subsidiary Body for Scientific and Technological Advice (SBSTA) and the CBD's SBSTTA, but has also been a concerned raised with UNCCD's Committee on Science and Technology). A key feature of IPCC and IPBES is that they are independent of the Conventions but highly responsive to the needs of the Conventions. They have robust rules of procedure that govern their processes, ensuring they are credible, legitimate, transparent, relevant, iterative and inclusive.

Looking beyond IPCC and IPBES to platforms across a range of issue areas, again the landscape of different platforms is characterized by variation in:

- the flexibility afforded to the platform to set its own agenda when it is a subsidiary entity to a convention
- whether the experts participating in the platform are serving in their individual capacity or at the will of a nominating government/region/institution
- the extent to which language barriers are addressed
- strategies for incorporating Indigenous and local knowledge

- the understanding of what counts as “balanced membership” and how it is achieved in practice.

Finally, the review of these diverse science-policy interfaces also brings to light several patterns that do apply broadly across cases:

- local knowledge is often incorporated but rarely sought out explicitly
- few mechanisms adequately involve experts from disciplines in the social sciences and the humanities (e.g., Historians)
- coping with uncertainty is a challenge encountered across contexts

4. Lessons Learned from GCO-II

Resolution 2/7, adopted at the second United Nations Environment Assembly (UNEA-2) in 2016, requested the Executive Director to submit an update of the first GCO published in 2013. The GCO-II – From Legacies to Innovative Solutions” is the culmination of a three-year, comprehensive science-based effort to collect state-of-the-art data on a wide range of topics relevant for understanding trends to achieve the sound management of chemicals and waste. The Summary for Policymakers (appr. 15 pp.) was launched six weeks in advance of UNEA4, the GCO-Synthesis Report (appr. 100 pp.) was launched at UNEA4 in March 2019 and the full GCO-II Report (appr. 700 pp.) was launched at the SAICM OEWG-3.[20]

Process

A Steering Committee provided oversight, strategic direction and guidance on all aspects of GCO-II development, as well as technical inputs and review, where applicable. The Steering Committee was composed of 38 representatives from Governments, non-governmental organizations (including civil society, industry/the private sector, and academia) and inter-governmental organizations, with participation from all regions and a wide range of stakeholders. The Steering Committee reviewed the draft GCO-II annotated outline, foundational papers, draft chapters, the zero draft, various drafts of the full GCO-II, as well as drafts of the Summary and a Synthesis Report.

Approximately 50 authors from all regions contributed to drafting chapters. Furthermore, once draft chapters were available, independent experts were invited to review the draft GCO-II or external experts were invited to review selected sections based on their expertise. Various organizations also reviewed relevant sections of the GCO-II, including the IOMC Participating Organizations. Overall, substantive contributions were received from more than 400 experts.

An initial GCO-II Consultative Meeting in April 2016 in brought together some 70 experts from all sectors and regions. To bring in regional perspectives, a series of four regional workshops was organized in March-April 2018 in Nairobi, Kenya (Africa); Frankfurt, Germany (Europe, including Central and Eastern Europe); Panama City, Panama (Latin America and the Caribbean and North America) and Bangkok, Thailand (Asia-Pacific). A global workshop, bringing together some 100 participants from all sectors and regions, was held in June 2018 in Bonn, Germany, to review the zero draft of the GCO-II and a series of foundational papers.

Lessons learnt

[20] The Summary for Policymakers is available in all six UN languages. Translation of the Synthesis Report in all UN languages is currently being finalized.

While a wealth of data, information and knowledge exists on chemical production, releases, concentrations and effects, the GCO-II encountered challenges in collecting coherent data, developing global baselines and identifying trends. Notably, a range of different – and not always complementary –indicators and reporting schemes have been developed under the 2030 Sustainable Development Agenda and the many treaties and voluntary instruments related to the sound management of chemicals and waste. This fragmented indicators framework, compounded by low reporting rates, further contribute to the challenge of developing global baselines and tracking progress in a systematic way. Moreover, the frequent use of activity- or instrument-based indicators (rather than impact indicators) provides limited insights in assessing impacts achieved.

To help fill global knowledge gaps, steps could be taken by stakeholders to harmonize research protocols across countries and research communities. Significant progress has already been made in some areas to harmonize data generation, for example in testing chemicals. Promising progress is also being made in harmonizing biomonitoring across countries and could be extended to other areas.

Part of the UNEA mandate for GCO-II was to address "other issues where emerging evidence indicates a risk." The GCO-II process brought to light the need for refining the approach to identifying such issues, lest such an effort yield an unmanageable number of issues.

Taking these considerations into account, the GCO-II Steering Committee agreed on the following selection criteria (i.e. entry points and necessary conditions for inclusion) to identify issues with emerging evidence of risk:

- At least two countries/regional economic integration organizations have recently (since 2010) undertaken of these two types of action, including at least one regulatory risk management action.

- There has been a regulatory risk management action on a chemical or group of chemicals, based on emerging evidence indicating a risk to human health and the environment.

- A full risk assessment or reassessment action for the same chemical or group of chemicals has been completed or initiated.

- Chemicals/groups of chemicals comprehensively covered by existing multilateral environmental agreements and issues covered by the SAICM were not included.

The approach taken did not aim to conduct and deliver an international science-based assessment of specific chemicals or groups of chemicals. Rather, it was meant to facilitate international sharing of knowledge on specific actions recently taken based on emerging evidence indicating a risk. By undertaking a metareview and drawing attention to existing risk assessment and regulatory risk management action, the objective was to facilitate understanding of issues of potential interest to governments and other stakeholders, which could facilitate future action in other countries or internationally. By drawing upon various types of action by public bodies in UN Member States, a weight-of evidence approach was brought to the process.

The criteria used resulted in the identification of issues for the following chemicals or groups of chemicals: arsenic, bisphenol A, glyphosate, cadmium, lead, microbeads, neonicotinoids, organotins, polycyclic aromatic hydrocarbons, phthalates and triclosan.

GCO-II raises a number of questions for identifying possible future issues of concern at the international level, including:

- Should priorities be set for individual chemicals or groups of chemicals?
- How could a transparent nomination process be designed, including use of clear criteria?
- What is the role of science in identifying and agreeing on issues/priorities and how do other considerations weigh in?
- How can knowledge from risk assessments, health and environmental impacts, and harm caused be taken into account?

In addition, the process of developing GCO-II revealed that the full potential of the academic community to provide data and knowledge to help develop robust global baselines and inform decision-making has not yet been reaped. Scientists are not necessarily given incentives nor rewarded for producing policy-relevant knowledge. Another potential challenge is that policymakers may have short windows of opportunity for scientific input while related research may require longer timeframes. GCO-II suggests:

- that proactive efforts can be made to foster dialogue between scientists and policymakers,
- that policymakers seek out means of informing scientists more systematically about their needs, and,
- establishing bodies organize regular exchanges between scientists and policymakers, both at the national and international level.

5. Needs for strengthening the science-policy interface at the international level for the sound management of chemicals and waste

Credibility, relevance, legitimacy, transparency, iterativity and inclusiveness are the hallmarks of an effective SPI platform, as well as being policy relevant, but not policy prescriptive. Furthermore, the more successful platforms, e.g., IPCC, IPBES and stratospheric ozone, have also increased the salience and visibility of their advice to both the public and decision-makers through impactful outreach and communication strategies. This section elaborates on challenges that have arisen specifically at the international level in the arena of the sound management of chemicals and waste in striving to achieve these hallmarks.

As detailed above, there are several established SPI platforms at the international level for the sound management of chemicals and waste. Yet, given their relatively focussed mandates commonly focused at the implementation stage of the policy process, there is a clear need for systematic assessments for identifying emerging issues (possibly via horizon scanning), monitoring trends, understanding the environmental and human health issues associated with chemicals in the environment, and evaluating and refining response options, e.g., policies, practices and technologies, and potentially stimulate the negotiation and enactment of new policy approaches.

This need is compounded by challenges specific to the sound management of chemicals and waste; challenges that warrant careful tailoring of lessons learned from science-policy interfaces in other arenas. These include:

- The breadth of the scientific knowledge/information to be assessed. For example, a study (published in 2020 in *Environmental Science and Technology*) of 22 chemical inventories from 19 countries and regions found that “over 350,000 chemicals and mixtures of chemicals have been registered for production and use, up to three times as many as previously estimated” (Wang et al. 2020).

- The extent to which information on chemical identities remains publicly unknown, leading to information asymmetries among experts contributing to the science-policy interface. The same 2020 study cited above notes “the identities of the many chemicals remain publicly unknown because they are claimed as confidential (over 50,000) or ambiguously described (up to 70,000)” (Wang et al. 2020).

- The breadth of disciplines being called upon in the conduct of a platform’s work (this is a common challenge for science-policy processes).

- The financial implications for private sector actors of sharing proprietary knowledge. Requiring disclosures of proprietary knowledge, including that which is necessary for the SPI platform to conduct its work, may disincentivize participation by these stakeholders.

- Concerns about potential conflicts of interest are commonly dealt with in existing SPIs in this arena, and not just for private sector participants. However, there is broad variation in the ways in which these are managed which may make it more difficult to reach agreement on a strategy for conflict of interest management as part of any initiative to strengthen the SPI at the international level for the sound management of chemicals and waste

- Limited incentives for academics to participate in an international-level SPI on chemicals and waste. A SPI at the international level for chemicals and waste has yet to confer the same status and professional rewards granted to academics participating in the IPCC or IPBES, for example, but could in the future.

- Technical challenges and expenses of the detection and identification of specific chemicals (in the environment, in products, in humans, in waste flows) and in tracking of waste flows.

- The prevalence of and range of approaches for dealing with uncertainty and precaution in producing assessments or science advice for implementation. As noted earlier, IPCC and IPBES provide confidence statements for key findings.

- The need for informing anticipatory governance arrangements in circumstances where the impacts of exposure to a chemical or class of chemical may not be known for several generations.

- The established track-record of participation by civil society and private sector stakeholders in existing SPI platforms on the sound management of chemicals and waste (this is not to say that this participation is good or bad, but rather to flag that there is a culture of participation by observers, for example in the work of the POPRC, that might be unusual in SPIs in other arenas). IPCC, IPBES and the stratospheric ozone science-policy interfaces all involve organizations and individuals from different stakeholders to participate; some organizations are strategic partners and are involved in elements of the work program, other organizations attend plenary meetings as observers, and individuals from different stakeholders are involved as experts in the assessments, but in their individual capacity.

- The importance of local, practical knowledge, especially in terms of understanding the ways in which products and processes governed under this arena may not be deployed or used as intended or may be influenced by different climatic contexts.

- The stark differences in approaches that can arise between countries that turn to risk-based chemicals management as opposed to those relying on hazard-based chemicals management (Geiser 2015).

- The difficulty of visually communicating the impact of substances that may exhibit one or more of the following characteristics: invisibility of the substance and cocktail or mixtures and of its/their effects; occurrence at very low concentrations; impacts to human health and the environment through complex pathways; no or incomplete information on extent of production, use and release; effects that are subtle and may only appear at population levels; and enduring gaps in our understanding of the processes through which chemicals and waste impact human health and the environment. There are some issue areas that have started to facilitate powerful visual depictions in this arena, notably the questions of plastic pollution and of e-waste flows.

- Potentially starker issues of geographic variation in capacity and training to participate in a strengthened SPI.

While not a challenge *per se*, the IOMC and the ties the Memorandum of understanding (MOU) forges among its nine IGO Participating Organizations presents a unique backdrop to any consideration of strengthening the SPI at the international level for the sound management of chemicals and waste. If a joint umbrella is envisaged, the logistics of getting mandates aligned under two or more governing bodies of these institutions may be challenging, but potentially worthwhile in the long-term (IPCC has two co-sponsoring bodies – WMO and UNEP, the FAO/WHO Codex Alimentarius Commission is advised by the FAO/WHO expert panels).

The list that follows sets out factors to consider in strengthening the SPI regardless of which option described in section 6 is being pursued. Each factor is briefly discussed as to how it can impact credibility, relevance, legitimacy, transparency, iterativity and inclusiveness while taking into account:

- the unique aspects of the chemicals and waste arena described above,
- the assessment of existing SPI platforms discussed in section 3,
- insights from scholars who have studied a wide array of SPI arrangements.

Thus, elaboration of any of the options assessed in section 6 would require attention to these factors. Furthermore, existing SPIs can turn to this list to identify means of strengthening their own processes, work and outputs. These factors include:

- Compensation and travel: the extent to which in-kind contributions[21] are expected from participating experts may skew participation in favor of experts whose employers (often a university) or own government are most able to support the costs of travel (if the experts are from a developed country) and are open to adjusting the experts' work expectations to account

[21] This presumes that it is correct for the expert's organization to pay. In the case of WHO it is not, because it is not consistent with the concept that experts are serving in their individual capacities and must be released from their organizations when so doing. In IPCC and IPBES all experts are viewed to be functioning in their individual capacity independent of who funds their travel.

UN environment programme

for the time devoted to their participation in a science-policy interface platform. Should this impact the perceived legitimacy and credibility of the platform, one solution might be to establish a special grant to facilitate travel by developed country experts who may diversify the expertise in a way not otherwise available. Another solution to ensure balance could be the trust fund that will support participation of experts from both developed and developing countries.

- Overcoming language barriers: this is relevant both for the procedures of the platform and for how its outputs may be communicated to its target audiences. Even though English is often considered the *lingua franca* of science, limiting the work of a platform to English can nevertheless be a barrier for the full participation of certain experts and may preclude the inclusion of certain kinds of knowledge. However, while some platforms will provide interpretation and translation at some stages of their work (this is the case for plenary sessions of IPCC and IPBES, and their working plenary documents, including the assessment summaries for policymakers, and for meetings of the POPRC), almost all of the substantive work is carried out in English in nearly all SPI platforms. In practice, this may mean that experts that might have been selected to participate on the basis of interpretation being available may be less likely to fully participate in those components of the platform's work occurring without interpretation.

- Expert participation: the rules governing the selection and mandates of participating experts can impact the extent to which the platform is considered "balanced." Depending on the issue at hand, some criteria may be considered more essential for balance than others. The global scale of the science-policy interfaces being discussed requires attention to balance among regions and/or between developed and developing countries; this is the role of the IPCC Bureau and the IPBES Bureau and MEP. Other criteria of concern for balance may include institutional affiliation, disciplinary expertise, gender, age (i.e., involvement of early career scientists). Several platforms have designated specific entities entrusted with ensuring that expert nominations are processed with an eye to meeting particular balance goals (it is famously difficult for an actor nominating just one expert to do so with an eye towards the balance of the overall platform).

- Conflict of interest (COI) policies: as discussed above, conflict of interest policies can be essential for ensuring the credibility and legitimacy of a science-policy interface platform. One key differential across platforms relates to whether the policies emphasize the disclosure of existing conflicts as opposed to the management of conflicts which may require experts to recuse themselves from some aspect of the platform's work. In principle, a COI policy should address both situations.

- Stakeholder engagement: there are a wide array of strategies for fostering stakeholder engagement in the work of a science-policy platform. Some platforms open some of their meetings to observer organizations and, such as the case in IPBES, will hold special events to facilitate coordination of stakeholder positions and contributions. None of the platforms allow observers at meetings where experts are preparing assessment reports. Other platforms have designated seats for experts from specific partner organizations, for example the Scientific and Technical Review Panel under the Ramsar Convention includes "one observer representative of each of the Convention's International Organization Partners."[22]

[22] Resolution XII.5 (2015) New framework for delivery of scientific and technical advice and guidance on the Convention. 12th Meeting of the Conference of the Parties to the Convention on Wetlands

- Opportunities for virtual engagement and collaboration: the bulk of the substantive work of a science-policy platform is increasingly taking place between face-to-face meetings. Several institutions have developed their own password-protected portals that allow for online collaboration. Such a portal can be a means of overcoming inequities of access to scientific journals and peer reviewed sources, but it may also highlight how difficulties in internet access translate into reduced participation in inter-sessional work of the platform.

- Scope of outputs: the shape and form of outputs are sometimes mandated at the creation of a platform (e.g., the negotiators decided that IPBES would have four broad categories of activities – assessments, capacity-building, stimulating research, and access and development of policy tools), or set by its primary target audience (as it may be in the case of a subsidiary expert institution). Some science-policy interface platforms, e.g., IPBES, have identified complementary outputs that may expand the reach of their work, for example by having several members of the platform publish articles or letters in peer-reviewed journals. While such outputs typically are not understood as standing in for the platform's official outputs, these products can be very effective means of encouraging engagement by stakeholders in academia and broadening the reach of the platform's work.

- Outreach/communication strategy: when the output of a science-policy interface platform has been shaped by rigorous and carefully crafted rules of procedure for finalizing the platform's outputs, concerns can arise when it comes to maintaining that credibility and legitimacy while also crafting outreach strategies to broaden the impact of these outputs. IPCC and IPBES have succeeded by centering some of their outreach strategy on communicating the process that underpins any given output in addition to their substantive messages.

- Strategies for addressing uncertainty: successful science-policy interface platforms often have an agreed upon framework for addressing uncertainty; in some cases this framework may be a central feature of the platform's design, while in others it may be established as the framework gains experience. As noted earlier, IPCC and IPBES use a confidence matrix to convey the level of certainty in key findings.

- Strategies for managing confidential (corporate) information/results: some platforms may opt to only consider information and research that is publicly available, but as discussed above, the chemicals and waste arena has led to some platforms putting in place specific procedures for sharing proprietary information. Deciding how to address proprietary information will be a key decision in the establishment of a strengthened S-P interface for chemicals and waste. IPCC, and IPBES only use information and data in their assessments that can be made available on their websites.

- Targeted outreach to specific disciplines or ways of knowing: certain disciplines or indigenous or local knowledge may be deemed especially pertinent for certain science-policy interface platforms. Platforms should consider whether certain types of knowledge are likely to be under-represented and thus may warrant identifying structural means, such as the processes developed by IPBES, of ensuring they are part of the platform's work. Strategies may include identifying a designated "seat" on a platform or establishing a cross-cutting task force (*à la* IPBES) that ensures that this type of knowledge is used throughout the platform's work.

- Means of enhancing effective participation: most platforms have provisions for rotation of membership (and sometimes term limits) which ensure that at any given time some of the participating experts are new to the process. IPCC and IPBES both have term limits for the chair and members of subsidiary bodies, e.g., the Bureau. Some platforms have successfully established strategies for supporting new members, including through handbooks and orientations (this is the case for CRC and POPRC).

- Uptake of new technology/methods, including data visualization and digitalization: science-policy interface platforms can be settings for applying, and in some-cases validating, new technologies that might facilitate their delivering on their mandates. Platforms can also be in a position to identify needs for new methods.

6. Assessing Institutional Options for Strengthening the Science-Policy Interface at the International Level for the Sound Management of Chemicals and Waste

The following section outlines options for strengthening the science-policy interface. Following a brief description, each option, and in some cases its variations, is assessed according to their potential strengths, potential weaknesses, and potential implications, including budgetary considerations. These options are presented in no particular order. Please note that while separate options have been devised for the purpose of this assessment, they are not intended to be mutually exclusive. Decision-makers may find that a design aspect of one option may well enrich a feature of another option described below.

Option A: An independent platform

An independent SPI platform[23] for the global sound management of chemicals and waste would be most analogous to the currently existing IPCC and IPBES models, which could be informed by lessons learned from the thirty years of experience of IPCC and the seven years of IPBES' work since its establishment in 2012. The principal outputs of such a platform would be expected to be in the form of authoritative assessments, horizon scanning and identifying emerging issues, but, as in the case of IPBES, could also including capacity-building, catalysis of knowledge generation, the development of policy tools.

As an independent body, this platform would not be subsidiary to an existing institution, and thus would not be captured by any political process. Such independence is key to ensuring the credibility of the platform among a wide range of end-users. Such independence would mean that the governing body of the platform, the plenary, would approve the platform's work programme, budget, and rules of procedure, and approve/accept the key outputs, e.g., assessment reports. Nevertheless, the platform would have close ties, and provide the policy-relevant but not policy-prescriptive information needed, to relevant decision-making arenas related to chemicals and waste,

[23] While IPCC is a Panel, IPBES is a Platform. Platform is used here as the term captures a more dynamic organization than say, for example, the Scientific Assessment Panel under the ozone treaties that is discussed along with Option C.

e.g., the Stockholm, Basel, Rotterdam and Minamata conventions, the governing bodies of the nine IOMC partner IGOs, and the relevant governing body of the Beyond 2020 framework. This would be analogous to the IPCC providing relevant knowledge to the UNFCCC, IPBES providing relevant knowledge to the CBD and biodiversity-related conventions, and the stratospheric ozone assessments providing information to members of the Montreal Protocol. From a process standpoint, this could include developing MoUs among the institutions[24]. From a practical standpoint, this could involve representatives of relevant decision-making arenas, in addition to national governments, MEAs, UN agencies, and other stakeholders, to suggest elements of the work program to the plenary, e.g., what topics need to be assessed, and attend the plenary as observers.

The membership of an SPI platform could be:

(A1) Intergovernmental, as is the case in IPCC and IPBES where only governments are members of the platform, although plenaries are open to observers who can intervene. IPCC has a Bureau, comprised of 34 government-nominated experts, which oversees the administrative and scientific functions of the platform and is supported by a secretariat, whereas IPBES has a Bureau of ten government-nominated experts to oversee the administrative functions of IPBES, and a separate multidisciplinary expert panel of 25 experts to oversee the scientific functions of the platform and is also supported by a secretariat;

(A2) Intergovernmental, as was the case in Intergovernmental Assessment of Agricultural Science and Technology for Development (IAASTD), where only governments were members of the platform, although the plenaries were open to observers. However, IAASTD had a multi-stakeholder Bureau, comprised of 30 government representatives and 30 members of civil society (NGOs, produce and consumer groups, private sector entities, and international organizations), which oversaw the administrative and scientific functions of the platform, supported by a secretariat;

(A3) Intergovernmental, with governments representing all regions, multi-stakeholder, including members from civil society, academia, and the private sector, and might be inspired by the current structure of ICCM where all four constituencies participate (but where formally a consensus of countries alone is sufficient for decision-making);

(A4) Non-governmental, multi-stakeholder, with a XX-member board comprised of members from government, civil society, academia, and the private sector, as was the case in the Millennium Ecosystem Assessment (MA) where all four constituencies participated on equal terms.

Strengths and weaknesses among the four options are:

- Option A1 has strong ownership of all governments and stakeholders through appropriate partnership agreements;

[24] In respect of the IOMC organizations that have their own SPI, it is not certain that this could work. For example, the World Health Assembly may not agree to establish an MOU that would have the WHA advised by another body, especially if the other body was set up in overlap of WHO's mandate, or does not use the same principles and procedures that the WHA has set for WHO's technical work (such as the role of the private sector), and not subject to the WHA's oversight. This model, of existing bodies agreeing upfront to be advised by another body needs to be rethought. Of course, existing bodies may use any information generated by others that is useful, but that is now their option (no MOU needed

- Option A2 has the advantage of all relevant stakeholders being included in the governance structure (not the plenary where all decisions are made), but correspondingly, governments must share the oversight of the administrative and scientific functions;
- Option A3 has some of the same concerns as option A2;
- Option A4 can be expected to have less buy-in from governments due to its non-governmental status.

The platform, via its plenary, would establish a set of rules of procedure, which would govern it processes, including regarding the nomination and selection of the chair, bureau members and experts, observers, peer-review, approval and acceptance of reports, and procedures governing conflicts of interest. These would ensure the science-policy interface was credible, relevant, legitimate, transparent, iterative, and inclusive and could be based, but modified as appropriate for chemicals and waste, on the IPCC, IPBES and IAASTD rules of procedure.

Assessments conducted under the auspices of the platform would be conducted by experts in their individual capacity (i.e., not representing any particular set of stakeholders - governments, private sector, NGOs, etc.), nominated by governments and other stakeholders and selected by the Bureau/multi-disciplinary expert panel. The experts preparing the assessment reports would be multidisciplinary and geographically and gender-balanced, as would the expert peer-reviewers who would complement official government reviews.

The secretariat would manage the platform, including organizing all meetings, managing the budget, overseeing the implementation of an effective communications strategy that reaches decision-makers and the broader public. The budget for the platform could be funded on a voluntary basis through a non-earmarked trust fund or through an agreed indicative scale of assessments for members of the platform.

It should be underscored that this platform would not replace existing SPIs such as POPRC and CRC that have specific legal mandates, but it might be envisioned that the platform may eventually supersede some of the more informal or *ad hoc* SPIs in the chemicals and waste arena. MOUs could be developed with existing chemicals and waste SPIs.

Potential Strengths of independent platform (with variations according to A1, A2, A3 or A4)

An independent SPI platform:

- could become the overarching authoritative science-policy interface at the international level for the sound management of chemicals and waste;
- could be credible, relevant, legitimate, transparent, iterative, and inclusive when considering appropriate factors in its design (see section 5);
- could be able to drive its own agenda while being responsive to the evidence/knowledge needs identified by chemical and waste conventions, the relevant governing body of the Beyond 2020 framework, and IOMC’s IGO partner organizations;
- could be best positioned to tackle cross-cutting issues that none of the current SPIs are able to take on due to their more limited mandates;
- in conjunction with an effective communication strategy, could raise the visibility, for the public and for decision-makers, of the issue area in a crowded policy arena;
- could contribute to stock-taking and evaluation by tracking trends, assessing the impacts of chemicals and waste and by monitoring and documenting policy developments;

- could be a means of bringing more visibility to outputs arising from existing SPIs in this arena (but that would require careful syncing of outputs so that the results from SPIs could be taken up in a timely fashion by the Platform at suitable points in the assessment preparation pipeline);
- beyond assessments and horizon scanning and the identification of emerging issues, the platform could explicitly incorporate and/or facilitate capacity-building activities such as early career fellowships, *à la* IPCC, IPBES and IAASTD and activities to assist developing countries in implementing agreed international goals and targets, and accessing and developing policy tools;
- could generate outputs that would contribute to capacity-building by making scientific and technical information available in more accessible and comprehensive formats; and
- link to other science-policy agendas, e.g., climate change, biodiversity and the sustainable development goals.

Potential Weaknesses

An independent platform:

- may require significant time from initiation of discussions to approval of an independent science-policy process[25]. However, given the UNEA mandate to establish a strengthened science-policy framework for chemicals and waste, this should be comparable to that for IPCC and significantly quicker than for IPBES.
- duplication of work being undertaken in existing SPIs for chemicals and waste would need to be avoided; this can potentially be accomplished by developing MOUs with the relevant SPI platforms and by inviting delegates from those SPIs to coordinate and participate in the work of the independent platform;
- relies extensively on financial and in-kind contributions from countries, other organizations and from experts (however, this is the same for all options);
- will require specific strategies for the inclusion of civil society and all relevant stakeholders for transparency, legitimacy and inclusiveness, and should be addressed in the rules of procedure. The stakeholder engagement model of IPBES could be adapted for this platform;
- may not be best suited to "rapid-response" scientific advice as the infrastructure and systematic production, review and adoption processes for IPCC and IPBES assessments have typically

[25] For example, in the case of IPBES, consultations on the question were initiated following the 2005 Paris Conference on Biodiversity, Science and Governance, itself held as the Millennium Ecosystem Assessment process (2001-2005) came to a close. From 2005 to 2007, an International Steering Committee and a series of regional consultations contributed to a consultative process on an International Mechanism of Scientific Expertise on Biodiversity (IMoSEB). Then, from 2008 to 2010 an *Ad Hoc* Intergovernmental Multi-Stakeholder Process further discussed the establishment of a science-policy interface for biodiversity. This Process culminated in the adoption in June 2010 of the "Busan Outcome" according to which "an intergovernmental science-policy platform for biodiversity and ecosystem services should be established." Following a UN General Assembly resolution on the issue (UN GA 65/162), UNEP was tasked with convening an intergovernmental "Plenary for an IPBES". This interim body met twice, and at its second meeting in April 2012 delegates adopted a resolution formally establishing IPBES. Since this establishment, the IPBES plenary has met on roughly an annual basis. The first two sessions were held in January and December 2013, IPBES-3 was held in January 2015, IPBES-4 in February 2016, IPBES-5 in March 2017, IPBES-6 in March 2018, IPBES-7 in April-May 2019. IPBES-8 is slated for January/February 2021. In its first work programme (2014-2019), IPBES delivered a global assessment, four regional assessments, a methodological assessment, a thematic assessment on pollinators, pollination and food production, and an assessment on land degradation and restoration. In addition, IPBES delivered a number of capacity-building activities, and developed a process for involving indigenous and local knowledge, as well as a strong outreach and communications capacity.

taking several years from framing to completion, although IPBES has rules of procedure for fast track assessments;
- will require, as in all science-policy interface platforms, detailed, rigorous and enforced conflicts of interest policies to ensure the legitimacy of outputs; and
- will require financial rules of procedure to prevent, or allow under specific circumstances, earmarking of certain funds (especially if a voluntary trust fund is employed).

Implications

The costs of an independent platform are primarily governed by the costs of the secretariat, travel for experts and government officials from developing countries, administrative and interpretation costs of plenary meetings, and the production and dissemination of the products of the platform.

A number of design choices would create opportunities for controlling these budgetary implications:

- Even though the platform would be independent, identifying an organization (or organizations) to serve as host of the Secretariat (for example IPBES while not a UN body has a Secretariat hosted by UNEP) is crucial. From the perspective of administrative costs, this may allow some cost-savings by sharing certain infrastructure and human resource services;
- Governments may be willing to consider seconding staff into the secretariat;
- the platform may opt for plenary meetings every 2 or 3 years, rather than annually, since the cost of convening a plenary is substantial. However, this would impact the frequency with which the work program could be modified and outputs (e.g., assessment reports) approved/accepted;
- The platform would likely opt to operate in English only (*à la* IPCC and IPBES), except for interpretation at meetings of the plenary and translation of plenary working documents (including the summaries for policymakers of assessment reports), but not information documents. Members might elect to counter the constraints on effective and broad participation arising from this choice by providing for the strategic use of sub-regional meetings that might be organized on the basis of common language (e.g. for francophone countries in Africa), thus constraining costs of translation only to the means of communicating the output from the regional meetings. The platform might want to encourage stakeholders to support the translation of outputs into specific languages even though these would not hold the same official status as English outputs.[26]
- The platform might want to broaden the range of potential financial contributors, *à la* IPBES, by encouraging contributions from civil society and the private sector, subject to strict rules of procedure, i.e., to preserve the legitimacy of the platform, it would be important to provide transparency about the sources of funding and spending decisions and to preclude earmarking of funds;
- An independent platform may be perceived by some as weakening the role of governing bodies and of the IOMC, however, this could potentially be addressed through a set of strategic partnerships involving the different constituencies in the Platform's work , similar to the strategic partnerships established by IPBES;

[26] Such translations of summaries for policymakers (SPMs) are currently undertaken in the IPCC for example. As of February 2020, the IPCC's 1.5C report is available on the IPCC website in the 6 UN languages as well as in German, Portuguese and Swedish (https://www.ipcc.ch/sr15/chapter/spm/).

- The platform could make use of modern web-based and video-conferencing technologies to allow for some of the work to be performed virtually, thus reducing the need for, and cost of, in person meetings; and
- A comprehensive outreach and communication strategy could and should leverage the infrastructure and existing networks among treaty secretariats and other organizations already engaged in the sound management of chemicals and waste.

Indicative budget: Document IPBES/7/4 presents a budgetary snapshot of IPBES;[27] which can inform cost implications of Option A. Key information from this document includes the following (all in US $)[28]:

- Trust fund contributions were $4.1 million and $4.9 million in 2017 and 2018, respectively;
- In-kind contributions to support the work program were about $3.5 million in 2017 and 2018;
- Costs of the plenary were about $862,000 and $1.55 million in 2017 and 2018, respectively;
- Costs of the Bureau/MEP meetings (10 Bureau members and 25 MEP members) were about $204,000 and $185,000 in 2017 and 2018, respectively;
- Secretariat staffing and operating costs, were about $1.33 million and $1.51 million in 2017 and 2018, respectively;
- Costs for implementing the work programme were about $3.22 million and $3.13 million in 2017 and 2018, respectively.

Option B: Institutionalizing the Global Chemicals Outlook (GCO) and Global Waste Management Outlook (GWMO) processes

The first GCO was released by UNEP in 2013, and the importance of its findings was recognized by the UNEP Governing Council later that year (Decision 27/12). In spring 2019, UNEP released the Global Chemicals Outlook II that was mandated by UNEA in 2016. Also in 2015, UNEP, in conjunction with the International Solid Waste Association (ISWA), released the GWMO. The second GWMO is under preparation.[29]

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27 Available at: https://ipbes.net/sites/default/files/ipbes-7-4_en_budget.pdf

28 From 2014 to mid-2019 IPBES produced one methodological assessment, two thematic assessments, four region assessments and one global assessment. It also funded capacity-building activities, a strong communications and outreach strategy, and developed innovative partnerships with indigenous peoples and local communities.

29 A similar approach would be to follow the model of the International Resource Panel (IRP) rather than of the GCO. This platform would have a steering committee as a governing body that provides strategic policy guidance to enhance policy relevance and impact of the platform and promotes the it's constituencies and networks at country, regional, and international levels. The platform, via its visible scientific panel would provide independent, coherent, and authoritative scientific assessments of policies in the management of chemicals and waste. The strong panel co-chairs with expertise and high-professional experiences would ensure that the science-policy interface was credible, relevant, legitimate, transparent, iterative, and inclusive as appropriate for chemicals and waste. The platform would have working groups (WG) and the WG member would be selected from panel members and external experts with expertise in a field relevant to the scientific study and assessment the platform would develop.
This model would respond to some of the weaknesses that may be associated with the GCO-II because it would have a broadly representative scientific panel, giving legitimacy and attracting authors for the redaction of the reports.
The key outputs of such a platform would be expected to be in the form of authoritative study reports, summaries for policymakers, and could eventually also organize capacity building events (meetings, online courses, training). Assessments conducted under the platform would be conducted by the working group members and they would serve in their individual capacity and not as representatives of organizations or governments.

This option would institutionalize the production of the GCO and the GWMO so that they are produced by UNEP on a regular schedule (for instance every 5 years or at another agreed-upon interval), thus ensuring their production is not contingent on a UNEA resolution or prioritization among a crowded UNEP-wide work programme. This could also bring the two outlooks closer together, which is important given the linkages between issues.

As is detailed in Section 4, a Steering Committee to the GCOII oversaw the scoping and process of preparing the output and it was the Steering Committee that signed off the final product.

This option would require:

- identifying a UNEP office, either on its own, or in combination with another organization, to take the lead on the preparation and release of the GCO and GWMO, and considering any full-time staffing implications;
- agreement on the size and composition of the membership of the Steering Committee(s);
- agreement on the process for nominations and appointments to the Steering Committee(s);
- elaborating the rules governing the Committee(s)' work;
- putting in place a transparent procedure for managing conflicts of interest;
- obtaining a multi-year budget.

Potential Strengths

The institutionalizing of the GCO's and GWMO's production on a regular schedule:

- could be an effective means of harnessing scarce resources to produce assessments that offer a broader scope than can be produced by existing SPIs in this arena;
- could be implemented relatively rapidly in light of the UNEA and existing processes and in-house experience with the production of GCOII and GWMO;
- could build on the credibility of the earlier GCO and GWMO reports;
- could help make the GCOs/GWMO more visible and broaden their impact;
- could contribute to stock-taking and evaluation by tracking trends, assessing the impacts on the environment and human health, and by monitoring and documenting policy developments; and,
- could be a means of bringing more visibility to outputs arising from existing SPIs in this arena (but that would require careful syncing of outputs so that the results from SPIs could be taken up in a timely fashion by the GCO and GWMO).

Potential Weaknesses

Institutionalizing the GCO's and GWMO's production on a regular schedule:

This option would require:

- agreement on the size and composition of the membership of the Steering Committee(s);
- agreement on the process for nominations and appointments to the Steering Committee(s);
- agreement on the and composition of the membership of the scientific panel;
- identifying the UN agency to host the secretariat.

- may not best be suited for rapid science advice or horizon scanning given the schedule might lock in several years from initiation to output;
- may limit the impact of conclusions; although the conclusions would be agreed by a broadly representative steering committee, they would not be formally adopted inter-governmentally and therefore would not carry as much weight. However, it would be possible to include a government review and approval process if mandated by UNEA;
- may have staffing implications for UNEP since the prior GCOs relied extensively on consultants and that expertise may be better suited to being "in-house";
- may be affected by the perceived authorship of the report, which could impact its uptake among decision-makers and the public. In comparing press coverage of the GCOII to press coverage of IPBES and IPCC outputs, in the former case information is presented as "UNEP reports…. UNEP warns…" while in the latter it is often presented as "Scientists warn…." Similarly press-releases accompanying IPBES and IPCC outputs emphasize the sheer number of scientists involved in the process, in some cases with information on the number of nationalities these scientists encompass. In designing the Steering Committee and its governing processes, attention should be paid to how the GCO and GWMO would be framed for the public (e.g. as a product of UNEP, or as a product of a multi-stakeholder Committee, or as a product of experts)
- while the GCO and GCOII largely relied on in-kind contributions and earmarked financing by a relatively small group of countries, an institutionalized GCO and GWMO may have greater legitimacy and credibility if the bulk of its funding were to come from a broader pool of donors
- may be perceived as competing with other UNEP assessments, such as the Global Environment Outlook (GEO-6 was released in 2019) or the Global Mercury Assessment (so far four have been released, in 2002, 2008, 2013 and 2018).
- If it was housed only within UNEP, it may be perceived as prioritizing UNEP views and experiences over those of the other IOMC member organizations (ILO, United Nations Development Programme (UNDP), United Nations Industrial Development Organization (UNIDO), FAO, United Nations Institute of Training and Research (UNITAR), WHO, World Bank, and OECD), yet this could be managed through close coordination and agreed MOUs among the agencies, or through a joint secretariat.

Implications

Based on the indicative budget of GCOII (see below), this option has the potential to be one of the least costly. However, in institutionalizing an *ad hoc* process, decisions are likely to be made that might lead to higher costs. For example, if the membership of the Steering Committee is being negotiated (perhaps under UNEA) for a lasting arrangement, more attention is likely to be paid to geographic balance than was exhibited in practice in GCOII. An increase in participation by Steering Committee members from developing countries is likely to lead to travel/DSA cost increases. Additionally, the scope of future assessments may need to be broader, which would require a greater range of expertise and number of experts.

Indicative budget:

The cost of preparing GCO-II was about USD 1.2 Million over a 3-year period, including coordination, stakeholder engagement, publication and outreach.

Option C: Thematic subsidiary panels with specialized task forces

This option would be most analogous to the SPI arrangements under the Vienna Convention and Montreal Protocol on the ozone layer. Parties are advised by three panels: The Scientific Assessment Panel (SAP), the Environmental Effects Assessment Panel (EEAP), and the Technology and Economic Assessment Panel (TEAP). These panels are non-governmental but respond to the needs of the Parties to the Montreal Protocol.

A similar structure of independent panels was widely acknowledged as playing a key role in the lead up to the negotiation and entry into force of the Vienna Convention and Montreal Protocol. Upon entry into force these panels were incorporated, into the Montreal Protocol and are now responsive to the parties of the Convention/Protocol. The first two Panels (SAP and EEAP) are tasked with providing assessments every four years on issues identified by the Parties as well as more frequent reports on emerging issues - this does not preclude panel members also initiating proposing that certain agenda items be added to their remit. Parties nominate experts and the assessment co-chairs select the experts. The assessment reports are expert peer-reviewed but not reviewed or approved by governments. The TEAP prepares annual reports to aid parties in implementation of the Protocol, notably through the work of its five specialized TOCs. The panels' and TOCs' recommendations and outputs serve to inform the negotiations both within the OEWG and the Meeting of the Parties (MOP); both bodies usually meet annually.[30] While the output of the panels is just one of the sources of information used by OEWG to prepare new decisions and review progress in implementing earlier MOP decisions, in practice the presentations of Panel members and discussions of their outputs take up a significant proportion of the OEWG's work. In effect, the OEWG, while serving other administrative duties, especially serves as a forum where experts from the Panels can interact with delegates on technical and scientific issues.

Meetings of the panels, and in the case of TEAP, the meetings of its specialized technical options committees (TOCs), are not open to parties or to observers. Information on current co-chairs of panels and TOCs is posted on the ozone secretariat website. Full list of members of the EEAP and TEAP are also listed on the website, while information on SAP members is listed in SAP reports. Members of TEAP and its TOCs complete conflict of interest declarations which are updated at least annually and are made available on the website as well. Members of all panels serve in their individual capacity, targeted nominations are regularly sought to broaden the geographic range of experts as well as to meet gaps in specific fields or areas of expertise, but there are no pre-agreed distributions of experts other than an effort to strive for a balance between developed and developing country experts (which has proven difficult to meet in the Panels' over 30 years of practice).

This option would entail the establishment of thematic panels subsidiary and responsive to a decision-making body; this body could be in a position to confer additional legitimacy to the panels by adding a government review and approval process, thus endorsing, accepting and/or acting upon the panel outputs, although this is not the case in the Montreal Protocol. This decision-making body would also ensure the panels' relevance to their needs by being able to set, at least in part, the panels' agenda. The most appropriate decision-making body to oversee such a collection of panels may well be UNEA, given its mandate on chemicals and waste and its focused programme of work, its pre-existing engagement in matters related to the sound management of chemicals and waste, and its universal membership and MEA hosting. However, additional issues would have to be

30 Every three years the Vienna Convention Conference of the Parties is held jointly with the MOP.

addressed such as the human health effects, workers safety, among others. Furthermore, the relevant governing body of the Beyond 2020 Framework would also be a logical venue to take up the panels' outputs.

Given the needs for strengthening the science-policy interface on chemicals and waste (see Section 5), it may be most appropriate to envision the establishment of several panels that would enable the engagement in cross-cutting themes that are currently very difficult to be addressed by existing SPI platforms in this arena given their carefully delineated mandates. These panels could be supplemented by nimbler task forces whose work could cut across all the panels. Such an arrangement would also allow for some panels to be shorter lived than others, and it may be appropriate, given the range of potential themes, for panels to develop their own guidelines and rules, subject of course to confirmation by the decision-making body to which they are subsidiary.

Potential themes that may fulfill needs for strengthening the science-policy interface at the international level for the sound management of chemicals and waste may include (not intended to be an exhaustive list):

- A panel on emerging issues for the chemicals and waste arena: this panel might be an opportunity to gather advice from experts in a range of disciplines including "critical social science and humanities." The scholarship in this area may be particularly well suited to anticipating policy problems before they are recognized as such by chemicals and waste management entities.
- A panel on waste management: this panel might broaden conversations on the recycling, storage and destruction of waste beyond those specialized examinations of hazardous waste under the Basel Convention. Establishing a panel to undertake a wholistic scientific and technical assessment of waste flows and management could help to identify expeditiously, or even pre-empt, "loopholes" or unexpected flows that might emerge in response to an existing gap in regulation of global chemicals and waste.
- A panel on green chemistry, including on avoiding regrettable substitutions. Such a panel could employ a variety of screening techniques, including modelling tools, to encourage leapfrogging as consumers and producers shift from one chemical to another.
- Panels to assess the environmental and human health implications of chemicals and waste.

Ad hoc task forces, could be established to examine particular issues (e.g. traditional and local knowledge, precaution and uncertainty, innovation, emerging technologies, models for conducting the work of panels …).

Potential Strengths

Such a structure of subsidiary thematic panels and cross-cutting task forces:

- Could provide advice responsive to the science needs of the body/bodies to which it reports;
- Would facilitate exchange among experts that are not likely to interact under the current delineation among SPI platforms in the chemical and waste arena;
- Might create a space for scientific and technical discussions that do not currently have a dedicated forum in the international arena on chemicals and waste;
- Might facilitate flexibility and foster responsiveness. It might be comparatively easy to set up a new task force or thematic panel, or perhaps even a subsidiary committee to a panel, which could rapidly take on an issue identified as emerging and warranting urgent science advice;

Potential Weaknesses

Especially if subsidiary to UNEA, such a structure of subsidiary thematic panels and cross-cutting task forces might be hampered by the following:

- UNEA decision-makers may not be sufficiently specialized to make the best use of the panel and task force outputs;
- Like many of the other options being considered, this structure relies extensively on in-kind contributions (essentially pro bono work) by experts participating in the panels and task forces;
- It may lack a mechanism to feed outputs on cross-cutting themes back into the work of existing SPIs;
- Being non-governmental may lead to a lack of government ownership;
- The legitimacy of this SPI might be particularly vulnerable should their outputs be heavily contested and not yield consensus on ways forward in the policy arena. Outputs would be reliant on validation or endorsement by the decision-making body to which the panels are submitting their outputs.

Implications

Since panel meetings are not open to parties or observers and there are no plenary meetings (if the Montreal Protocol model is followed) there may be cost savings compared to Options A and B. While panels and task forces will benefit from meeting in person, much of the ongoing work of these SPIs could possibly be undertaken through virtual platforms and/or video conferences, although no more than other options.

Indicative budget:

The Annex to Decision XXXI/17[31] sets out the approved budget for 2020 and proposed budget for 2021 which can inform cost implications of Option C (all in US$).

This document details:

- $ 55,000 for annual communicating costs of assessment panel members and organizational costs of panel meetings
- $ 350,000 for travel of developing country experts to assessment panel meetings
- The approved budget does not communicate the number of Secretariat staff devoted to supporting the work of the assessment panels

Summary Comment

[31] As detailed in UNEP/OzL.Pro.31/9/Add.1 available at: http://conf.montreal-protocol.org/meeting/mop/mop-31/report/English/MOP-31-9-Add-1E.pdf

The list of options assessed above are not intended to be exhaustive. Rather, numerous additional options can be developed by taking elements of the different options and following the guiding questions from Table 1.

Appendix 1: Science-Policy Interface Platforms Reviewed for Report

*<u>Related to sound management of chemicals and waste and international level</u>***:**

UN/ECE Convention on Long-Range Transboundary Air Pollution
- Working Group on Effects

Montreal Protocol
- Scientific Assessment Panel
- Environmental Effects Assessment Panel
- Technology and Economic Assessment Panel (and its Technical Option Committees)

Basel Convention
- Open-Ended Working Group
- Partnerships (on E-Waste, household waste, plastic wastes)
- Small intersessional working group to assist with technical Guidelines (for example on mercury wastes)
- Regional Centers

Rotterdam Convention
- Chemical Review Committee

Stockholm Convention
- POPs Review Committee
- Global Monitoring Plan
- BAT/BEP expert group
- Regional Centers

Minamata Convention
- BAT/BEP expert group on Article 8 emissions (convened prior to COP1)

Strategic Approach to International Chemicals Management (SAICM)
- Emerging Policy Issues (EPIs)
- Other Issues of Concern for cooperative action

Arctic Council
- Arctic Monitoring and Assessment Programme

International Programme on Chemical Safety
DDT Global Alliance
FAO/WHO Panel of Experts on Pesticide Management
WHO Chemical Risk Assessment Network
International Resource Panel and its Global Material Flow Database
UNEP Chemicals in Product Network
UNEP Global Chemicals Outlook
UNEP Global Waste Management Outlook
UNEP Mercury Assessments
PCB Elimination Network
Endocrine Society
FutureEarth and its International Global Atmospheric Chemistry global research project
International Panel on Chemical Pollution
C8 Science Panel
UNEP- WHO Global Alliance to Eliminate Lead Paint

<u>Related to other issue areas</u>:

IPCC
IPBES
Convention on Biological Diversity
- Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA)

Ramsar Convention on Wetlands
- Scientific and Technical Review Panel (STRP)

UN Convention to Combat Desertification
- Committee on Science and Technology
- Scientific Conferences
- Science-Policy Interface

Convention on International Trade in Endangered Species
- Animals Committee
- Plants Committee

International Convention on the Regulation of Whaling
- Scientific Committee

Bonn Convention on Migratory Species
- Scientific Council

Convention on Antarctic Living Marine Resources
- Scientific Committee

UN Framework Convention on Climate Change
- Subsidiary Body for Scientific and Technological Advice (SBSTA)

International Maritime Organization (IMO)
- Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP)

Global Environment Facility (GEF)
- Scientific and Technical Advisory Panel (STAP)

UN Secretary General's Scientific Advisory Board

International Science Council
- Research programmes (on data, monitoring/observations…)
- Thematic organizations (on disaster risk, on oceanic research…)
- FutureEarth

Inter Academy Partnership (IAP)
- Projects and programmes on varied topics

World academy of sciences for the advancement of science in developing countries (twas)
- Solar Radiation Management Governance Initiative

International Network of Government Science Advice

Appendix 2: Criteria for Assessing a Strengthened Science-Policy Interface Platforms

ASSESSMENTS CRITERIA USED

CRITERIA (ASSESSMENTS)	INDICATORS
Maximize cost-effectiveness	Structure allows for efficient processes/minimization of bureaucracy.
Make best use of new technologies	• Use state-of-the-science models for data collection and analysis • Use modern tools for data visualization • Use web-based systems • Use artificial intelligence to assist identification of relevant evidence
Track progress	• Develop a timetable for the assessment • Evaluation of progress at regular intervals
Policy-relevance	• Ensure that the assessments are demand-driven, policy relevant, and identify key uncertainties, taking into account the needs of different stakeholders • Develop mechanisms to feed policy priorities into the consideration of the scope of assessments • Assessments are designed to provide the evidence needed at global and sub-global scales, and if possible at the national level • Ensure that the needs and circumstances within developing countries and countries with economies in transition are taken into consideration when scoping an assessment • Capacity-building activities are tailored to assist developing countries and countries with economies in transition A process to assess the degree of uptake of assessment findings by relevant policymakers and other stakeholders
Credibility, transparency/legitimacy and scientific rigor	• Rules of procedure that prescribe all aspects of an assessment, including developing the scope of an assessment, approval of the scope, nomination and selection of experts (chairs, convening lead authors, lead authors, contributing authors, review editors, and fellows), peer-review processes, and final approval/acceptance processes • All data and information used in an assessment must be made publicly available and accessible to all stakeholders and the public • Experts/contributors/authors/"peer reviewers" are selected based on clearly defined scientific competences • Measures in place to avoid conflicts of interest • Findings undergo expert and government peer-review processes according to scientific standards • Degree to which broad range of stakeholders are engaged Due consideration of sources of information from all regions, addressing language barriers and inclusion of indigenous and local knowledge (ILK)
Communication	• Press releases that address the full range of issues assessed, including response options • Create a coordination system with existing interface bodies to avoid duplication of work

	• Provide for an effective two-way dialogue using a range of mechanisms between the scientific and policy communities and other relevant stake-/knowledge-holders • Measures in place to communicate outputs/findings/advice in user-friendly language to relevant stakeholders as well as the general public • Take-up by the press and social media
Flexibility	• Degree to which structure allows to swiftly react to emerging knowledge/adaptability to changing context • One-off reports/meetings/ad-hoc working groups vs. continuous arrangements • Topics addressed are adjusted/evolve based on continuous input and review of relevant knowledge

POLICY CRITERIA

CRITERIA (POLICY)	INDICATORS
Maximize cost-effectiveness	• Ratio between cost of running the interface versus policy impact • Structure allows for efficient processes/minimization of bureaucracy.
Make best use of new technologies	• Use policy screening scenarios to evaluate the projected impact of a policy • Use retrospective policy evaluation scenarios to assess the degree to which the desired outcomes were achieved
Track progress	• Use of clearly defined objectives and targets • Use of indicators that are specific, measurable, attainable, relevant and time-bound in monitoring and evaluating progress in implementation of relevant policy measures • Evaluation of progress using above at regular intervals to allow identification of trends
Policy-relevance and impact	• Provision of concrete policy options to tackle identified gaps/challenges in strengthening capacity for sound management of chemicals and waste • Mechanisms tailored to feed policy priorities into the considerations of the interface/ensure policy priorities are addressed • Policy options are tailored to specific circumstances at relevant levels (national/regional/international) • Consideration of the needs of and circumstances within developing countries and countries with economies in transition • Degree to which input from various stakeholder groups is considered • Uptake by relevant policymakers and other stakeholders • Degree to which proposed measures inform policy-making • Degree to which proposed measures generate envisioned impact Improve implementation of relevant multilateral environmental agreements (MEAs) at the national level (provision of concrete response options for strengthening national ability to implement relevant MEAs; degree of uptake of response options by stakeholders at national level)
Credibility, transparency/legitimacy and scientific rigor	• Demonstrate that the most credible information is used in evidence-based decision-making
Communication	• Provide for an effective two-way dialogue between the scientific and policy communities and other relevant stake-/knowledge-holders • Processes/mechanisms in place to communicate outputs/findings/advice to relevant stakeholders in a user-friendly manner as well as the general public

	• Take-up by the press and social media
Flexibility	• Degree to which structure allows to swiftly react to emerging knowledge/adaptability to changing context • One-off reports/meetings/ad-hoc working groups vs. continuous arrangements Topics addressed are adjusted/evolve based on continuous input and review of relevant knowledge

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