SCIENCE-POLICY INTERFACE FOR PLASTIC POLLUTION

GRID ARENDAL

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Authors
Karen Raubenheimer (University of Wollongong)
Niko Urho (Independent consultant)

Project implementation
Ieva Ručevska, GRID-Arendal
Natalia Skripnikova, GRID-Arendal

Internal Review
Miles Macmillan-Lawler, GRID-Arendal
Clever Mafuta, GRID-Arendal

Graphics
Edward Stone Hinkle, GRID-Arendal

Photos
Olivia Rempel, GRID-Arendal and Diego Noguera, IISD/ENB (p.6)

Contact information
grid@grida.no

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Alethia Vázquez Morillas (Universidad Autónoma Metropolitana)
Amila Abeynayaka (Institute for Global Environmental Strategies)
Ana Paula Souza (Office of the United Nations High Commissioner for Human Rights)
Andrés H. Arias (Argentine Institute of Oceanography – CONICET)
Arturo Castillo Castillo (Copernicus Institute of Sustainable Development, Utrecht University)
Bethanie Carney Almroth (University of Gothenburg)
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Francois Galgani (Institut Français de Recherche pour l'Exploitation de la Mer)
Genevieve Quirk (University of Wollongong)
Giulia Carlini (Center for International Environmental Law)
Issifu Ibrahim (Institute for the Oceans and Fisheries, University of British Columbia)
Juan Baztan (Université Paris-Saclay, UVSQ, CEARC)
Kristian Syberg (Roskilde University)
Laura Monclus Anglada (Norwegian University of Science and Technology)
Leslie Adogame (Sustainable Research and Action for Environmental Development – SRADev)
Lizzie Fuller (Minderoo Foundation)
Margaret Spring (Monterey Bay Aquarium)
Martin Wagner (Norwegian University of Science and Technology)
Melissa Wang (Greenpeace Research Laboratories, University of Exeter)
Michael S. Bank (Institute of Marine Research, Norway)
Nidhi Nagabhatla (United Nations University – CRIS)
Patricia Villarrubia-Gómez (Stockholm Resilience Centre, Stockholm University)
Peter Stoett (Ontario Tech University)
Premakumara Jagath Dickella Gamaralalage, the IGES Centre Collaborating with UNEP on Environmental Technologies (CCET)
Richard C. Thompson (University of Plymouth)
Roland Weber (POPs Environmental Consulting)
Sam Adu-Kumi (EnviroHealth Consult Ltd)
Sara Brosché (International Pollutants Elimination Network)
Sedat Gundogdu (Cukurova University)
Therese Karlsson (International Pollutants Elimination Network)
Tony R. Walker, Professor (Dalhousie University)
Trisia Farrelly (Massey University)
Zhanyun Wang (Empa — Swiss Federal Laboratories for Materials Science and Technology)

Acronyms and abbreviations

AHTEG	Ad Hoc Technical Expert Group
BAT	Best available techniques
BEP	Best environmental practice
BIP	Biodiversity Indicators Partnership
CARE	Collective Benefit, Authority to Control, Responsibility, and Ethics
CBD	Convention on Biological Diversity
CHM	Clearing-House Mechanism
CIP	Chemicals in products
CMS	Convention on Migratory Species
COP	Conference of Parties
CRC	Chemical Review Committee
DDT	Dichlorodiphenyltrichloroethane
ECHA	European Chemicals Agency
EDCs	Endocrine disrupting chemicals
EEAP	Montreal Protocol Environmental Effects Assessment Panel
EPOC	Environment Policy Committee
EPR	Extended producer responsibility
FAIR	Findable, accessible, interoperable, reusable
FAO	The Food and Agriculture Organisation of the United Nations
FPIC	Free, Prior, and Informed Consent
FSC	Forest Stewardship Council
GADSL	Global Automotive Declarable Substance List
GBF	Kunming-Montreal Global Biodiversity Framework
GDP	Gross domestic product
GEO	Global Environment Outlook
GESAMP	Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection
GHG	Greenhouse gas
GHS	Global Harmonized System for Classification and Labelling of Chemicals
GMP	Global Monitoring Plan
GPML	Global Partnership on Plastic Pollution and Marine Litter
GWP	Greenhouse warming potential
HFCs	Hydrofluorocarbons
HRBI	Human Rights Based Instrument
HS	Harmonized System
IAEA	International Atomic Energy Agency
IGO	Intergovernmental organisation
IHR	International Health Regulations
ILO	International Labour Organisation
IMDS	International Material Data System
IMO	International Maritime Organisation
INC	Intergovernmental Negotiating Committee
IPBES	Intergovernmental science-policy Platform on Biodiversity and Ecosystem Services
IPCC	Intergovernmental Panel on Climate Change
IPLCs	Indigenous Peoples and local communities
IRP	International Resources Panel
IWC	International Whaling Commission
JWG	Joint Working Group
LCA	Life cycle assessment
LCIPP	Local Communities and Indigenous Peoples Platform
LRTP	long-range environmental transport potential
MEA	Multilateral environmental agreement
MEPC	Marine Environment Protection Committee
MOP	Meeting of Parties
MoU	Memorandum of understanding
MSC	Marine Stewardship Council
NDC	Nationally determined contribution
NGO	Non-governmental organisation
NIP	National implementation plan
ODP	Ozone depleting potential
ODS	Ozone depleting substance
OECD	Organisation for Economic Co-operation and Development
OEWG	Open-ended Working Group
PIC	Prior Informed Consent
POPRC	Persistent Organic Pollutants Review Committee
POPs	Persistent organic pollutants
PRTR	Pollutant Release and Transfer Register
PWP	Plastic Waste Partnership
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals.
RSC	Review Subcommittee
RSCAP	Regional Seas Conventions and Action Plan
SAP	Scientific Assessment Panel
SBSTA	Subsidiary Body for Scientific and Technological Advice
SBSTTA	Subsidiary Body on Scientific, Technical and Technological Advice
SC	Scientific Council / Committee
SCIP	Substances of Concern in Products
SDG	Sustainable Development Goal
SEEA	System of Environmental and Economic Accounting
SIWG	Small Intersessional Working Group
SNA	System of National Accounts
SPI	Science-policy interface
SPP	Science-Policy Panel to contribute further to the sound management of chemicals and waste and to prevent pollution
STRP	Scientific and Technical Review Panel
SVHC	Substances of very high concern
TEAP	Technology and Economic Assessment Panel
TER	Technical expert review
TOC	Technical Options Committee
UAP	Unnecessary, avoidable and problematic
UNCTAD	United Nations Conference on Trade and Development
UNEA	United Nations Environment Assembly
UNEP	United Nations Environment Programme
UNFCCC	UN Framework Convention on Climate Change
UNGA	UN General Assembly
UNHRC	UN Human Rights Council
UPOPs	Unintentional persistent organic pollutants
UPR	Universal periodic review
USD	United States dollar
WHO	World Health Organisation
WPIEEP	Working Party on Integrating Environmental and Economic Policies
WPRPW	Working Party on Resource Productivity and Waste


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Foreword

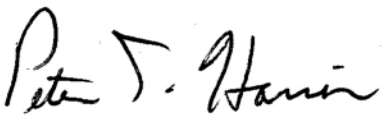
The 1963 Nobel Prize in Chemistry was awarded to Karl Ziegler and Giulio Natta for their remarkable innovation in the creation of a long polyethylene chain out of a small chemical monomer ethylene. The "age of plastics" had begun and this ground-breaking development set the stage for the widespread use of plastics, changing our world in unimaginable ways. Plastics paved the way for new and highly useful industrial processes in various spheres including the green energy transition and medical applications.

Today the extensive use of plastics and their products is posing a threat to human health and the environment. The threats in plastic pollution are not localised given that today´s consumption and production patterns are global, often putting developing regions and people in vulnerable situations at risk. Plastic pollution, in the form of microplastics, can be found in the most remote places, from the deepest ocean trenches, to the highest mountain peaks and in the Arctic and Antarctic polar ice caps. We know now that microplastic particles occur in the global food web and that plastic enters our bodies through the food we eat and the air we breathe.

The situation has reached a critical turning point where we need to base our future in scientific evidence and knowledge. We must work together in order to create a robust set of policies that can tackle the immense challenge of how to control our use of plastic throughout its life cycle.

The milestone resolutions adopted by the fifth session of the United Nations Environment Assembly concerning the establishment of a Science-Policy Panel on chemicals, waste and pollution, and mandating intergovernmental negotiations towards a global legally binding instrument to end plastic pollution attests to the world's attention to solving the problem of plastic pollution.

This report offers a critical and timely contribution to how decision makers can establish the scientific and technical functions needed for an effective global plastic instrument. The report not only lays the groundwork on the needs for a Science-Policy Panel, but also draws lessons from well-established panels such as the Inter-governmental Panel on Climate Change.



Peter Harris
Managing Director
GRID-Arendal

Executive Summary

The international legally binding instrument on plastic pollution serves as a crucial mechanism for navigating the intricacies of the global plastic pollution crisis and fostering the development of evidence-based policies to end plastic pollution. With the Intergovernmental Negotiating Committee mandated to develop the plastics instrument by the end of 2024, a unique opportunity arises to establish a strong science-policy interface for plastic pollution.

Key principles guiding this endeavor encompass credibility, salience, and legitimacy, widely recognised as foundational to any science-policy interface. Other important related principles include integrity, crucial for preventing conflicts of interest, and inclusivity, ensuring diverse representation across regions, genders, and disciplines, and incorporating local, traditional, and Indigenous Knowledge systems.

The development of a science-policy interface for plastic pollution encompasses three main components.

1. Internalising science-policy functions and associated governance structures within the plastics instrument, drawing from UNEA Resolution 5/14.
2. Supporting and complementing the science-policy functions of the plastics instrument with those of the Science-Policy Panel on chemicals, waste, and pollution prevention, as specified in UNEA Resolution 5/8.
3. Building complementarity with other science-policy interfaces, especially those within multilateral environmental agreements, to reinforce certain aspects of the science-policy interface of plastic pollution.

Ten key potential functions of the science-policy interface for plastic pollution, spanning across the four phases of the policy cycle – agenda setting, policy formulation, implementation, and evaluation – have been identified. The report advocates for a multi-faceted approach that enables seamless interlinking of the functions through cooperative arrangements and clear, established roles and responsibilities between the Science-Policy Panel and the plastics instrument. Based on the review of the functions, the report offers recommendations for developing governance arrangements across the four phases of the policy cycle, aiming to improve the sound management of chemicals and waste, and aid in preventing pollution.

In the initial ***agenda setting phase***, the focus is on proactive identification of potential threats. The Science-Policy Panel's *horizon scanning* function is instrumental in identifying emerging threats linked to novel entities, including new chemicals, polymers, or engineered plastic materials, or new forms of chemicals or engineered plastic materials, that have not been assessed and monitored for safety. Recognising emerging risk related to legacy plastics and existing and new technologies and practices will also be critical.

The ***policy formulation phase*** requires extensive scientific and technical support. The development of various *scientific criteria for control measures* is envisaged, in particular to address the recognised global governance gap in the upstream activities. They could be operationalised by establishing a subsidiary body on chemical, polymer, and product safety under the plastics instrument. This body could potentially include committees, each with their specific mandates, including a review committee for assessing chemicals, polymers, and products of concern proposed for listing. It could also assess the sustainability and technical feasibility of alternatives and non-plastic substitutes, or this task could be delegated to a separate socio-economic committee. Lastly, a design committee dedicated to formulating and updating criteria for the sustainable and safe design of plastic products is needed. It could focus on product performance – including minimisation, recyclability, durability, reusability, and non-toxicity – and transparency aspects. The subsidiary body could also undertake other tasks, even to address functions in other policy phases, if deemed necessary.

In this phase, broader *assessments* also play an important role. Iterative global assessments are needed to inform the status and trends of plastic pollution and their impacts on ecosystems, biota, and human health. This role could potentially be accredited to the Science-Policy Panel, due to its independent role and intergovernmental nature, enabling it to provide scientifically credible information and draw strong links across the three planetary crises of biodiversity loss, climate change, and pollution, with plastic pollution at the forefront. If the SPP does not lead these global assessments, the plastics instrument could take on a primary role in conducting them, possibly through a subsidiary scientific and technical body. Moreover, based on specific needs, thematic assessment can be developed by both bodies, depending on the type of information needed.

The ***implementation phase*** marries science and feasibility. The development of *policy support tools* (e.g., methodologies and toolkits) is envisaged to

predominantly occur under the plastics instrument. Their development could potentially be institutionalised under a subsidiary body or rely on working groups developed on a need's basis. Setting up a *knowledge management mechanism* or "data hub" is crucial for effective data management and presentation. Options vary from developing a comprehensive data repository on all chemicals and forms of pollution, including plastic pollution, under the Science-Policy Panel, to a dedicated data hub for plastic pollution under the plastics instrument. The plastics instrument can also help to *catalyse knowledge generation* at all levels by empowering relevant bodies and initiatives, encouraging cooperation between them. The role of the Science-Policy Panel is important in identifying gaps and directing future research. In this context, moving towards interdisciplinary data and valuing of traditional, Indigenous Peoples', and local knowledge systems is crucial.

The ***evaluation phase*** is data-centric, emphasising global *monitoring of progress* and *evaluation of effectiveness* of globally agreed goals and obligations, as well as individual response options. The plastics instrument will provide a framework for regular reporting, monitoring, and inventories supporting data collection and subsequent evaluation. Scientific and technical input is needed for crafting an indicator framework, standardising data collection methodologies, and formulating a reporting framework to evaluate performance. Institutional arrangements may include the development of a global monitoring plan and an effectiveness evaluation process overseen by regional coordination groups appointed by governments and supported by an open-ended scientific group.

Beyond these stages, emphasis is on *capacity building*, as well as *communication and outreach*. Both functions underscore the involvement of developing countries, highlighting the importance of a global, inclusive approach in strengthening the science-policy interface. The Science-Policy Panel's role could be pronounced in enhancing foundational competencies of scientists through initiatives like fellowship programs, while the plastics instrument could aim to address capacity building needs in conjunction with relevant functions. Facilitating developing country representatives' involvement in overall work and meetings is important under both bodies.

In conclusion, by outlining potential functions of the science-policy interface for plastic pollution and providing recommendations, the report will support the establishment of effective arrangements for the science-policy interface within the global plastics instrument. Furthermore, it emphasises the need to enhance collaboration with the Science-Policy Panel, multilateral environmental agreements, and other relevant bodies, paving the way for a coherent and concerted effort needed to end plastic pollution.

1 Introduction

1.1. Objective

This report aims to identify scientific and technical functions relevant to the effective implementation of the international legally binding instrument on plastic pollution, including in the marine environment (hereafter: plastics instrument), which is presently undergoing intergovernmental negotiations. Additionally, the report considers how the work of the Science-Policy Panel to contribute further to the sound management of chemicals and waste and to prevent pollution (hereafter: Science-Policy Panel), can synergies with and complement the plastics instrument. Lastly, the report identifies opportunities to ensure smooth collaboration with other relevant scientific bodies.[1]

1.2. Background

Science-policy interfaces are defined as social processes that encompass relations between scientists and other actors in the policy process, and that allow for exchanges, co-evolution, and joint construction of knowledge with the aim of enriching decision-making (van den Hove, 2007). Communication of such knowledge should be policy-relevant but not policy-prescriptive, providing solution-oriented assessments, while allowing decision-makers to balance competing priorities (UNEP, 2020).

Science-policy interfaces can perform a spectrum of functions, including, but not limited to, assessments, policy support, and communication and outreach. A notable feature of science-policy interfaces is their involvement in large-scale assessments that involve many scientific disciplines and knowledge holders. This has become an institutionalised component of the Intergovernmental Panel on Climate Change (IPCC), the Intergovernmental science-policy Platform on Biodiversity and Ecosystem Services (IPBES), and the Global Environment Outlook (GEO).

A fundamental role of science-policy interfaces is providing member states and stakeholders with the scientific and technical information needed to implement and review relevant multilateral environmental agreements (MEAs). Science-policy interfaces may operate as independent intergovernmental bodies or function as subsidiary bodies of governing bodies to the multilateral environmental agreements. While some independent bodes, like the IPBES and IPCC, address specific scientific advisory needs of multilateral environmental agreements, others cater to broader scientific advice requirements.

Another challenge involves the inclusion and representation of people in vulnerable situations who bear a disproportionate burden of the hazards of plastic pollution (UNGA 76/207). People in vulnerable situations include indigenous peoples who have the right to full and effective participation in decision-making in international law and the right to protection of their traditional knowledge systems (Jones, 2021).

1.2.1. Science-Policy Panel for chemicals, waste and pollution

The need to strengthen the science-policy interface for chemicals and waste has been promoted in academic and policy spheres for over a decade. In 2009, Swedish politicians – M. Wallström and V. Bohn – proposed the establishment of a UN panel on chemicals (ECHA, 2009). A report published in 2017 by the Nordic Council of Ministers highlighted the absence of an independent intergovernmental science-policy panel dedicated to supporting informed policy formulation under international chemicals and waste instruments, and outlined options to fill this gap, including establishing an independent science-policy panel for chemicals and waste (Honkonen & Khan, 2017). This message was echoed by several reports that followed (Urho, 2018; Tuncak et al., 2018; Wang et al., 2019).

In 2019, the United Nations Environment Assembly (UNEA) adopted Resolution 4/8 that requested the Executive Director of the United Nations Environment Programme (UNEP) to prepare an assessment of options for strengthening the science-policy interface at the international level for the sound management of chemicals and waste (para 14g). In 2020, the assessment was published, which presented three options, including the establishment of an independent intergovernmental platform, analogous to the IPCC and IPBES models (UNEP, 2020).

In 2022, UNEA adopted Resolution 5/8 to establish a Science-Policy Panel (SPP) to further contribute to the sound management of chemicals and waste and to prevent pollution. The Resolution established an ad hoc open-ended working group (OEWG) with the ambition of establishing the Science-Policy Panel by the end of 2024. According to the Resolution, "the panel should be an independent intergovernmental body with a programme of work approved by its member Governments to deliver policy-relevant scientific evidence without being policy prescriptive."

The preamble of Resolution 5/8 highlights the role of the science-policy panel in supporting countries in their efforts to take action, including to implement multilateral environmental agreements and other relevant international instruments. The Resolution also specifies that the Science-Policy Panel is intended to complement, and not duplicate, the work of relevant multilateral environmental agreements, other international instruments, and intergovernmental bodies.

Paragraph 2 of Resolution 5/8 outlines an initial set of key functions for the Science-Policy Panel:

- Undertaking "horizon scanning" to identify issues of relevance to policymakers and, where possible, proposing evidence-based options to address them.
- Conducting assessments of current issues and identifying potential evidence-based options to address, where possible, those issues, in particular those relevant to developing countries.
- Providing up-to-date and relevant information, identifying key gaps in scientific research, encouraging and supporting communication between scientists and policymakers, explaining and disseminating findings for different audiences, and raising public awareness.
- Facilitating information-sharing with countries, in particular developing countries seeking relevant scientific information.

The resumed session of the first session of the ad hoc open-ended working group (OEWG 1.2) was held in Bangkok from 30 January to 3 February 2023. A mapping analysis of the current landscape of existing science-policy interfaces on the sound management of chemicals, waste and pollution was prepared to inform the meeting (UNEP, 2022a). This session was instrumental in finalising the primary functions laid out in UNEA Resolution 5/8, while also incorporating capacity building as a fifth function (UNEP, 2023a).

1.2.2. International instrument to end plastic pollution

In parallel, UNEA adopted Resolution 5/14 in March 2022, mandating intergovernmental negotiations towards a global legally binding instrument to end plastic pollution. The Executive Director of UNEP was requested to convene an Intergovernmental Negotiating Committee (INC), aiming to complete its work by the end of 2024. According to paragraph 4f of Resolution 5/14, the INC is to consider a possible "mechanism to provide policy-relevant scientific and socio-economic information and assessment related to plastic pollution." The Resolution outlines several functions related to the review and regular monitoring of progress and generation of robust and continuous scientific evidence:

- Periodically assessing the progress of implementation of the instrument (para 3g).
- Periodically evaluating the effectiveness of the instrument in achieving its objectives (para 3h).
- Providing scientific and socio-economic assessments related to plastic pollution (para 3i).
- Promoting research into and development of sustainable, affordable, innovative and cost-efficient approaches (para 3o).
- Increasing knowledge through awareness-raising, education and the exchange of information (para 3j).
- Improving understanding of the global impact of plastic pollution on the environment (preamble).

In this context, the plastics instrument is also expected to take into account:

- Best available science, traditional knowledge, knowledge of indigenous peoples and local knowledge system (para 4d).
- Lessons learned and best practices, including those from informal and cooperative settings (4e).

Resolution 5/14 does not provide conclusive details about the science-policy interface, as the control measures and other obligations are still to be determined and will shape the requirements for scientific and technical information. Moreover, other crucial considerations and expectations include:

- Ensuring the meaningful involvement[2] of indigenous peoples and local communities, persons and groups in vulnerable situations, and independent scientists.
- Establishing effective rules of procedures, which may involve decision-making through voting rather than consensus.
- Promoting operationalisation of principles, such as transparency, waste hierarchy and circularity, to facilitate the effective management of plastic pollution and achieve long-term reduction goals.

The first meeting of the INC (INC-1) convened in Punta del Este, Uruguay from 28 November to 2 December 2022. Some Members supported exploring the possibility of developing dedicated subsidiary bodies for the instrument to assist implementation and evaluation of the effectiveness of the instrument, specifically bodies related to science, technical and technological developments, economy, and policy (UNEP, 2023b). Some Members voiced the need to discuss the role the Science-Policy Panel could have in relation to the plastics instrument (EU, 2022). Moreover, specific functions were highlighted by individual countries, such as creating a database for exchange of scientific information, a science-based monitoring and follow up mechanism, and regular assessments of progress (IISD, 2022).

INC-2 took place in Paris from 29 May to 2 June 2023 with the objective of discussing potential options for

elements towards an international legally binding instrument on plastic pollution, based on document UNEP/PP/INC.2/4 (UNEP, 2023c). The co-facilitators' report from contact group II emphasised the need for a science-backed and evidence-based instrument and acknowledged widespread support for utilising a scientific and technical body to evaluate scientific data, socio-economic data, and impacts, as well as problematic plastics, polymers, and chemicals of concern (UNEP, 2023d). The report suggested considering mechanisms for scientific bodies similar to those under other multilateral environmental agreements and emphasised that close collaboration with the ongoing Science-Policy Panel process was essential. Views on the types of research to be undertaken converged on the state of current knowledge, the impact of plastic pollution, and potential solutions. Some Members expressed interest in establishing a knowledge-sharing platform.

Before the INC-3 meeting, several countries submitted written input stressing the need for a comprehensive scientific and technical body, with proposals encompassing all ten functions discussed in this report. Many argued that guiding principles should be rooted in the best available science and/or the precautionary approach. The interdisciplinary nature and the value of traditional, indigenous peoples' and local knowledge systems were underscored in many submissions. Many countries called for avoiding conflicts of interest and emphasised the importance of cooperation and coordination with other relevant bodies, including the Science-Policy Panel. Some countries suggested that intersessional work leading up to INC-4 should focus on defining the role, responsibilities, and structure of the scientific and technical body. Additionally, one country recommended conducting a comparative study with existing bodies associated with key multilateral environmental agreements to inform future decision-making.

1.3. Scope and conceptual framing of the report

The development of the science-policy interface for the plastics instrument encompasses three core components. These include science-policy functions and associated governance mechanisms to be:

1. Internalised in the plastics instrument.
2. Carried out by the Science-Policy Panel to support the science-policy interface of plastic pollution.
3. Carried out by other bodies that complement certain aspects of the science-policy interface of plastic pollution.

Figure 1 provides an overview of the key components that require consideration when developing a coherent science-policy interface to address plastic pollution. This report particularly focuses on the science-policy interface for the plastics instrument and its cooperation with the Science-Policy Panel for chemicals, waste and pollution.

Adhering to the principle that "form follows function," this report first introduces possible functions for the science-policy interface on plastic pollution (section 2). Subsequently, it outlines possible institutional arrangements for their efficient delivery (section 3). This provides a bottom-up and pragmatic approach, prioritising the identification of actual needs before exploring the structure. The analysis and consolidation of functions are derived from a thorough examination of influential

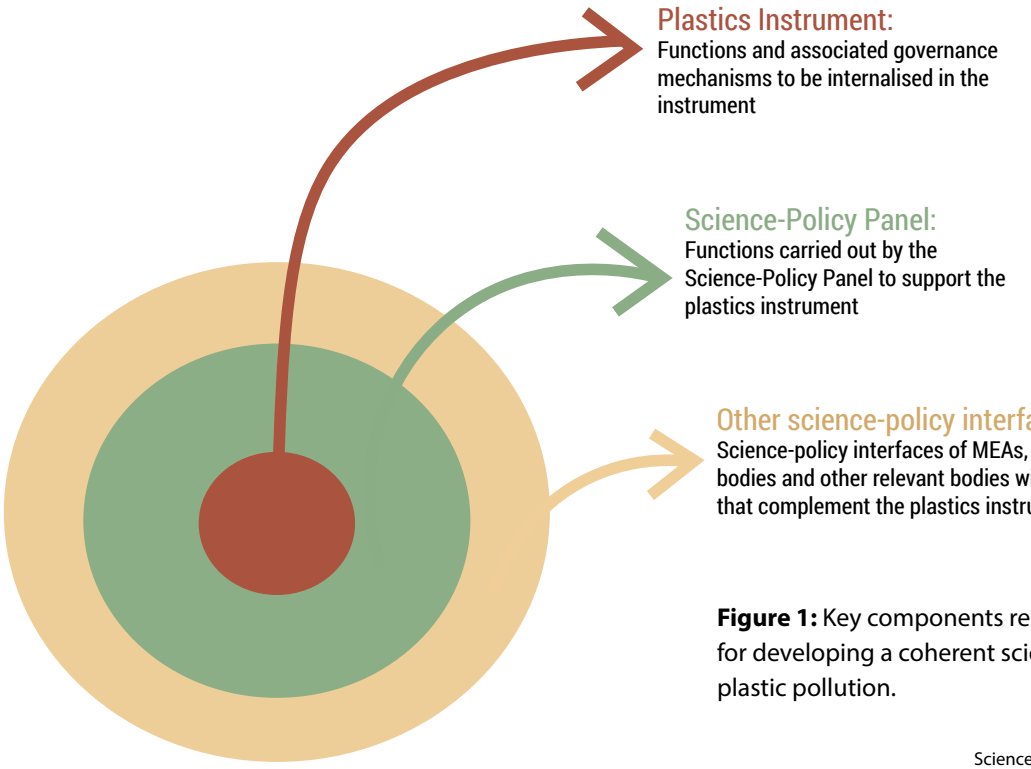


Figure 1: Key components requiring consideration for developing a coherent science-policy interface for plastic pollution.

literature and authoritative resolutions, including:

- Foundational literature pinpointing essential functions for an effective science-policy interface in the realm of plastic pollution (Busch et al., 2021), chemicals (Wang et al., 2019; UNEP, 2020), and chemicals, waste and pollution (UNEP, 2022a).
- Functions benefitting from scientific input outlined in UNEA Resolutions 5/14 and 5/8.

In this context, Table 1 presents a synthesis of the ten science-policy interface functions identified during our review, correlating them with the sources and UNEA mandates. For clarity and a structured analysis, these functions are categorised according to the four phases of policymaking, as delineated by Jann and Wegrich (2006):

1. Agenda setting: This phase involves problem recognition and issue selection, where the scientific community plays a pivotal role in identifying critical concerns that require attention.
2. Policy formulation: In this phase, policies are developed and decisions are made based on scientific and socio-economic inputs.
3. Implementation: This phase encompasses the actual execution of policies, often under the purview of governments, with scientific and technical support.
4. Evaluation: This phase involves the assessment of progress made and the effectiveness of policies, requiring significant scientific and technical support.

Figure 2 illustrates the key scientific and technical functions outlined for the plastics instrument and for the SPP outlined in UNEA Resolutions 5/14 and 5/8, respectively. The analysis of UNEA resolutions indicates that early warning / horizon scanning is a distinct feature of the Science-Policy Panel. While development of scientific criteria for control measures is not explicitly mentioned in UNEA Resolution 5/14, it is inherently related to control measures outlined therein. The functions also differ in that the plastics instrument provides emphasis on the review of progress and effectiveness, whereas the Science-Policy Panel lists activities related to communication and outreach. Notably, the second part of the first session of the ad hoc open-ended working group on a Science-Policy Panel agreed to add capacity building as a fifth function of the panel (UNEP, 2023a).

In terms of similarities, the analysis reveals that both bodies regard assessment as a pivotal function. The plastics instrument emphasises scientific and socio-economic assessments, while the Science-Policy Panel stresses "evidence-based options," potentially encompassing socio-economic aspects in context of science-based assessments. In realm of "catalysing knowledge generation," the plastics instrument advocates advancing research, whereas the Science-Policy Panel underscores identifying gaps in scientific research.

Both bodies address the types and sources of information, including the role of knowledge holders. The plastics instrument extends beyond best available science to the need to include traditional knowledge, knowledge of indigenous peoples and local knowledge systems. In contrast, the Science-Policy Panel highlights ensuring interdisciplinary and inclusive participation, including indigenous peoples, and maintaining geographical, regional, and gender balance.

Table 1: Sources for the possible science-policy interface functions for the plastics instrument presented in the report.

Policy phase	SPI function	Wang et al. (2019)	Busch et al. (2021)	UNEP (2020)	UNEP (2022a)	UNEA Res. 5/8	UNEA Res. 5/14
Agenda setting	Early warning / horizon scanning	■		■	■	■	
Policy formulation	Scientific criteria for control measures	■		■			■
	Assessment		■	■	■	■	■
Policy implementation	Policy support tools			■			
	Knowledge management mechanisms	■	■		■		
	Catalysing knowledge generation	■	■	■	■	■	■
Policy evaluation	Monitoring global progress	■		■			■
	Effectiveness evaluation	■		■			■
Cross-cutting	Capacity building	■	■	■	■	■	
	Communication and outreach		■	■	■	■	

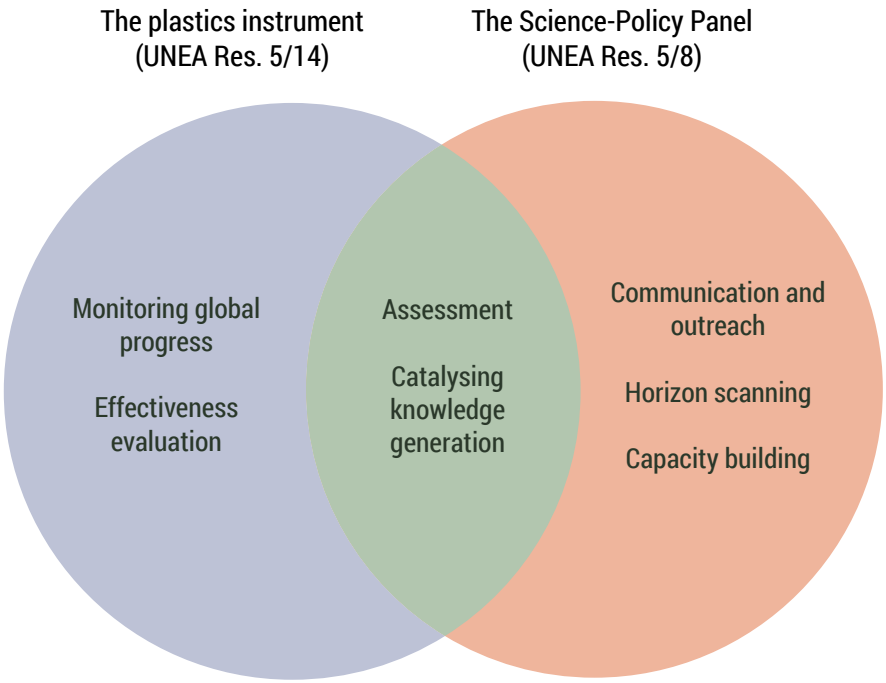


Figure 2: Key scientific and technical functions of the SPI of the plastics instrument and the Scienc-Policy Panel as per UNEA resolutions and the outcome of the OEWG 1.2 meeting of the Science-Policy Panel.

1.4. Principles for effective science-policy interfaces

Below are concise definitions of principles for effective science-policy interfaces derived from existing literature. These principles often intersect and mutually reinforce one another, with credibility, legitimacy, and salience being particularly emphasised in academic discussions. For more comprehensive descriptions, refer to Annex 2.

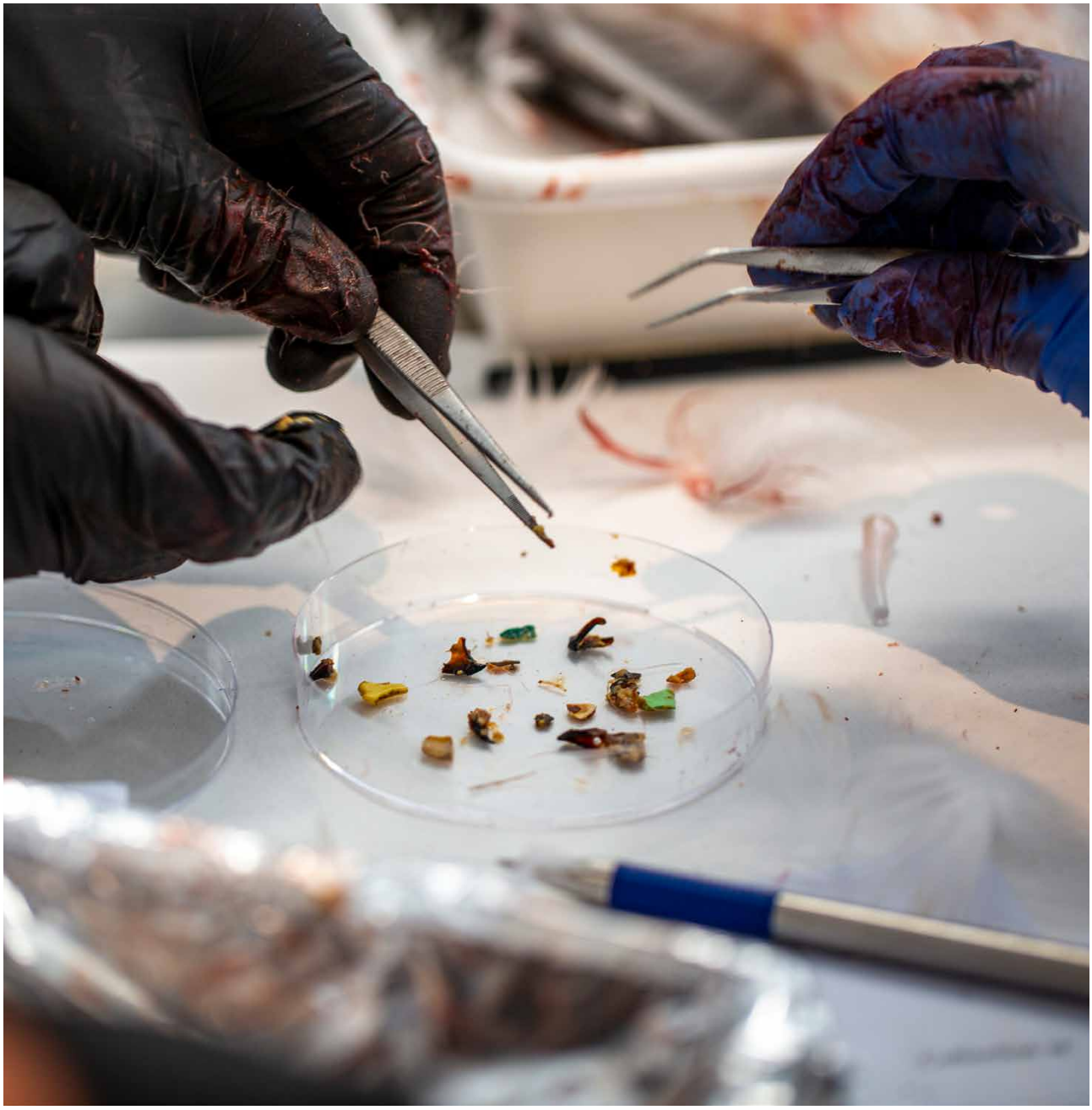
- Access to information: Ensuring the right to information regarding human and environmental health and safety (Stockholm Convention, Art. 9).
- Agility: Achieving organisational efficiency that minimises redundancy and allows adaptability to changing circumstances (Wang et al., 2019).
- Credibility: Being recognised for scientific adequacy of scientific products and arguments (Cash, 2003).
- Effectiveness: Creating streamlined processes that minimise bureaucracy (UNEP, 2020).
- Flexibility: Possessing the ability to swiftly act on emerging knowledge or adapt to shifting contexts (UNEP, 2020).
- Human-rights-based approach: Aligning decisions with scientific evidence and the rights of marginalised groups, while critically evaluating plastic alternatives (OHCHR, 2023).
- Inclusivity: Promoting diverse representation to enhance legitimacy across regions, genders, and disciplines and incorporating local, traditional and Indigenous knowledge systems (Díaz-Reviriego et al., 2019).
- Integrity: Upholding the integrity of the scientific process and preventing conflicts of interest (IRP, 2016).
- Iteration: Engaging in continuous, evolving interactions that enhance relationships and knowledge, building upon past experiences (Sarkki et al., 2015).
- Legitimacy: Ensuring the fairness of knowledge production and assessment, respecting divergent values, interests and beliefs (Cash, 2003).
- Leveraging advanced technologies: Employing cutting-edge models and tools for data collection, processing and visualisation (UNEP, 2020).
- Objectivity: Conducting unbiased studies, employing the best available science and robust methodologies, and maintaining transparent decision-making processes (IRP, 2016).
- Policy-relevance: Delivering non-prescriptive, science-based policy options and knowledge (IRP, 2016).
- Precautionary principle: Advocating preventive actions amid potential severe environmental threats, even without full scientific certainty (UN, 1992).
- Relevance: Aligning scientific results with policymakers' needs (UNEP, 2020).
- Salience: Establishing the relevance of science institutions and their imparted knowledge for policymaking (Cash, 2003).
- Transparency on procedural issues: Providing clear disclosure of information regarding expert involvement and procedural methodologies (UNEP, 2020).
- Visibility: Ensuring wide dissemination of outputs to both the public and policymakers through strategic communication (UNEP, 2020).

1.5. Methodology

To ensure the report presents feasible options for countries and stakeholders participating in the INC process, diverse input was solicited. This included the establishment of an Advisory Group of experts to support the drafting of the report. Experts were invited from governments, the scientific community and non-governmental organisations (NGOs). A wide geographic representation was sought, including from different levels of economic development.

The report's development involved several steps:

- A literature review: A comprehensive review of both scientific literature and grey literature was conducted to identify an initial list of science-policy interface functions.
- Online survey: Preliminary findings of the literature review informed an online survey, which was distributed to the Advisory Group to gather insights for a workshop focused on the initial set of science-policy interface functions.
- In-person meeting: On 28 May 2023, the Advisory Group met in Paris, alongside the INC-2 meeting, to discuss the findings of the survey, agree on the report's outline and methodology, and provide comments on the preliminary draft.
- Online workshops: Two digital workshops were organised. The first, on 15 June 2023, addressed the science-policy interface functions outlined in the preliminary draft. The second, on 14 September 2023, focused on the institutional arrangements for the science-policy interface and the division of labour with the Science-Policy Panel.
- Draft reviews: The Advisory Group conducted two comprehensive reviews of the draft report.



2 Possible science-policy interface functions for plastic pollution

This section outlines ten potential science-policy interface functions for addressing plastic pollution. Each function is flexible, designed to be deployed as necessary, and they frequently intersect and reinforce one another in practice. Figure 3 provides a schematic representation of these functions, demonstrating their alignment with the four phases of the policy cycle. Two functions, capacity building and communication and outreach, transcend specific phases, while the others are primarily aligned with individual phases.

Table 2 presents a snapshot of the possible functions for a science-policy interface for plastic pollution, setting the stage for the more detailed explanations that follow. To bridge theory and practice, concise examples illustrate how these functions are implemented in multilateral environmental agreements. For a more comprehensive understanding, Annex 3 provides extended versions of these examples with additional examples.

2.1. Horizon scanning / early warning

Function origin

UNEA Resolution 5/8 recognises that a principal function of the Science-Policy Panel includes undertaking "horizon scanning" to identify issues of relevance to policymakers and, where possible, proposing evidence-based options to address them (para 2a). However, UNEA Resolution 5/14 does not address the need to identify emerging threats.

Overall description

Horizon scanning serves as a strategic tool to detect early signs of change that are not yet on the policy radar or are not adequately addressed, including signs of change not sufficiently addressed under multilateral environmental agreements (European Commission, 2023). Horizon scanning is therefore not about predicting the future but focuses instead on the early detection of signals as

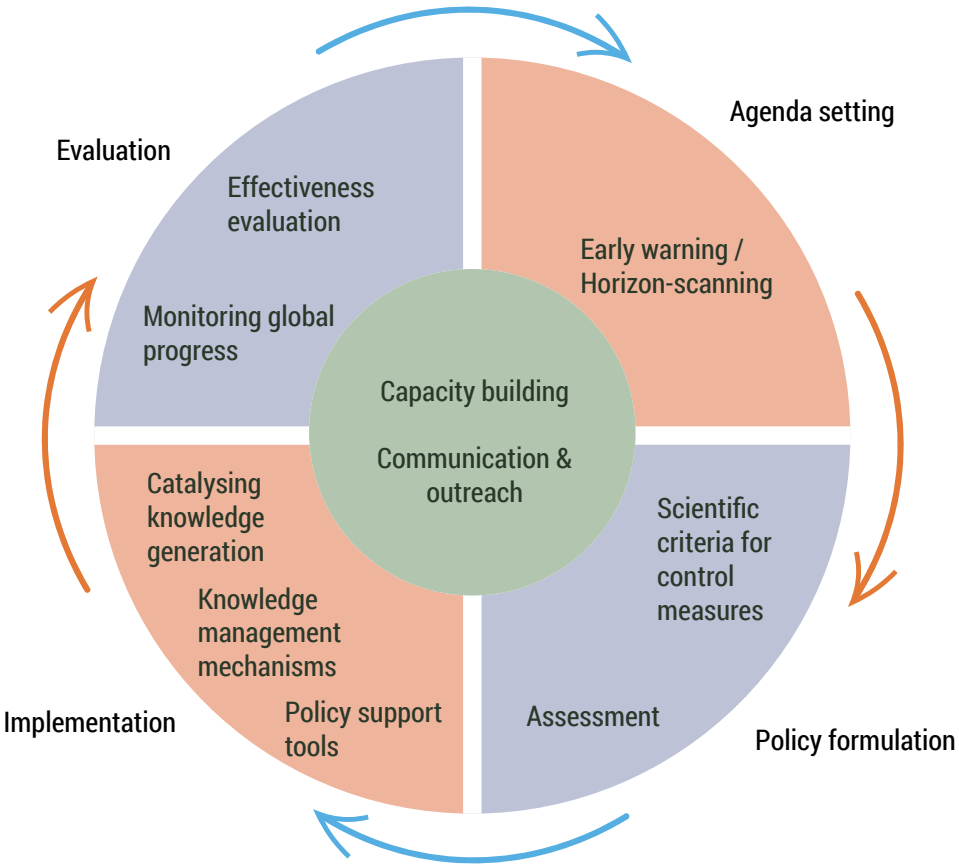


Figure 3: Overview of the ten functions and their alignment with the four phases of the policy cycle.

Table 2: Summary of possible functions for a science-policy interface for the plastics instrument.

Policy phase	Possible functions	Possible activities	Plastics instrument (UNEA Res. 5/14)	Science-Policy Panel (UNEA Res. 5/8)
Policy phase 1: Agenda setting	1. Horizon scanning / early warning	• Early warning • Foresight		• Undertake horizon scanning to identify issues of relevance and propose evidence-based options to address them (para 2a)
Policy phase 2: Policy formulation	2. Scientific criteria for control measures	• Criteria to identify chemicals and polymers of concern • Criteria to identify products of concern • Criteria to promote safe and sustainable design of plastics • Criteria to promote safe and sustainable alternatives and non-plastic substitutes • Criteria to facilitate access to information on plastics (transparency) • Criteria to promote environmentally sound waste management	• Develop provisions to promote sustainable production and consumption of plastics, including product design and environmentally sound waste management, resource efficiency and circular economy approaches (para 3b)	
	3. Assessment	• Global assessments on status and trends of plastic pollution • Socio-economic assessment • Thematic assessments	• Develop provisions to provide scientific and socio-economic assessments related to plastic pollution (para 3i)	• Conduct assessments of current issues and identify potential evidence-based options to address them, in particular those relevant to developing countries (para 2b)
Policy phase 3: Implementation	4. Policy support tools	• Technical guidelines • Best available techniques and best environmental practices • Toolkits		
	5. Knowledge management mechanisms	• Database of chemicals, polymers, and products of concern • Knowledge management hub for visualising progress • Knowledge management hub for facilitating implementation and outreach		• Implied in paras 2c-d which include two functions related to knowledge management: communication and information-sharing, and stakeholder engagement
	6. Catalysing knowledge generation	• Assessments of externalised costs of plastic pollution • Assessment of non-plastics substitutes and alternatives for chemicals, polymers and products of concern • Examine systems to safeguard traditional knowledge, practices and innovations	• Develop provision to promote research into and development of sustainable, affordable, innovative and cost-efficient approaches to end plastic pollution (para 3o)	• Identify key gaps in scientific research (para 2c)
Policy phase 4: Evaluation	7. Monitoring global progress	• Tracking global trends of plastics in the environment, biota and human populations • Tracking global trends of plastic flows, including trade flows • Tracking global trends of discharge/ leakage of plastic waste • Tracking global trends of emissions and releases of microplastics and chemicals • Tracking global presence of chemicals of concern in products • Tracking global trends of greenhouse gas emissions across the life cycle	• Develop provisions to periodically assess the progress of implementation of the instrument (para 3g). • Strengthen methodologies for monitoring and sharing available scientific and other relevant data and information (para 14)	

Table 2 *(continued)*

Policy phase	Possible functions	Possible activities	Plastics instrument (UNEA Res. 5/14)	Science-Policy Panel (UNEA Res. 5/8)
	8. Effectiveness evaluation	• Assessing progress of the plastics instrument in implementing core obligations • Determining the effectiveness of the plastics instrument in achieving objectives and goals • Determining the effectiveness of national actions • Determining the effectiveness of individual response options	• Develop provisions to periodically assess the effectiveness of the instrument in achieving its objectives (para 3h)	
Cross-cutting	9. Capacity building	• Early warning / horizon scanning • Scientific criteria for control measures • Assessment • Policy support tools • Knowledge management mechanisms • Catalysing knowledge generation • Monitoring progress • Evaluating effectiveness • Communication and outreach		• Capacity building as fifth function at OEWG 1.2
	10. Communication and outreach	• Internal communication • External communication		• Encourage/support communication between scientists and policymakers, explaining and disseminating findings for different audiences, and raising public awareness (para 2c) • Facilitate information-sharing with countries, in particular developing countries (para 2d)

indicators of potential change (NACEM, 2020). Horizon scanning should be differentiated from foresight, which evaluates possible futures and actions to foster desired outcomes using techniques such as horizon scanning, analysing megatrends, and scenario creation (Cook et al., 2014; OECD, 2023).

2.1.1. Horizon scanning

Description

Horizon scanning is pivotal for identifying and monitoring emerging and novel threats to the environment and human health from plastic pollution. Horizon scanning includes continuous scanning (often with regular updates), periodic reviews (e.g., every 5 years), or ad-hoc scans for specific purposes (European Commission, 2015). Expert input from a variety of credible sources is critical to the success of a horizon-scanning process (NACEM, 2020). Key themes central to this process may include:

- Novel entities: This includes new chemicals, polymers, or engineered plastic materials, or new forms of chemicals or engineered plastic materials, that have not been assessed and monitored for safety. Novel entities in plastic pollution may be recognised as a particular threat for their potential negative health and environmental impacts when they exhibit the characteristics of persistence, mobility, accumulation in people and organisms, and affect people, organisms and/or earth system processes.
- Legacy plastics: As science evolves, plastics in the environment might be reclassified as even greater threats based on new evidence. For instance, researchers have raised concern that plastic pollution might threaten ocean carbon sequestration since marine microplastics can affect phytoplankton photosynthesis and growth and have toxic effects on zooplankton and affect their development and reproduction (Shen et al., 2020a; Shen et al., 2020b).
- Technologies and practices: Recognising emerging risks associated with existing and new technologies and practices throughout the plastic life cycle is vital. This recognition ensures the safety and sustainability

of solutions linked to the circular economy, renewable solutions and plastic-to-energy projects. For instance, specific mechanical methods aimed at removing plastic waste from the environment could inadvertently trap and endanger marine species (Parker-Jurd et al., 2022).

Added value
Undertaking horizon scanning is critical for early detection of emerging and new threats to the environment and human health to inform decision-making and policy planning, allowing for proactive management and mitigation.

Link to the Zero Draft
Part I of the Zero Draft provides options for the objective of the agreement. Both options include the protection of the environment. Reference is made to undertaking research and advancing scientific knowledge (Part IV, Control Measure 7.3) without explicit reference to identifying emerging threats. However, Part IV, Control Measures 4.b on "Periodic assessment and monitoring of the progress of implementation of the instrument and effectiveness evaluation" requires the governing body to conduct a review on a regular basis of chemicals and polymers of concern used in plastic production, intentionally added microplastics, and avoidable plastic products with a view to assessing the state of knowledge with respect to their identification, production and use by Parties, and their impact on human health and the environment. Such periodic review may be conducted in a form of horizon scanning.

2.1.2. Foresight

Description
Strategic foresight involves considering various possible futures, underpinning assumptions, their potential impacts for policies and decisions, and the actions that might promote more desirable futures (Cook et al., 2014). Strategic foresight includes the following steps: collecting inputs, analysing signals, interpreting the information, determining how to act, and implementation (Cook, et al., 2014). Strategic foresight can therefore be used to understand medium- to longer-term concerns for the environment and human health resulting from the use of plastics (e.g. long-term toxicity from new application areas of plastics). Foresight can also anticipate connections between multilateral environmental agreements and Human Rights Based Instruments (HRBIs) to aid in identifying synergies.

Added value
Foresight can be crucial in planning and realising safe and sustainable innovative solutions for tackling plastic pollution, while also seeking co-benefits to address climate change and advance circularity. Foresight can also help realise distributive environmental justice on the socio-economic impacts of adjustments to the plastics cycle. This may include the just transition of workers and communities affected by the transformation and relocation of aspects of the plastics industry. In particular, their involvement can lead to the co-design of solutions to ensure the environmental and health benefits and burdens are distributed fairly with a particular focus on avoiding further marginalisation and harm to People in vulnerable situations (UNDP, 2022). Foresight planning is important for preparing regulatory interventions and remedies for affected communities.

Link to the Zero Draft
Part I of the Zero Draft provides options for the objective of the agreement. Both options include the protection of the environment. Reference is made to undertaking research and advancing scientific knowledge (Part IV, Control Measure 7.3) without explicit reference to identifying potential future threats. However, Part IV, Control Measures 4.b on "Periodic assessment and monitoring of the progress of implementation of the instrument and effectiveness evaluation" requires the governing body to conduct a review on a regular basis of chemicals and polymers of concern used in plastic production, intentionally added microplastics and avoidable plastic products with a view to assessing the state of knowledge with respect to their identification, production and use by Parties, and their impact on human health and the environment. Strategic foresight may provide an option to utilise the current state of knowledge to identify potential future threats.

2.2. Scientific criteria for control measures

Function origin
UNEA Resolution 5/14 underscores the need to develop control measures to promote sustainable production and consumption of plastics. This encompasses aspects such as product design, environmentally sound waste management, resource efficiency, and circular economy approaches (para 3b).

Overall description
The development of criteria and the provision of science-based recommendations for the prohibition or restriction of chemicals, polymers and products of concern can provide a robust basis to ensure the sustainable production and consumption of plastics. Several sections of the Zero Draft address the creation of scientific criteria for control measures. It will be important to consider how such criteria could be formulated to identify and subsequently list items to be removed from the economy, based on the environmental and human health hazard they pose, or any other reasons deemed necessary for

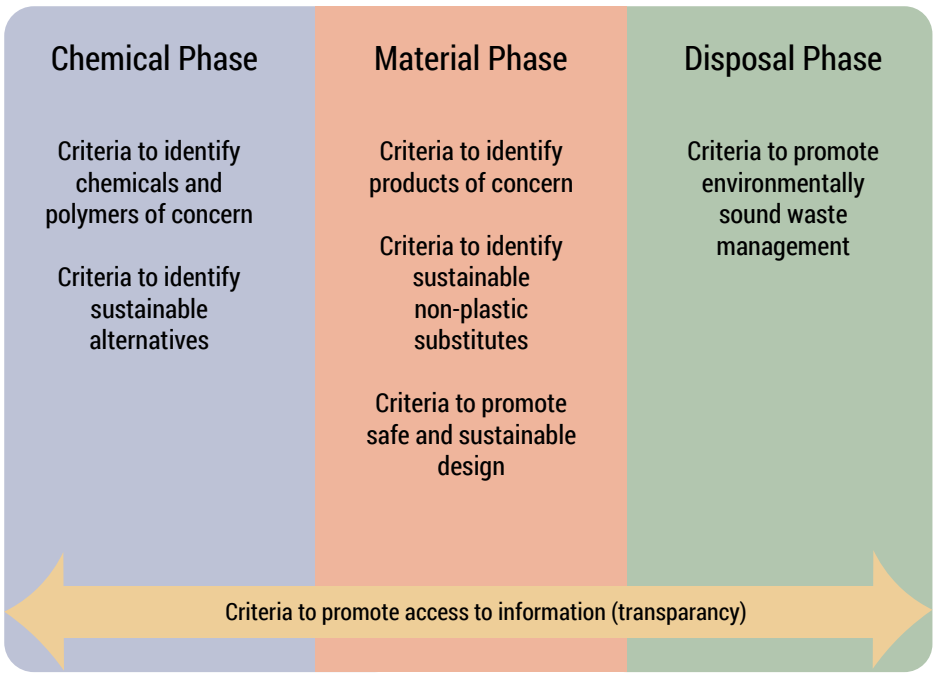


Figure 4: Applicability of the proposed criteria in the chemical, material and disposal phases of plastics.

such action. Figure 4 provides a grouping of the key focus areas of the proposed criteria according to the chemical, material and disposal phases of plastics.

2.2.1. Criteria to identify chemicals and polymers of concern

Description

The science-policy interface for plastic pollution could develop necessary control measures and associated criteria for listing of chemicals and polymers of global concern for elimination and/or restriction (BRS, 2023). The criteria should be reviewed on a regular basis to assess whether they are effective, meaningful and fit-for-purpose. Implications of the updates to the criteria and additional exemptions or control measures required for chemicals and polymers already listed or newly qualified for listing can be assessed and advised by the science-policy interface.

At present, most multilateral environmental agreements identify and recommend listing chemicals of concern in a reactionary manner, addressing chemicals that are already in widespread use rather than prior to market entry. In addition, regrettable substitutions may occur. Moving towards a grouping of chemicals approach and emphasising the early identification of chemicals and polymers of concern will be important.

Drawing from the Stockholm Convention's INC process, the early integration of scientific expertise proves pivotal. The Convention established a Criteria Expert Group during its inaugural meeting, with clearly defined mandates and responsibilities. Composed of government-designated experts and observers, this group was instrumental in crafting science-backed criteria and procedures for identifying persistent organic pollutants (POPs) for future international action, significantly influencing Article 8, and Annexes D, E, and F of the Stockholm Convention. Adopting a similar approach, particularly in defining clear terms of reference for the intersessional group, could provide a strong foundation for criteria development under the new plastics instrument.

Added value

Existing multilateral environmental agreements only regulate a mere 4% of chemicals of concern used in plastics, with polymers largely unregulated (BRS, 2023). The development of criteria will help address this governance gap by facilitating the identification and removal of unregulated chemicals of concern across the value chain of plastics, thereby reducing the negative effects on human health and the environment.

Examples from existing multilateral environmental agreements

- The Montreal Protocol establishes criteria for identifying controlled substances.
- The Stockholm Convention establishes criteria for prohibition and restriction of POPs, which are used by the Persistent Organic Pollutants Review Committee (POPRC) to review chemicals proposed for listing.
- The Rotterdam Convention establishes criteria for applying the Prior Informed Consent (PIC) procedure on banned or severely restricted chemicals and severely hazardous pesticide formulations.

Link to the Zero Draft

The development of criteria for chemicals and polymers of concern can be found in the Zero Draft, Part II, Control Measure 2 "Chemicals and polymers of concern."

2.2.2. Criteria to identify products of concern

Description

Addressing plastic products of concern is pivotal to ending plastic pollution. Presently, there is no clear definition of such products or criteria for their identification. Terms like 'unnecessary', 'avoidable' and 'problematic' (UAP) plastics are prevalent, often associated with single-use or short-lived plastics, packaging, certain agriplastics, plastics containing chemicals of concern, and plastics composed of specific polymers (e.g., polystyrene and polyvinyl chloride). In response, some national and regional legislation aims to ban or reduce the production and/or consumption of such products. Likelihood of leakage is often a determining factor in instituting bans and restrictions. Nevertheless, a holistic approach for classifying products of concern is necessary, potentially spanning two or three tiers based on clear criteria.

Criteria for products of concern would also apply to specific product design issues of high priority, thereby establishing negative characteristics to be avoided, whereas criteria for sustainable design could apply to a broad range of products and refer to positive characteristics to be promoted. It is essential that these criteria align with other established standards, especially those concerning chemicals, polymers, and waste management. The listing should provide a mechanism for reviewing and updating the criteria to ensure relevance and futureproofing of the agreement.

Added value

The material phase of plastics represents the greatest global governance gap, with limited means for addressing problematic and avoidable plastics (BRS, 2023). Restricting and reducing the production and use of such plastics will help reduce resource use, chemicals use, and plastic waste generation, and subsequently reduce GHG emissions while facilitating the transition towards a chemically safe circular economy (BRS, 2023).

Developing a set of global criteria for the identification of products of concern could accelerate the adoption at the national and regional level of regulations and voluntary measures to eliminate, reduce (including through reuse) or redesign such plastics and/or business models as appropriate to the national context. Criteria could also allow for a greater range of products to be captured under such measures, which could include bans, taxes and other market-based instruments.

Examples from existing multilateral environmental agreements

- The Stockholm Convention establishes criteria for prohibition and restriction of POPs, used by the POPRC to review chemicals proposed for listing. While focus is on chemicals, the model could be adjusted for reviewing potential products of concern.
- The Basel Convention provides a list of characteristics to determine if wastes subject to transboundary movement are to be deemed hazardous (Art. 1.1a).

Link to the Zero Draft

UNEA Resolution 5/14 specifies the need to develop provision on sustainable consumption and production (para 3b). The development of criteria for problematic and avoidable plastics is reflected in the Zero Draft, Part II, Control Measure 3 "Problematic and avoidable plastic products, including short-lived and single-use plastic products and intentionally added microplastics."

2.2.3. Criteria to promote safe and sustainable design of plastics

Description

Scholars suggest that the design criteria for plastics and associated chemicals should focus on enhancing the environmental and safety performance of plastic products to be placed on the market (BRS, 2023). Possible guiding principles could include minimisation, durability, reusability, recyclability, and transparency (NCM, 2022; Simon et al., 2021). Moreover, the principle of non-toxicity, intrinsically tied to recyclability, could benefit from UNEP's objectives and guidelines on green and sustainable chemistry (UNEP, 2021a).

The design principles and criteria could adopt a sector-specific approach, targeting the most polluting sectors (BRS, 2023). While these principles might be universally applicable, detailed criteria and indicators can be formulated for individual sectors. To ensure compliance, certification systems may be necessary. These will require robust scientific and technical expertise for validation, helping to identify compliant materials and products throughout the value chain.

Added value

The global governance framework for plastics does not explicitly address sustainable design (BRS, 2023). Design plays a critical role in improving the environmental and safety performance of plastics, towards enabling their safe circularity. It will also lead to benefits for recyclers, particularly low-income workers, due to better-quality and higher value wastes, leading to increased investment and job opportunities and improved livelihoods, especially for the informal sector (Simon et al., 2021)

Examples from existing multilateral environmental agreements

- The Stockholm Convention's Expert Group on Best Available Techniques and Best Environmental Practices is developing guidance for intentionally used

chemicals, with exemptions for known on-going uses, including by non-Parties.

Link to the Zero Draft

The development of criteria for sustainable design of plastics is captured in the Zero Draft, Part II, Control Measure 5 "Product design, composition and performance."

2.2.4. Criteria to promote safe and sustainable alternatives and non-plastic substitutes

Description

It may be necessary to develop a set of criteria to help guide the development of safe alternatives and substitutes to chemicals, polymers and products of concern, should the above criteria for identification and listing of these, and the criteria for sustainable design, not capture the full potential scope of alternatives satisfactorily. Life cycle assessments are key tools for acquiring necessary decision-making information on alternatives and substitutes.

As for other chemicals of concern governed at the international level, alternatives are promoted through the relevant multilateral environmental agreements to replace those substances being phased out. It is important to prevent regrettable substitutions of chemicals, polymers or products gaining market penetration through such policies. Options include a grouping of chemicals approach, similar to the current grouping of single-use plastics legislated for elimination at the national level. This can, however, rely heavily on the development of definitions that prevent the exploitation of loopholes for applications not listed under exceptions or exemptions.

Scientific and technical expertise is needed to develop and update criteria for non-plastic substitutes. Criteria would need to consider the full life cycle of substitutes, including the following preliminary list of issues (UNCTAD, 2021):

- Impacts on the natural environment and human, animal, and plant health upon disposal.
- Durability and functionality for desired end-uses.
- Environmental and social impacts of production and economic feasibility.
- Sustainable development opportunities for developing countries.

Criteria for substitutes would likely be heavily weighted towards sustainable and ethical sourcing in line with a number of existing Sustainable Development Goal (SGD) indicators, such as Target 6.2 to increase water-use efficiency and ensure freshwater supplies and Target 15.1 to conserve and restore terrestrial and freshwater ecosystems. Such criteria may therefore be developed with the support of relevant advisory bodies, such as IPBES.

Added value

Concern and confusion are common when determining the most economical, safe and sustainable material to fulfil the current functions of various plastic applications. Where substances have been regulated for phase-out under other multilateral environmental agreements, examples can be found where alternatives and substitutes were found to be more harmful than the regulated substance. As for safe and sustainable design of plastics, criteria for alternatives and non-plastic substitutes would provide opportunity for certification and validation prior to their entry to the market. This function is closely linked to the development and updating of criteria for safe and sustainable design of plastics.

Examples from existing multilateral environmental agreements

- The Stockholm Convention defines the following criteria for alternatives (products and processes): technical feasibility, costs (including environmental and health costs), efficacy, risk, availability, and accessibility (Annex F, para b).
- The Montreal Protocol defines the following criteria for alternatives: commercially available; technically proven; environmentally sound; economically viable and cost-effective; safe to use in areas with high urban densities considering flammability and toxicity issues, including, where possible, risk characterisation; easy to service and maintain (Decision XXVI/9, para 1a).

Link to the Zero Draft

Alternative plastics and plastic products and non-plastic substitutes are addressed in Control Measures 5d "Alternative plastics and plastic products" and Control Measures 6 "Non-plastic substitutes" in Part II of the Zero Draft.

2.2.5. Criteria to facilitate access to information on plastics (transparency)

Description

Promoting access to information on the makeup of plastic products reinforces the principle of the right to know. It entails the provision of publicly accessible information on the environmental and societal impacts, including human health, spanning the life cycle of plastic products, as well as the materials they are made of, the processes used, and their origin.

Transparency is critical to inform persons and groups regarding their rights associated with environmental and societal impacts of plastics. These rights include:

- Right to a safe and healthy environment.
- Right to science and information on the hazards of plastics.
- Right to participation in decision-making on plastics policy (UN Doc. A/77/183).

Developing transparency criteria requires consideration of what levels of concentration must be disclosed, how to address proprietary information and which methods of sharing disclosed information are best for the intended audience. Disclosure of safety is closely linked to the criteria for identifying chemicals and polymers of concern, whereas the declaration of compliance may be more closely linked to criteria for identifying products of concern and criteria for sustainable product design.

The development of criteria for transparency will draw heavily on technical and scientific insights. Initiatives such as UNEP's Chemicals in Products (CIP) Programme and industry efforts such as the Global Automotive Declarable Substance List (GADSL) can serve as foundational references. Also, multilateral environmental agreements provide support for the need to develop such criteria to expand on the disclosures these multilateral environmental agreements require, although they do not include specific criteria for transparency.

Added value

Enhanced transparency guides informed choices, enabling the safe handling and use of chemicals, polymers and products throughout their life cycle. To maximise its impact, transparency should be coupled with awareness-raising initiatives. Specific benefits encompass:

- Safety: Disclosing the identity and concentrations of materials used in the production of plastic products (chemicals, polymers) helps inform consumers about safety and can advise the value chain about safe material handling. Information can include benchmarking of safety disclosures against allowable concentrations.
- Compliance: Products that meet sustainable and safe design criteria may qualify for particular certification labelling, enabling informed purchases by consumers (e.g., durability rating based on index/criteria).
- Treatment/Disposal: Information about ideal disposal methods and sorting protocols will assist final treatment processes (e.g., separating compostable plastics from recyclable plastics).
- Responsibility: Ownership markings can prevent unlawful environmental dumping and aid in enforcement (e.g., marking of fishing gear to identify owner).
- Traceability: Monitoring material flows, including recycling, aids in trend assessment and compliance checks (see Section 2.7).

Examples from existing multilateral environmental agreements

- The Aarhus Convention mandates comprehensive product information for informed environmental consumer decisions.
- The Kyiv Protocol introduced Pollutant Release and Transfer Registers (PRTRs) to boost transparency and grant public access to pollutant data.
- The Rotterdam Convention establishes a PIC procedure for the trade of regulated chemicals, whereas the Basel Convention applies this to certain plastic wastes.
- The ILO Chemicals Convention (C170) mandates both suppliers and employers to label hazardous chemicals and provide safety data sheets, prohibiting the use of chemicals without such information.

Link to the Zero Draft

Access to information is addressed in Control Measure 13 "Transparency, tracking, monitoring and labelling" in Part II of the Zero Draft.

2.2.6. Criteria to promote environmentally sound waste management

Description

Environmentally sound management of hazardous wastes and other wastes is the objective of the Basel Convention, with several guidelines developed to promote implementation by Parties. Annex III of the Basel Convention provides characteristics/criteria for categorising wastes as hazardous.

Criteria for waste management could be developed under the plastics instrument to help expedite implementation of waste management that is least harmful to the environment and human health, and strengthen practices promoted in the Basel Convention guidelines. Such criteria would need to take into account the definitions established in the Basel Convention Glossary of Terms (Basel Convention, 2017), developed by a Small Intersessional Working Group (SIWG) on legal clarity, as well as work by other relevant expert groups under the Basel Convention that consider criteria / technology for the environmentally sound management of plastic waste and other pertinent waste streams, such as rubber, textiles, household waste, medical waste, and POPs waste.

Added value of the function

Investment in waste management infrastructure is costly and can result in long-term lock-ins of technology that is harmful to human health and the environment. Criteria can guide the selection of sustainable infrastructure and investment choices. Criteria could promote infrastructure that enables safe circularity of plastics, reduces greenhouse gas (GHG) emissions, safely manages effluent, promotes energy and water efficiency and protects communities, including facility workers.

Examples from existing multilateral environmental agreements

- In 2023, the Basel Convention CoP adopted the updated Technical guidelines on the identification and environmentally sound management of plastic wastes and for their disposal, which include consideration of relevant criteria and technology.

Link to the Zero Draft

Waste management is captured in Control Measure 9 "Waste management" in Part II of the Zero Draft.

2.3. Assessment

Function origin

UNEA Resolution 5/14 requests the development of provisions to provide scientific and socio-economic assessments related to plastic pollution (para 3i). Moreover, UNEA Resolution 5/8 suggests that the Science-Policy Panel should conduct assessments of current issues and identify potential evidence-based options to address, where possible, those issues, in particular those relevant to developing countries (para 2b).

Overall description

Assessment is an integral part of the work of a scientific body. It commonly focuses on aggregating and assessing existing research, rather than conducting research itself. Global environmental assessments primarily focus on the state of the environment but may also include human health aspects and extend to include the acknowledgement of drivers and sources, identification and elaboration of impacts, as well as assessment of possible response options (Beck et al, 2022).

2.3.1. Global assessments on status and trends of plastic pollution

Function description

A periodic global assessment on the extent, sources, pathways, drivers and impacts of plastic pollution on the environment and human health across the life cycle of plastics is necessary to provide policymakers and other stakeholders with an understanding of the extent of the problem and whether policies and actions are effective towards achieving the objectives and goals of the agreement. Such information can also empower the general public, persons and groups in vulnerable situations, indigenous peoples and local communities and the media to take action and demand a clean, healthy and sustainable environment.

Added value of the function

An assessment framework that is agile and allows scientists to determine where efforts are best applied can help ensure resource efficiency and relevance to the evolving priorities of policymakers and the global scientific community alike. Global assessments can help identify national and regional gaps in data and progress towards agreed targets and goals, while also assessing the inputs and impacts of all sectors and demographics. Such assessments are useful in determining planetary boundaries.

Examples from existing multilateral environmental agreements

- The Montreal Protocol's Scientific Assessment Panel (SAP) assesses the status of depletion of the ozone layer and its future evolution, the evaluation of trends in emissions, climate impacts, early identification of any other issues of importance to the ozone layer and climate system, and discrepancies between reported emissions and observed atmospheric concentrations, among others (Decision XXXI/2).

Link to the Zero Draft

Control Measure 4b of Part IV "Review of chemicals and polymers of concern, microplastics and problematic and avoidable products" suggests that the governing body shall conduct a review of chemicals and polymers of concern used in plastic production, intentionally added microplastics and avoidable plastic products, with a view to assessing the state of knowledge with respect to their identification, production and use by Parties, and their impact on human health and the environment.

2.3.2. Socio-economic assessment

Description

Socio-economic assessment often forms an integral part of science-policy interfaces supporting multilateral environmental agreements. Scientific findings from socio-economic assessments can support policy development by highlighting trade-offs and assessing the effectiveness of policies. An important aspect in assessing chemicals, polymers and products of concern is gauging the availability, suitability, and technical feasibility of alternatives and non-plastic substitutes (see section 2.2.4). Additionally, the inclusion of local knowledge and stakeholder perspectives in socio-economic assessment can enhance their context-specificity and inclusivity, making the information more relevant and applicable to policy formulation.

There are requirements in international law for respecting and protecting human and environmental rights, notably the UN General Assembly Resolution in 2022 recognising the right to a clean, healthy and sustainable environment. Procedural fairness on the impacts of plastics requires open, transparent and inclusive decision-making at every stage of the plastics cycle. The science-policy interface is an important mechanism to improve access to justice and

legal empowerment regarding rights related to human and environmental impacts of plastics.

Socio-economic analysis is becoming more prevalent in chemical risk policies. Yet, ensuring impartiality in these assessments has proven challenging (Maxim, 2023). For example, various NGOs have pointed out flaws in the socio-economic analyses under REACH, including consistent underestimation of health and environmental impacts and overestimation of costs for manufacturers. Concerns also arise from disadvantaging producers of alternatives and overlooking societal impacts beyond employment.

Added value

The development of periodic global assessments on the economic and societal costs of plastic pollution throughout the plastics life cycle, including health and environmental impacts from extraction to waste, could provide valuable information to support decision-making in addressing plastic pollution. Also, specific socio-economic impacts of suggested control measures under the instrument could be analysed to help evaluate the feasibility, costs, efficacy, and distributional impacts of various options, including substitutes and alternatives for chemicals, polymers and products of concern. Such socio-economic assessments can feed into global and thematic assessments.

Examples from existing multilateral environmental agreements

- The Montreal Protocol's Technology and Economic Assessment Panel (TEAP) reviews control measures every four years, focusing on the technical transition to sustainable alternatives and challenges with substitutes (Decision XXXI/2).
- The Stockholm Convention's financial needs assessment occurs quadrennially, drawing from POPs inventory data from various sources.
- The Stockholm Convention's POPRC formulates risk management documents for potential chemical listings based on Annex F, considering socio-economic factors and the impact of possible control measures (Art. 8.7a).

Link to the Zero Draft

Control Measure 4.a(3c) in Part IV of the Zero Draft lists socio-economic assessment as an element of effectiveness evaluation and refers to the functions of the subsidiary body. The Control Measure 12 "Just Transition" in Part II of the Zero Draft refers to elements that could be included in socio-economic assessments.

2.3.3. Thematic assessments

Description

Emerging science and changes in global priorities may necessitate detailed assessment of research on particular subjects. The science-policy interface would need to identify such requirements, clarify the knowledge gaps, and advise on the scope of research required. Integrating the science on plastics material and product pollution with, for example biodiversity science, climate science, economics and social sciences, would strengthen the knowledge base and understanding of potential policy responses and their outcomes in different contexts. Such integration requirements could be considered by the science-policy interface.

Added value

Thematic assessments could encompass topics such as resource efficiency, circularity, extended producer responsibility (EPR) (including internalisation of costs by relevant private sectors), environmentally sound waste management, trade of products and components, remediation of legacy plastic waste, sectoral impacts and stewardship efforts, and planetary boundaries, among others. These thematic assessments can feed into global assessments.

Examples from existing multilateral environmental agreements

- The Stockholm Convention features various expert groups, like the dichlorodiphenyltrichloroethane (DDT) Expert Group, which evaluates the need for DDT and strategies for its replacement.
- The Conference of Parties (COP) of the Convention on Biological Diversity (CBD) can commission Ad Hoc Technical Expert Group (AHTEG) assessments for expert guidance during negotiations, including creating new guidelines or frameworks.

Link to the Zero Draft

In Part IV of the Zero Draft, Control Measure 7 "Awareness-raising, education and research" emphasises that research is essential to improve understanding of the impacts of plastic pollution, as well as to advance scientific knowledge and promote technological innovation to reduce plastic pollution.

2.4. Policy support tools

Function origin

The development of policy support tools has not been specified as a function in the UNEA resolutions, but they play an indispensable role in multilateral environmental agreements, and their significance has been acknowledged in the literature reviewed.

Description

The development of policy support tools is needed to help translate core obligations of multilateral environmental agreements into national policies and

actions. Expert groups or committees often play a crucial role in their preparation. These tools encompass the following:

1. Technical guidelines are comprehensive documents that offer detailed instructions, recommendations, or procedures for implementing obligations under related multilateral environmental agreements. They provide guidance on technical standards, methodologies, monitoring procedures, reporting formats, and other pertinent aspects. These guidelines promote consistency and uniformity in the implementation of multilateral environmental agreement provisions.
2. Best available techniques and best environmental practices promote the use of the most effective and environmentally sound techniques, technologies, or practices to minimise pollution or environmental impacts. The OSPAR Convention, for example, defines best available techniques as "the latest stage of development of processes, of facilities or of methods of operation which indicate the practical suitability of a particular measure for limiting discharges, emissions and waste" and best environmental practices as "the application of the most appropriate combination of environmental control measures and strategies" (Appendix 1). Multilateral environmental agreements often incorporate best available techniques and best environmental practices as guiding principles, encouraging parties to integrate them into domestic regulations and industry practices. They serve as benchmarks to achieve higher environmental performance standards.
3. Toolkits are comprehensive sets of resources, tools, and practical materials that facilitate the implementation of specific activities or measures outlined in multilateral environmental agreements. These toolkits include guidance documents, templates, checklists, training materials, case studies, and other resources. They assist parties, stakeholders, or implementing agencies in carrying out tasks, such as capacity-building, data collection, reporting, monitoring, or enforcement. They provide practical assistance and can be tailored to specific sectors or issues covered by the multilateral environmental agreement.

The development of technical guidelines, best available techniques, best environmental practices, and toolkits are often mandated by the governing body that outlines the objectives, scope, and expected outcomes of these resources. Expert groups are then established to draft them, drawing upon existing scientific knowledge, best practices, and stakeholder inputs. The drafts undergo refinement and finalisation before being presented to the governing body for adoption. The dissemination of these resources occurs through various channels, such as convention websites, workshops, training programs, and publications.

Added value

The policy support tools play an indispensable role in enhancing compliance and implementation, by ensuring countries can interpret and implement obligations consistently. These tools are particularly beneficial for developing countries or countries with economies in transition that often lack the technical expertise or resources needed to implement multilateral environmental agreements. Technical guidelines and toolkits simplify the monitoring and reporting process, while the development of best available techniques and best environmental practices encourage the adoption of sustainable technologies and environmental practices.

Examples from existing multilateral environmental agreements

- The Basel Convention's Open-ended Working Group (OEWG) is supported by technical experts that contribute to the development of technical guidelines for specific waste streams and for specific disposal operations. These are approved by the COP, including POPs, e-waste, mercury wastes, and plastic waste, among others (UNEP, 2022b).
- The Expert Group on Best Available Techniques and Best Environmental Practices under the Stockholm Convention develops and updates technical guidance documents that provide information on best available techniques and best environmental practices for specific POPs or industrial sectors. The group also supports capacity building activities by organising workshops, training programs, and information-sharing events to enhance understanding and implementation of best available techniques and best environmental practices measures.

Link to the Zero Draft

This function is not referred to in the Zero Draft.

2.5. Knowledge management mechanisms

Function origin

While the founding UNEA resolutions of the Science-Policy Panel (Resolution 5/8) and the plastics instrument (Resolution 5/14) do not explicitly articulate knowledge management mechanisms, such mechanisms are implied in Resolution 5/8, which suggests that the Science-Policy Panel's principal functions include the following two functions related to knowledge management: communication and information-sharing, and stakeholder engagement (UNEP, 2022c).

Overall description

A centralised platform to manage, store and present data can make it easier for policymakers and other stakeholders to find relevant knowledge, and they can help ensure the same knowledge and tools are considered by all stakeholders to facilitate consistency and for monitoring progress (Wang et al., 2019). Where knowledge involves indigenous peoples, specific principles are available to guide the just handling of such information. Global Indigenous Data Alliance 's Principles for Indigenous Data Governance offer detailed guidelines on the ethical stewardship of indigenous knowledge, emphasising the CARE principles (Collective Benefit, Authority to Control, Responsibility, and Ethics). These principles ensure indigenous data is managed respectfully and align with the FAIR criteria (findable, accessible, interoperable, reusable), promoting integrity and fairness in data handling (Carroll et al., 2020).

2.5.1. Database of chemicals, polymers and products of concern

Description

The lack of a consolidated digital database for data on chemicals, polymers, and products of concern hinders easy access to crucial information. To detoxify markets, it is essential to have readily available data on hazards, occurrences, and the identities of chemical and polymers (BRS, 2023). Unfortunately, significant barriers exist, such as the scattering of this data across various sources or its confinement behind paywalls, which obstructs informed decision-making.

Information provision can be based on comprehensive national inventories, fostering transparency and accountability. Additionally, it is essential to implement a disclosure requirement for industries to mandatorily disclose relevant data, further enhancing the effectiveness of such a database. The scientific community can play a key role in helping to establish the database, leveraging their expertise on its execution, including digital setup.

Added value

A dedicated platform that centrally manages, stores, and disseminates data on chemicals, polymers and products of concern would significantly facilitate informed decisions. It would enable manufacturers, retailers, recyclers and other stakeholders to gain easy access to information and empower them to comply with environmental and safety regulations.

Examples from existing multilateral environmental agreements

- The Montreal Protocol's Data Centre[3] hosts a central database with detailed data on production, consumption, and trade of ozone-depleting substances by individual countries.
- The Rotterdam Convention's PIC Circular[4] provides information on the chemicals regulated under the Convention, including trade data, regulatory decisions, and risk profiles.
- The CITES Trade Database[5] includes information on trade permits, species listings, and trade volumes to support monitoring and regulation of wildlife trade.

Link to the Zero Draft

The Zero Draft, Part IV, Control Measure 5 "International cooperation" requires Parties to promote international cooperation in support of the objective of the instrument through the promotion of technical and scientific cooperation, including regional platforms or databases, technical-scientific cooperation projects, and networks of technical centres. Part IV, Control Measure 6 "Information exchange" requires each Party to facilitate and undertake exchange of information relevant to implementation of the instrument, including through an online registry.

Part II, Control Measure 3 "Problematic and avoidable plastic products, including short-lived and single-use plastic products and intentionally added microplastics" provides an option that requires Parties to share information on measures taken to not allow the production, use in manufacturing, sale, distribution, import or export of plastics and products containing intentionally added microplastics through an online registry with the aim of promoting transparency.

2.5.2. Knowledge management hub for visualising progress

Description

Knowledge management hubs, utilised for visualising progress, help foster transparency and accountability among Parties. Such hubs can rely on information obtained from national inventories as well as relevant monitoring data. This may require capacity building for knowledge management and transfer, including through the development of relevant guidelines.

Added value

Presenting data in a user-friendly and accessible format enables Parties to track their own progress and compare action to that of others, facilitating shared learning and best practices. A dynamic and up-to-date knowledge hub can also provide a compelling way to communicate progress to the broader audience (Ivanova et al., 2018).

Examples from existing multilateral environmental agreements

- The Stockholm Convention maintains the Global Monitoring Plan (GMP) Data Warehouse,[6] which

offers standardised, reliable global data on POPs in environmental matrices, aiding Parties in evaluating the success of control measures and the overall reduction of POPs.

Link to the Zero Draft
This function is not explicitly mentioned in the Zero Draft.

2.5.3. Knowledge management hub for facilitating implementation and outreach

Description
It is relevant to consider other possible opportunities for digitally sharing relevant information to facilitate implementation, including research findings and best practices. These databases can include a global hub, accompanied by national nodes.

Added value
By utilising digital platforms and databases, Parties and other stakeholders can access a wealth of information, fostering collaboration and promoting evidence-based decision-making.

Examples from existing multilateral environmental agreements
- The UNCCD's Knowledge Hub[7] enhances sustainable land management and anti-desertification efforts by centralising knowledge, practices, and research findings.
- The CBD's Clearing-House Mechanism (CHM) functions as a worldwide network for biodiversity data, offering resources such as scientific studies, reports, and national strategies through its main website and national nodes.

Link to the Zero Draft
Part IV, Control Measure 6 "Information exchange" requires each Party to facilitate and undertake exchange of information relevant to implementation of the instrument, including through an online registry.

2.6. Catalysing knowledge generation

Function origin
UNEA Resolution 5/14 requests the development of provisions to promote research into and development of sustainable, affordable, innovative and cost-efficient approaches to end plastic pollution (para 3o). The role of best available science, traditional knowledge, knowledge of indigenous peoples and local knowledge systems is highlighted (para 4d). UNEA Resolution 5/8 suggests the panel's principal functions could include identification of key gaps in scientific research (para 2c).

Overall description
This section examines possible research topics spanning various scientific disciplines, endeavouring to catalyse research and mobilise the scientific community. This effort includes exploring possibilities to ensure a multidisciplinary foundation for the science-policy interface by incorporating perspectives beyond natural sciences, in particular social science and humanities, and addressing responsibilities regarding the use of traditional and Indigenous knowledge (as per the United Nations Declaration on the Rights of Indigenous Peoples). The science-policy interface for plastic pollution can serve as a significant platform for international research collaborations.

Traditionally, intergovernmental science-policy bodies do not conduct research themselves but synthesise existing scientific research. Similarly, while multilateral environmental agreements do not engage in research directly, supporting obligations often encourage the conducting of research at the national level to help reinforce the delivery of core obligations. Thus, a prerequisite for developing a strong science-policy interface for plastic pollution is the availability of credible scientific information, including ensuring the science-policy interface encourages the directing of necessary funds and other resources to conduct relevant research. A pressing challenge in this endeavour is to ensure that reliable scientific information is both available and accessible, especially in developing countries.

2.6.1. Assessments of externalised costs of plastic pollution

Description
An important role of the science-policy interface would be to agree on methodologies for estimating human health and economic costs of plastic pollution, both globally and domestically. Initially, these assessments could focus on selected topics (e.g., policies, plastics, or sectors) and gradually expand to more comprehensive estimates (SAICM, 2022). Coordinating with national reporting and statistical frameworks, such as the System of National Accounts (SNA) and the System of Environmental and Economic Accounting (SEEA), is essential.

Such assessments would help to fill a notable void, namely the lack of an exhaustive global estimation of the externalised cost of plastic pollution, including costs covered by taxes and other public funds versus funds raised through the application of the polluter pays principle. Similarly, the total cost of the externalities generated by the plastics industry at the national level remains vaguely understood. Box 1 provides examples of existing estimates of externalised costs of plastic pollution.

Box 1: Examples of existing estimates of the externalised costs of plastic pollution.

Global estimates:

- The global cost of plastic pollution to human health stands at over USD 250 billion (Landrigan et al., 2023). Meanwhile, its social and environmental costs are estimated at approximately USD 2.2 trillion (Forrest et al., 2019).
- Exposure to selected chemicals led to the loss of 2 million lives and 53 million disability-adjusted life-years in 2019 (WHO, 2021), according to an updated addition to The Public Health Impact of Chemicals: Knowns and Unknowns (WHO, 2016).
- The annual global social cost from harm to human health due to chemicals found in plastics, specifically phthalates, flame retardants, and bisphenols, is estimated to exceed USD 100 billion (Merki and Charles, 2022).

Regional and national insights:

- In the USA and Europe, exposure to endocrine disrupting chemicals (EDCs) has resulted in diseases and conditions costing annually 2.3% and 1.3% of their respective gross domestic products (GDPs) (Attina et al., 2016). In Canada, EDC exposure is estimated to amount to 1.25% of the Canadian GDP (Malits et al., 2022).
- In the Asia-Pacific, marine litter's economic damage to maritime industries has grown eightfold since 2008, reaching USD 10.8 billion in 2015, which contributes to a global cost equivalent to USD 18.3 billion (McIlgorm et al., 2022).
- A study estimating the cost of environmental degradation by plastic pollution undertaken for the World Bank in Tanzania and Zanzibar highlights variables to be taken into account in such assessments (McIlgorm and Xie, 2023).

Strengthening such assessments requires incorporating biomedical and human research. This includes understanding human chemical exposure from plastics, improving toxicological methods, and initiating epidemiological studies to discern the health effects of such exposures (Landrigan et al., 2023).

Added value of the function

Assessments of externalities of plastic pollution would support alignment of industry accountability with the polluter pays principle. It paves the way for market-based instruments, such as fees, taxes, and EPR schemes, to offset these externalities. The distribution of the impacts of plastic production and waste is currently unequal, with the burden falling disproportionately on low-income and minority communities (UNEP, 2021b).

Link to the Zero Draft

The Zero Draft does not specifically refer to assessment of externalised costs. It does, however, promote the adoption of EPR schemes, which infer limited accountability by producers of all externalities resulting from their products in the form of waste management costs currently borne by authorities. EPR is promoted for national adoption in Part II, Control Measure 7 "Extended Producer Responsibility" of the Zero Draft.

2.6.2. Assessment of non-plastics substitutes and alternatives for chemicals, polymers and products of concern

Description

Ensuring that the introduction of non-plastic substitutes and alternatives for chemicals, polymers, and products of concern does not lead to regrettable substitutions is important. Operational research is needed to determine which solutions are most effective and cost-effective in the context of particular countries, and to assess the risks, benefits, and trade-offs of proposed solutions (Landrigan et al., 2023).

Life cycle assessment (LCA) is an important tool that evaluates the environmental impacts at all stages of the product's life cycle, serving as a tool for assessing alternatives to plastics and related chemicals. However, not all LCA models are comprehensive, with some overlooking certain stages or neglecting the risks posed by hazardous chemicals. In particular, there is a marked tilt towards assessing climate impacts, which can inadvertently favour hard-to-recycle materials like multi-layered plastics (Notten et al., 2022). Moreover, health effects linked to plastics, often stemming from undisclosed chemical content and the unclear dynamics of chemical release and exposure, are typically underemphasised in current life cycle assessments (Notten et al., 2022).

Added value of the function

This pre-emptive assessment ensures that alternatives and non-plastic substitutes undergo rigorous scrutiny, balancing their perceived benefits against potential hidden costs or threats, thereby preventing regrettable substitutions.

Examples from existing multilateral environmental agreements

- The Stockholm Convention requires Parties to encourage and/or undertake appropriate research pertaining to POPs and, where relevant, to their alternatives and to candidate POPs (Art. 11.1).

- The preamble of the Montreal Protocol highlights the importance of promoting international co-operation in the research, development and transfer of alternative technologies.

Link to the Zero Draft

The Zero Draft is clear on the need for safe, environmentally sound and sustainable alternatives and non-plastic substitutes in Part II, Control Measure 5.d "Alternative plastics and plastic products" and Control Measure 6 "Non-plastic substitutes." For substitutes, the draft promotes the role of services, which could include alternate business models.

2.6.3. Examine systems to safeguard traditional knowledge, practices and innovations

Function description

It is essential to integrate traditional knowledge, knowledge of indigenous peoples and local knowledge systems into the development of the science-policy interface on plastic pollution (BRS, 2023). This knowledge is protected under the United Nations Declaration on the Rights of Indigenous Peoples and there are specific rules regarding respectful engagement with these knowledge holders and the use of their traditional knowledge. The Declaration provides for the specific right of Free, Prior, and Informed Consent (FPIC) concerning the use and application of their knowledge. The FPIC process depends on meaningful involvement of indigenous peoples and their representative institutions, as well as respecting their consultation protocols, to give effect to indigenous peoples' rights to self-determination.

Added value of the function

Solutions sought with Free, Prior, and Informed Consent (FPIC) may help to protect traditional knowledge, systems, practices and innovations and nature-based solutions of indigenous peoples, including when researching and scaling up alternative and new materials. Given the limited research in this area, a review of existing practices and technologies should also require engagement with relevant communities.

Link to the Zero Draft

Part IV, Control Measure 6.1.c "Information Exchange" of the Zero Draft promotes the inclusion of knowledge, including indigenous knowledge on "environmentally sound waste management, sources of plastic pollution, human and fauna and flora exposure to plastic pollution and the associated risk management and reduction options." In addition, Part IV, Control Measure 7 "Awareness-raising, education and research" suggests Parties should incentivise information sharing, including on indigenous, traditional and local knowledge systems. Part II, Control Measure 12 "Just Transition" implies the inclusion of such knowledge, stipulating that each Party shall promote and facilitate a fair, equitable, and inclusive transition for affected populations."

2.7. Monitoring global progress

Function origin

UNEA Resolution 5/14 requests the INC to include provisions to periodically assess the progress of implementation of the instrument (para 3g). Moreover, the Resolution highlights the need for strengthening methodologies for monitoring and sharing available scientific and other relevant data and information (para 14).

Overall description

Monitoring may encompass the entire life cycle of plastics to capture material flows from production to final disposal, including leakage/discharge of macroplastics and emissions/releases of microplastics and chemicals therein. It may also include the identification of quantities of plastic pollution in the environment, and concentrations of plastics in biota and human populations and their impacts. Monitoring is necessary to account for externalities like greenhouse gas emissions related to the plastic life cycle. To this end, the science-policy interface could have the following roles:

- Support the development and updating of indicators for monitoring.
- Help harmonize methodologies for data collection to ensure comparability of data across regions.

2.7.1. Tracking global trends of plastics in the environment, biota, and human populations

Description

It will be important to assess the presence, concentrations, and trends of plastics and associated chemicals in environmental media (soil, water and air), biotic media, and human matrices, as well as the impacts of plastics and associated chemicals on human health and the environment, and socio-economic and cultural impacts of plastics. Monitoring efforts need to emphasise locations that process plastics (i.e., production and disposal), to enable identification of illegal activities, including possible exposure of people in vulnerable situations and ecosystems.

Added value

The lack of coherent standards and uniform methodologies for studying plastic pollution complicates global data analysis and hinders comparability (Vered & Shenkar, 2021). To address the threats that plastic pollution poses to the environment and human health,

standardised data detailing the types, amounts, and distribution of plastic pollution are needed. This will deepen the understanding of the risks of plastic pollution and guide more efficient strategies for its management, containment, and possible remediation solutions.

Examples from existing multilateral environmental agreements

- The Stockholm Convention's Global Monitoring Plan (GMP) monitors global persistent organic pollutants trends using various mediums.

Link to the Zero Draft

The Zero Draft, Part IV, Control Measure 4.b "Review of chemicals and polymers of concern, microplastics and problematic and avoidable products" requires the governing body to conduct a review on a regular basis of chemicals and polymers of concern used in plastic production, intentionally added microplastics and avoidable plastic products, with a view to assessing the state of knowledge with respect to their identification, production, and use by Parties, and their impact on human health and the environment.

2.7.2. Tracking global trends of plastic flows, including trade flows

Description

Tracking trends of plastic flows involves a material flow analysis of production, markets and end of life, focusing on the different forms and components of plastics, including precursors, polymers, additives, materials, products, and waste. Tracking trends of plastic flows across the life cycle could focus on:

- Upstream: origin, resin types and volumes.
- Midstream: use and reuse.
- Downstream: collection, recycling, landfilling, incineration and remediation.
- Trade: precursors, polymers, additives, products and waste.

Tracking trends of plastic flows will require disclosure of information by manufacturers on the volumes of plastics and associated chemicals produced. Moreover, the plastic flow inventory can be enhanced by improving classification and monitoring of trade flows across the life cycle of plastics, including by refining the Harmonized System (HS) codes under the World Customs Organisation (Birkbeck, 2022).

Collaboration and data sharing across the value chain will be important to track plastic flows, with the involvement of industry associations, research institutions, and government agencies, including statistical agencies (NCM, 2020; Heller et al., 2020). It is important to build on and complement existing work, including the Plastic Waste Partnership (PWP) established under the Basel Convention that is working towards enhancing data collection, tracking, and monitoring of the transboundary movements of plastic waste at the global level. The Global Partnership on Plastic Pollution and Marine Litter (GPML) also collates useful information and methods.

Developing and implementing standardised reporting frameworks and certification schemes can help track and monitor plastics. For instance, the New Plastics Economy Global Commitment encourages companies to report on their plastic usage, recycling, and other relevant metrics. Certification programs such as the Marine Stewardship Council (MSC) and Forest Stewardship Council (FSC) provide examples of traceability and assurance of sustainable sourcing practices.

Added value

An efficient plastic flow inventory equips policymakers and stakeholders with insights into challenges, opportunities, and the implications of potential interventions. This understanding facilitates targeted innovations in product design, recycling, and recovery (Heller et al., 2022).

Examples from existing multilateral environmental agreements

- The Montreal Protocol mandates parties to provide statistical data on production of controlled substances.
- The Stockholm Convention does not explicitly mandate POP inventories, but they are often central to national implementation plans (NIPs).
- The Basel Convention promotes the establishment for a tracking system, namely the Basel Convention Control System, for hazardous waste.

Link to the Zero Draft

The Zero Draft, Part II, Control Measure 13 "Transparency, tracking, monitoring and labelling" requires Parties to mandate the disclosure of information by producers and importers on "the chemical composition of all plastics and plastic products throughout their life cycle; take appropriate measures to ensure the traceability of chemicals, polymers and the plastic contents of products throughout the life cycle of plastics and plastic products." Part IV, Control Measure 3 "Reporting on progress" provides an option requiring each Party to report on this, including statistical data on types and volumes of its production, imports and exports of plastic polymers and products. In addition, Parties are required to "monitor and track the types and volumes of its production, imports and exports of chemicals and polymers used in the production of plastic polymers, plastics and plastic products, and regulated plastic products across their life cycle." Part IV, Control Measure 4.b "Review of chemicals and polymers of concern, microplastics and problematic

and avoidable products" implies the need to track flows of plastics.

2.7.3. Tracking global trends of discharge/ leakage of plastic waste

Description

Transnational environmental leakage of plastic waste occurs throughout the life cycle, resulting in extensive pollution and health hazards (Landrigan et al., 2023). Leakage includes plastic resin spills, leakage during use (e.g., litter, paint, artificial turf, paint, tires, and synthetic textiles), and disposal (e.g., wastewater sludge and mismanaged waste) (Landrigan et al., 2023).

Tracking the trends of discharge/leakage of macroplastics could focus on:

- Sources and pathways, e.g.:
  - Surface run-off, and
  - Stormwater, floods, etc.
- Stocks of wastes, e.g.:
  - Waste collection, landfill, open dumps and other waste management services.
- Sectors, particularly those that deploy plastics directly into the environment or areas where risk of leakage is high, e.g.:
  - Fishing gear,
  - Agriplastics, and
  - Packaging and single-use products.

Added value

Understanding the sources and pathways of leakage can facilitate targeted action to end such leakage. Stock-taking of plastic waste will also help design optimal waste management systems and assign necessary financial resources for operating these systems.

Link to the Zero Draft

The Zero Draft does not provide specifically for the tracking of leakage, but leakage could be accepted as being within the life cycle of plastics materials and products. In the Zero Draft, Part II, Control Measure 13 "Transparency, tracking, monitoring and labelling," Parties are required to monitor and track the types and volumes of production, imports, and exports of chemicals and polymers used in the production of plastic polymers, plastics, and plastic products, and regulated plastic products across their life cycle." Part II, Control Measure 8 "Emissions and releases of plastic throughout its life cycle" requires the prevention and elimination of emissions and releases of plastic polymers, plastics, including microplastics, and plastic products across their life cycle, to the environment from the sources to be identified in the annex. It could be assumed this would require tracking of releases to determine efficacy of measures.

2.7.4. Tracking global trends of emissions and releases of microplastics and chemicals

Description

Plastics contain many chemicals that are, in most cases, not chemically bound to the polymer matrix. These chemicals can therefore slowly migrate from within the polymer matrix, diffusing out and into the environment. Moreover, microplastics and nanoplastics are released as result of breakdown of macroplastics, which can create risks when they function as vectors for chemical contaminants, and potentially as a chemical threat to human health and the environment.

Monitoring trends of plastic use in different economic sectors, including textiles, agriculture, and transportation, can provide a comprehensive understanding of sources and pathways of microplastics and chemicals, enabling the identification of hotspot areas. Monitoring trends of emissions and releases of microplastics and chemicals could focus on the environments with higher levels of human activities such as agricultural lands and transportation routes, and settings of urban and industrial infrastructure.

Added value

Data on emissions and releases of microplastics and chemicals is still scarce, and risks are poorly understood. Creating harmonized methodologies for tracking releases will provide a better understanding of the magnitude of the problem and help develop targets and solutions spanning the life cycle of plastics from design to disposal.

Examples from existing multilateral environmental agreements

- The Minamata Convention requires Parties to establish and maintain an inventory of emissions from relevant sources (Art. 8, para 7) and an inventory of releases from relevant sources (Art. 9, para 6).
- The Stockholm Convention states that the action plan for unintentional persistent organic pollutants (UPOPs) shall include source inventories and release estimates of unintentional persistent organic pollutants (UPOPs) (Art. 5, para 1).
- The Kyiv Protocol mandates reporting of micro/ nanoplastics from wastewater facilities in PRTRs, yet differentiated reporting on these particles is not current practice (UNECE, 2022).
- The Regional Seas Conventions and Action Plans (RSCAPs) and the CBD use indicator 14.1.1b on plastic debris density of the 2030 Agenda for Sustainable Development.

Link to the Zero Draft

The Zero Draft, Part II, Control Measure 13 "Transparency, tracking, monitoring and labelling,"

Parties are required to monitor and track the types and volumes of production, imports, and exports of chemicals and polymers used in the production of plastic polymers, plastics and plastic products, and regulated plastic products across their life cycle." This would include the release of chemicals and polymers of concern." Part II, Control Measure 8 "Emissions and releases of plastic throughout its life cycle" requires the prevention and elimination of emissions and releases of plastic polymers, plastics, including microplastics, and plastic products across their life cycle, to the environment from the sources to be identified in the annex. It could be assumed this would require tracking of releases to determine the efficacy of measures.

2.7.5. Tracking global presence of chemicals of concern in products

Description

Ensuring the safety of plastic products across the value chain necessitates transparency of their chemical content. While consumers have the right to know if a product contains any hazardous substances, detailed chemical composition information is typically not provided clearly on the product label. The presence of chemicals of concern may also need verification through chemical analysis of samples of plastic products and waste. The development and use of toolkits may also be necessary to indirectly assess quantities of specific chemicals of concern in plastic products, along with more rigorous plastic waste import and export data.

Added value

Increased transparency can help inform consumers and retailers, enabling informed consumer choices and facilitating the detection of chemicals of concern in customs control. This is especially vital for developing countries with limited capabilities for assessing the chemical content of imported products. Moreover, enhanced transparency supports the safe circularity of plastics by enabling proper handling and management of plastic waste throughout its life cycle.

Examples from existing multilateral environmental agreements

- The Stockholm Convention mandates the creation of strategies for identifying items and wastes containing POPs, including stockpile identification, and underscores the need for inventories to evaluate the quantity of POPs in these materials (Art. 6).
- The ILO Chemicals Convention (C170) prescribes the classification of all chemicals by hazards and other properties, the labelling of chemicals with appropriate hazard information and symbols, as well as the provision of safety data sheets to workers for all hazardous chemicals used at their workplace.

Link to the Zero Draft

As per the Zero Draft, Part II, Control Measure 13 "Transparency, tracking, monitoring and labelling," Parties are required to monitor and track the types and volumes of production, imports, and exports of chemicals and polymers used in the production of plastic polymers, plastics, and plastic products, and regulated plastic products across their life cycle. "This would include tracking the presence of chemicals of concern in products." Part IV, Control Measure 4.b "Review of chemicals and polymers of concern, microplastics, and problematic and avoidable products" requires the governing body to conduct periodic reviews of chemicals and polymers of concern used in plastic production, with a view to assessing the state of knowledge regarding their production and use by Parties.

2.7.6. Tracking global trends of greenhouse gas emissions across the life cycle

Description

Given the large and growing impact of plastics on climate change, tracking of plastic-related GHG emissions will be important, building on and complementing work under relevant multilateral environmental agreements and other initiatives. In 2015, the plastics sector accounted for 4.5% of global GHG emissions (Cabernard, 2022). With current growth rates, plastic-related GHG emissions could almost quadruple by 2050 (Zheng & Suh, 2022). To achieve the Paris Agreement's 1.5°C climate target, studies suggest that plastic production needs to be reduced by 46-70% from its 2019 levels (Chen et al., 2023; Hann, 2022).

GHG emissions are emitted across the life cycle of plastics, with 94% originating from upstream activities of extraction, processing, and manufacturing (Cabernard, 2022). Although recycling emits the fewest GHGs during disposal, it involves energy-intensive steps (i.e., collection, sorting, processing, and transportation), whereas incineration and landfilling cause higher emissions (Pew Charitable Trusts & Systemiq, 2022). Additionally, discarded plastics release GHG emissions (Royer et al., 2018) and exacerbate climate change by interrupting ecological functions such as phytoplankton photosynthesis and growth (Shen et al., 2020a), and accelerating cryosphere melting (Zhang et al., 2022).

Added value

By meticulously tracking GHG emissions derived from plastics, the global community can heighten accountability and address a critical, though underrepresented, factor in meeting climate targets.

Examples from existing multilateral environmental agreements

- The UNFCCC and Paris Agreement mandate GHG emissions inventories in areas such as energy,

industrial processes, and waste, facilitating detailed insights into GHG emissions throughout the life cycle of plastics.
- The Ramsar Convention's Scientific and Technical Review Panel is conducting assessments of direct and climate-change-related pressures on wetlands, their impacts, and responses (STRP, 2023).
- The Kyiv Protocol on PRTRs advocates for transparency through public access to pollutant data, mandating industries to report their pollutant releases, thereby enhancing accountability.
- The Stockholm Convention's Expert Group on Best Available Techniques and Best Environmental Practices evaluates unintentional persistent organic pollutants releases, sourced from national reports and reliable data, highlighting pollutants emitted from combustion processes, including open burning, though not directly linked to GHG emissions.

Link to the Zero Draft

This function is not referenced in the Zero Draft, presenting a gap that has been identified in the literature. GHG emissions should be recognised as a critical component of plastic pollution under the agreement.

2.8. Evaluation of progress of implementation and effectiveness

Function origin

UNEA Resolution 5/14 requests the INC to include provisions in the plastics instrument to enable it to periodically assess progress of implementation and the effectiveness in achieving its objectives (paras 3g-h).

Overall description

Evaluating progress and effectiveness at regular intervals is essential for identifying trends and understanding how specific actions contribute to problem-solving (UNEP, 2020; Young, 2011). This process necessitates the development and updating of relevant indicators that are specific, measurable, attainable, relevant, and time-bound (UNEP, 2020). A pronounced role can be envisaged for the science-policy interface in supporting the assessment of effectiveness, including development and updating of relevant indicators. Moreover, scientific and technical expertise will be essential in informing the development of a reporting format capable of effectively measuring progress.

2.8.1. Assessing progress of the plastics instrument in implementing core obligations

Description

Creating a comprehensive yet minimally burdensome reporting system is crucial for effectively assessing progress in implementing the core obligations of the instrument. While a simplistic framework could revolve around binary output measurements (e.g., yes/no compliance queries), a shift towards a results-based approach is advocated, focusing more on quantifiable outcomes and offering a deeper understanding of performance (NCM, 2020). Scientific and technical expertise is needed to help develop a reporting format that provides comparable information for assessing collective progress. Nonetheless, ensuring compliance in reporting presents a significant challenge (Ivanova et al., 2018).

Added value

Reporting on implementation is critical to monitoring compliance with international agreements as well as their effectiveness (Ivanova et al., 2018). National reports provide an invaluable metric for measuring the extent of an agreement's implementation, and understanding each country's advancement in establishing necessary regulations, institutions, and strategies to meet their commitments (Escobar-Pemberthy & Ivanova, 2020).

Examples from existing multilateral environmental agreements

- The Basel Convention's Open-ended Working Group functions as a versatile advisory body, responsible for creating technical guidelines, aiding in workplan development and review, and scrutinising both the implementation of these plans and decisions made by the COP (UNEP, 2022d).

Link to the Zero Draft

The Zero Draft, Part IV, Control Measure 4 "Periodic assessment and monitoring of the progress of implementation of the instrument and effectiveness evaluation" requires the governing body to periodically evaluate the effectiveness of the instrument and determine any measures required to advance in achieving the objective (para a "Effectiveness evaluation").

2.8.2. Determining the effectiveness of the plastics instrument in achieving objectives and goals

Description

The purpose of an effectiveness evaluation is to assess whether the multilateral environmental agreement is succeeding in achieving its objectives, to determine the effectiveness of the specific measures taken in its implementation, and to identify ways to improve and accelerate its effectiveness. Several multilateral environmental agreements have institutionalised the development of effectiveness evaluations, drawing from several sources, including monitoring data, reporting information, and reports from compliance committees.

To assess the collective effectiveness of the instrument in achieving its objective and goals, data on both country performance and impacts on the ground are required. This includes the analysis of trends and drivers, development and review of indicators, and the identification of best practices. The effectiveness of implementing an instrument can be tracked using indicators focusing on:

- Outputs – e.g., number of Parties to the instrument, and number of action plans adopted.
- Outcomes – e.g., proportion of chemicals in use in commodity plastics where risk has been assessed for toxicity, and number of new patents on alternative materials.
- Impacts – e.g., concentration of plastics in biota and human.

Added value

Assessing the effectiveness of a multilateral environmental agreement is crucial for understanding its success in addressing the issues it was designed to solve or mitigate, reflecting its actual value (Young, 2011). Regular effectiveness assessments are essential, providing necessary feedback that can inform policy adjustments and strategic planning for future actions, thereby ensuring the multilateral environmental agreement remains relevant and responsive to changing circumstances and new scientific insights. Furthermore, these evaluations promote transparency and accountability, ensuring that responsible parties are held to their commitments.

Examples from existing multilateral environmental agreements

- The Stockholm Convention's effectiveness evaluation, as outlined in Art. 16, relies on diverse global information and undergoes a six-year review cycle managed by an expert committee nominated by governments.
- The Minamata Convention mandates effectiveness evaluations based on comprehensive global data (Art. 22). It is overseen by an Effectiveness Evaluation Group with support from an Open-ended Scientific Group.
- The Scientific Assessment Panel (SAP) of the Montreal Protocol prepares Assessment reports every four years, evaluating the state of the ozone layer, the effectiveness of control measures, and the progress made in phasing out ozone-depleting substances (ODSs).
- The Global Stocktake under the Paris Agreement is conducted every five years and assesses international efforts and progress towards achieving global climate targets (Art. 14).

Link to the Zero Draft

The Zero Draft, Part IV, Control Measure 4 "Periodic assessment and monitoring of the progress of implementation of the instrument and effectiveness evaluation" requires the governing body to periodically evaluate the effectiveness of the instrument and determine any measures required to advance in achieving the objective (para a "Effectiveness evaluation").

2.8.3. Determining the effectiveness of national actions

Description

A national review mechanism could provide a comprehensive, technical assessment of a State's implementation of its commitments, evaluating the comprehensiveness and effectiveness of measures at the domestic level. This mechanism would likely require significant expert input, necessitating the establishment of dedicated expert teams to review national actions on a country-by-country basis. These activities would demand financial resources to cover logistical costs, administrative support, expert engagement, data management, and technical infrastructure.

Added value

A national review mechanism can identify needs for technical assistance and can design targeted interventions. The mechanism becomes particularly relevant if the plastics instrument emphasises the development of nationally determined contributions, following the model of the Paris Agreement.

Examples from existing multilateral environmental agreements

- The technical expert review (TER), established under Art. 13 of the Paris Agreement, evaluates progress on nationally determined contributions (NDCs) using desk, centralised, and in-country reviews.

Link to the Zero Draft

The Zero Draft, Part IV, Control Measure 3 "Reporting on progress" requires each Party to report on the measures taken to implement the provisions of the instrument and on the effectiveness of such measures.

2.8.4. Determining the effectiveness of individual response options

Description

Monitoring and evaluating the implementation of policy measures are pivotal for evidence-based policymaking and effective governance. However, many science-policy interface bodies do not actively monitor and evaluate progress achieved by implementing individual policy measures, which hinders effective quality management and progress (Wang et al., 2019).

Added value

Independent evaluation of evidence on the efficacy of solutions is critical for the plastics instrument (Landrigan et al. 2023). Response options that may benefit from determining their effectiveness include bans and restrictions, EPR schemes, and waste management infrastructure. The evaluation of individual response options may also help avoid regrettable substitutions, with examples provided below (Landrigan et al. 2023):

- Carrier bags marketed as "biodegradable" that fail to explain the context required for meaningful degradation to occur, and that remain fully functional after several years in the sea or in soil.
- Devices that claim to reduce the release of microfibers from laundering, but fail to deliver any significant reductions
- Devices marketed for the removal of litter from ports and harbours, that fail to remove much plastic, but instead capture large quantities of seaweed and kill juvenile fish.

Examples from existing multilateral environmental agreements

- The Stockholm Convention requires the promotion or execution of research on proposed alternatives to POPs, evaluating aspects such as environmental release and transport, human and ecological impacts, and socio-economic effects (Art. 11.1).

Link to the Zero Draft

This function is not specifically referred to in the Zero Draft.

2.9. Capacity development

Function origin

During the second part of the first session of the ad hoc open-ended working group on a Science-Policy Panel, it was agreed to include a fifth function on capacity building (UNEP, 2023a). Further, UNEA Resolution 5/14 recognises that the fulfilment of certain legal obligations under the instrument is contingent upon the availability of capacity building, but it does not explicitly address obligations of a scientific and technical nature (para 3n).

Description

Capacity building is a cross-cutting function that can be linked to the functions described above, such as ensuring effective participation in the preparation of assessments and policy support tools. Other areas that may require the development of capacities in the science-policy realm include ensuring sufficient participation at the global level in meetings of the science-policy interface bodies and developing a national science-policy interface to help translate the international dimension to the national level. Identifying and prioritising capacity building needs for an effective science-policy interface on plastic pollution may help to reveal areas in need of dedicated assistance, including those of indigenous peoples and local communities (IPLCs) who hold unique rights and interests in science-policy outcomes.

Multilateral environmental agreements support capacity building in the realm of the science-policy interface in several ways. These include the formation of subsidiary scientific bodies or expert groups responsible for conducting assessments that engage scientists and experts from member countries which builds their capacities by enhancing scientific understanding. Also, multilateral environmental agreements can conduct capacity building initiatives tailored to the scientific or policy domains. In this context, recognition of the diverse views, knowledge systems and rights holders is integral to equity and inclusivity. A testament to this is the UNFCCC's Local Communities and Indigenous Peoples Platform (LCIPP), instituted to foster knowledge sharing, capacity enhancement, and the integration of indigenous wisdom in policy design.

Added value

Enhancing capacities is crucial for amplifying the reach and impact of the science-policy interface's initiatives (UNEP, 2022c). Capacity building strengthens decision-making, ensuring it is legitimate, inclusive, and accountable. It also respects and incorporates the rights and traditional knowledge of indigenous peoples and vulnerable communities, thereby enriching and informing the entire process.

Examples from existing multilateral environmental agreements

- The Stockholm Convention requires Parties to support efforts to strengthen national scientific and technical research capabilities, particularly in developing countries and countries with economies in transition (Art. 11.2b).
- The Basel and Stockholm conventions have endorsed (sub-)regional centres for capacity building and technology transfer relating to the conventions' implementation.

Link to the Zero Draft

The Zero Draft, Part III, Control Measure 2 "Capacity building, technical assistance and technology transfer" requires Parties to cooperate to enable, within their respective capabilities, the provision of timely, sustainable, comprehensive and adequate capacity building and technical assistance to developing countries, in particular, to least developed countries and SIDS, to assist them in implementing their obligations under the instrument and to retain such capacity once built. This must also be kept under review by the governing body.

2.10. Communication and outreach

Function origin
UNEA Resolution 5/8 acknowledges that the principal functions of the Science-Policy Panel include providing up-to-date and relevant information, identifying key gaps in scientific research, encouraging and supporting communication between scientists and policymakers, explaining and disseminating findings for different audiences, and raising public awareness (para 2c). Additionally, it facilitates information-sharing with countries, in particular developing countries seeking relevant scientific information (para 2d).

Overall description
Communication can be understood both as an internal function, enabling dialogue between researchers and decision-makers within a science-policy interface body, and externally, aiding in disseminating messages beyond the body to the relevant public, media and other key stakeholders, including people in vulnerable situations.

2.10.1. Internal communication

Description
The involvement of scientists may occur at various levels, both formally and informally, within an international body. An effective science-policy interface facilitates:

- A better understanding among scientists of policymakers' needs, enabling their effective and relevant participation in the science-policy sphere.
- A better understanding among policymakers of scientific processes and findings.
- Meaningful involvement of stakeholders, including people in vulnerable situations, particularly in accessing information, participating, and representing their interests in decision-making at the science-policy interface, thereby ensuring procedural and distributive environmental justice.

A structured approach to communicating science occurs in the form of brokering (Dobbins et al., 2009). Here, a broker serves as an intermediary, bridging the gap between science and policymaking by providing information, cultivating relationships within networks, and connecting knowledge producers with potential users (Dobbins et al., 2009). In the plastics instrument, this translates to creating a space for science-policy dialogue, including presenting information for policymakers and receiving input of scientific evidence to meet policy needs. An integral component of internal communication includes inclusive accreditation to allow scientists access to all facets of the plastics instrument's ongoing implementation.

Added value
Effective internal communication can enable better decision-making when policymakers understand the science, better equipping them to develop informed policies.

Examples from existing multilateral environmental agreements

- The Aarhus Convention and the Escazú Agreement promote access to information, decision-making, and justice in environmental affairs, empowering stakeholders in plastic pollution to uphold their human and environmental rights.

Link to the Zero Draft
The Zero Draft, Part IV, Control Measure 6 "Information Exchange" requires Parties to facilitate and undertake exchange of information relevant to the implementation of the instrument, including on best practices and policies on sustainable consumption and production, research and technologies, and knowledge, including indigenous knowledge, inter alia, on environmentally sound waste management, sources of plastic pollution, human and fauna and flora exposure to plastic pollution and the associated risk management and reduction options.

In addition, Part IV, Control Measure 7 "Awareness-raising, education and research" requires Parties to cooperate in promoting and/or undertaking "relevant research, development, exchange of information and cooperation to improve understanding of the impacts of plastic pollution and advance scientific knowledge and promote technological innovation to reduce plastic pollution, including in the marine environment" and share such information through various means.

2.10.2. External communication

Description
Effective external communication is crucial for promoting general understanding of the scientific foundation of the plastic pollution, including identifying gaps and information needs. External communication encompasses agreeing on modalities for dialogue between the plastics instrument and external science-policy interface bodies, including the Science-Policy Panel. Moreover, it involves the development of campaigns and other means to inform the general public and media.

For the meaningful involvement of the public and people in vulnerable situations, including indigenous peoples and local communities, there is a duty to provide accessible, comprehensive and culturally understandable information. There is a duty to inform and involve people

in vulnerable situations; these groups include (UN, 2021):

- Workers in plastics production.
- Children at risk from plastic-related hazards.
- Women, often side-lined in policy decisions.
- Persons of African descent living near waste sites.
- Indigenous communities affected by fossil fuel exploitation (primary plastic ingredient).
- Coastal inhabitants grappling with marine plastic debris.
- Impoverished individuals living near chemical hubs or facing plastic waste influx.
- Future generations whose rights and environment are jeopardised.

Added value

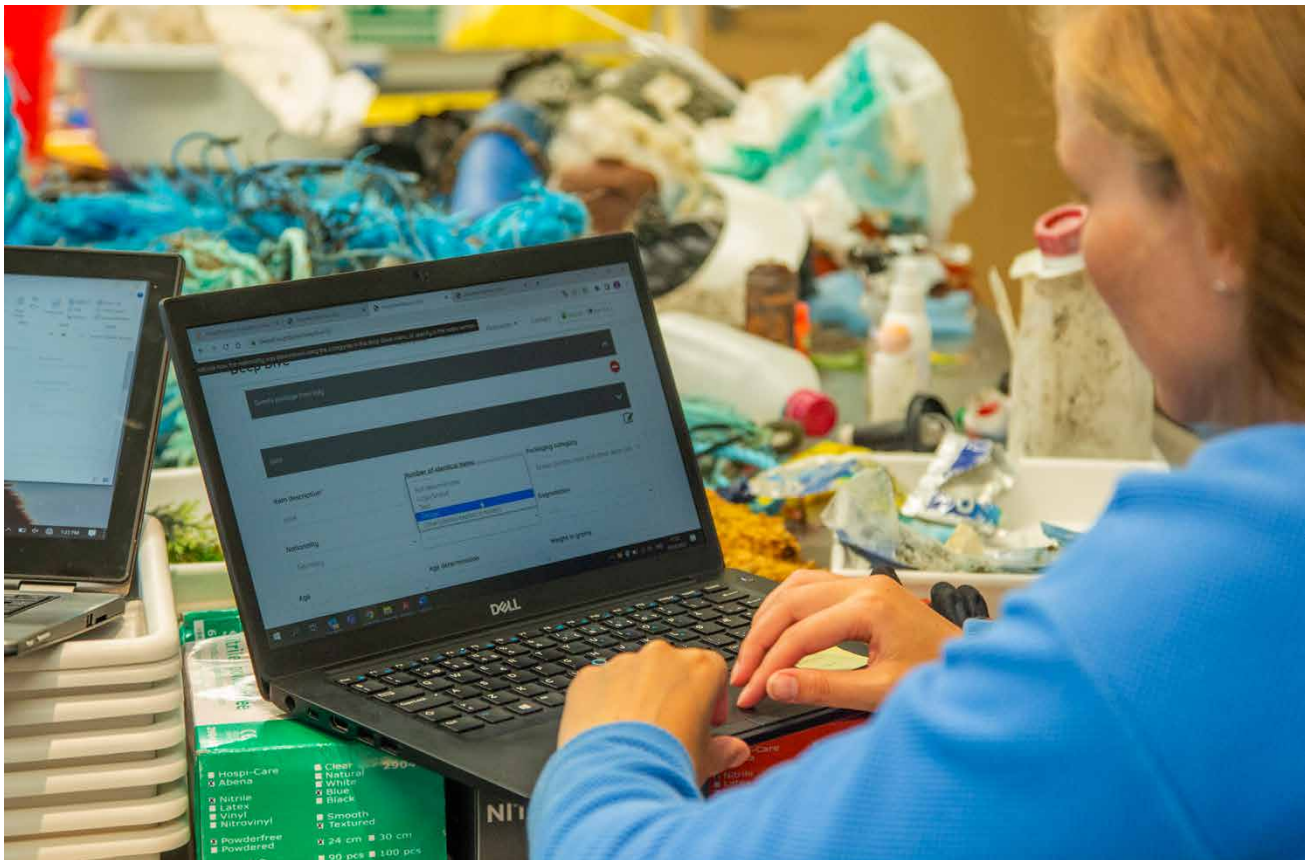
When the public is informed and understands the rationale behind policies, they are more likely to support and comply with them.

Examples from existing multilateral environmental agreements

- The CBD COP has defined engagement procedures with IPBES, requiring the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) to submit to IPBES their work program requests for approval by the COP. Moreover, the SBSTTA is authorized to exchange scientific and technical information with IPBES where the subject is within the mandate given to it by the COP (decision XII/25, paras 1-2).
- UNFCCC COP repeatedly requests the Subsidiary Body for Scientific and Technological Advice (SBSTA) to strengthen cooperation with the IPCC. According to Art. 21.2 of the Convention, the Secretariat "will cooperate closely with the IPCC to ensure that the Panel can respond to the need for objective scientific and technical advice". In 1995, UNFCCC COP 1 established the Joint Working Group (JWG) between SBSTA and IPCC to coordinate and exchange information (Decision 6/CP.1). The JWG includes Chairs of SBSTA and IPCC, presiding officers of both, and Secretariat members.

Link to the Zero Draft

The Zero Draft Part IV, Control Measure 7 "Awareness-raising, education and research" requires Parties to cooperate in promoting and/or undertaking "relevant research, development, exchange of information and cooperation to improve understanding of the impacts of plastic pollution and advance scientific knowledge and promote technological innovation to reduce plastic pollution, including in the marine environment." Such information could be shared through various means, such as communication and education strategies on the objective of the instrument as well as the health risks of plastic pollution, potential alternatives and the importance of behavioural change. These should involve all stakeholders and can include educational and awareness-raising programmes and citizen campaigns. It calls for promoting public participation and public access to information and providing training at all levels.



3 Synergies and cooperation with other science-policy interface bodies

This section describes the approaches various science-policy interface bodies employ in addressing plastic pollution, suggesting potential collaborative arrangements to tackle plastic pollution jointly. The entities involved are categorized into four groups:

1. Independent intergovernmental science-policy interface bodies.
2. Science-policy interface bodies within multilateral environmental agreements.
3. Other relevant science-policy interface bodies (in the environmental sphere).
4. Sectoral multilateral bodies (outside the environmental realm).

3.1. Roles and responsibilities of existing science-policy interface bodies

Table 3 provides and overview of objectives of existing science-policy interface bodies and other relevant bodies, detailing their approaches to plastic pollution and suggesting avenues to enhance collaborative efforts. This compilation is not exhaustive, indicating a necessity for further exploration and comprehension of the distinct role each body can contribute to the science-policy interface for plastic pollution.

Table 3: Objectives of science-policy interface bodies and other relevant bodies and their links to plastic pollution.

Body	Objective	Link to plastic pollution
Independent intergovernmental science-policy interface bodies		
Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)	To strengthen the science-policy interface for biodiversity and ecosystem services for the conservation and sustainable use of biodiversity, long-term human well-being and sustainable development (IPBES, 2010).	The 2019 IPBES Global Assessment Report emphasises the critical state and growing concern of plastic pollution, noting its impact rivals or surpasses other persistent organic pollutants, especially in marine ecosystems.
Intergovernmental Panel on Climate Change (IPCC)	To assess the scientific, technical and socio-economic information relevant to understanding the scientific basis of risk of human-induced climate change, its potential impacts and options for adaptation and mitigation (IPCC, 2013).	The sixth assessment report details the role of plastics in GHG emissions. It emphasises that plastic production and petroleum use, coupled with insufficient investments in breakthrough low-emission technologies, are not in alignment with the necessary emission reductions (IPCC, 2022).
Science Policy Panel on chemicals, waste and pollution prevention (SPP)	To contribute further to the sound management of chemicals and waste and prevent pollution, with details to be further specified upon its establishment (UNEA Res. 5/8, para 1).	An interface will need to be established between the subsidiary body of the plastics instrument and the Science-Policy Panel. This will facilitate requests by the subsidiary body for independent advice from the Science-Policy Panel.
Science-policy interface bodies within multilateral environmental agreements		
Basel Convention Open-ended Working Group (OEWG)	To advise the COP on scientific and technical issues and other aspects to facilitate implementation of the Convention (Decision VI/36).	OEWG provided significant advice to help update the technical guidelines for the Environmental Sound Management of plastic waste that was adopted at BC COP-16 in May 2023.
Convention on Biological Diversity (CBD) Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA)	To provide the CBD COP with timely advice relating to the implementation of the Convention (Art. 25).	Target 7 of the Kunming-Montreal Global Biodiversity Framework aims to reduce pollution risks and the negative impact of pollution from all sources by 2030, by preventing, reducing, and working towards eliminating plastic pollution. The associated indicator "floating plastic debris density" will require scientific and technical expertise.
Convention on Migratory Species (CMS) Scientific Council (SC)	To provide advice on scientific matters to other CMS bodies and CMS Parties (Art. 7).	Resolution 13.123 calls for the CMS Scientific Council to create a report on plastic pollution's impact on migratory species, recommend solutions, and foster collaboration with international entities to address this environmental threat (CMS, 2020).

Table 3 *(continued)*

Body	Objective	Link to plastic pollution
International Whaling Commission (IWC) Scientific Committee (SC)	To cover a wide range of scientific subjects related to the conservation and management of cetacean populations (IWC, 2018).	The Scientific Committee has been tasked with assessing the current knowledge of the impacts of marine plastic pollution on cetaceans, with a view to providing a global risk assessment which identifies 'hotspots' of cetacean exposure to plastic debris (IWC, 2022).
Montreal Protocol Environmental Effects Assessment Panel (EEAP)	To assess control measures based on available scientific, environmental, technical and economic information (Art 6). EEAP evaluates the diverse impacts of ozone layer depletion.	The EEAP's 2022 assessment indicates that the Montreal Protocol's role in controlling UV radiation has likely slowed the formation of microplastics in the environment, highlighting an indirect benefit of the treaty in combating plastic pollution.
Montreal Protocol Scientific Assessment Panel (SAP)	To assess control measures based on available scientific, environmental, technical and economic information (Art 6). SAP assesses the status of ozone layer depletion and relevant atmospheric science issues.	Collaboration between the plastics instrument and the SAP could enhance the evaluation, regulation, and minimisation of exempted controlled substances used in fluoropolymer production, ensuring their responsible use in plastic manufacturing.
Montreal Protocol Technology and Economic Assessment Panel (TEAP)	To assess control measures based on available scientific, environmental, technical and economic information (Art 6). TEAP provides technical information on alternative technologies.	Through collaboration with the plastics instrument, TEAP could evaluate the environmental impacts of materials used in plastic production, including potential alternative substances, considering their effects on the ozone layer and plastic pollution levels.
Ramsar Convention on Wetlands Scientific and Technical Review Panel (STRP)	To provide scientific and technical guidance to foster the implementation of the Convention (Resolution XII.5, Annex 1).	Given the extent of plastic pollution and its potential damage to wetlands both nationally and internationally, there is an important connection between the Ramsar Convention and the plastics instrument. However, the Convention and its scientific body have yet to take action on this matter.
Stockholm Convention Persistent Organic Pollutants Review Committee (POPRC)	To review chemicals nominated by Parties for listing in Annexes A, B and/or C and recommend whether the chemical should be considered for listing by the COP (Art. 8).	This review includes many POPs, which are used, among others, as additives in plastics (e.g., as flame retardants, plasticisers, or surfactants), as well as unintentional POPs deriving, inter alia, from open burning of waste and waste incinerators. Close collaboration will be needed on chemicals that intersect between the Stockholm Convention and the plastics instrument.
United Framework Convention on Climate Change (UNFCCC) Subsidiary Body for Scientific and Technological Advice (SBSTA)	To provide the COP and, as appropriate, its other subsidiary bodies with timely information and advice on scientific and technological matters relating to the Convention (Art. 9.1).	The SBSTA could explore the integration of plastic pollution into its climate change work, potentially synchronising emissions reporting with plastic regulations and studying plastic's environmental impacts and contributions to greenhouse gases. This effort could also involve identifying innovative technologies to reduce GHG emissions across the life cycle of plastics.
Other relevant science-policy interface bodies		
Basel Convention Plastic Waste Partnership (PWP)	To improve and promote the environmentally sound management of plastic waste at all levels and prevent and minimise their generation to reduce significantly and in the long-term eliminate the discharge of plastic waste and microplastics into the environment, in particular the marine environment (Basel Convention, 2019).	The PWP is a working group and has established four project groups on 1) Plastic waste prevention and minimisation, 2) Plastic waste collection, recycling and other recovery including financing and related markets, 3) Transboundary movements of plastic waste, and 4) Outreach, education and awareness-raising.
Global Environment Outlook (GEO)	To keep the world environmental situation under review in order to periodically inform and support collective and individual action by Member States and by stakeholders, while strengthening the science-policy interface of UNEP (UNEA Res. 5/3, para 1).	In the sixth edition, known as GEO-6, published in 2019, plastics pollution is one of the issues addressed within the context of broader environmental challenges.

Table 3 *(continued)*

Body	Objective	Link to plastic pollution
International Resources Panel (IRP)	To provide independent, coherent and authoritative scientific assessments of policy relevance on the sustainable use of natural resources and their environmental impacts over the full life cycle; and contribute to a better understanding of how to decouple economic growth from environmental degradation (IRP, 2022).	In 2021, IRP published a report on Policy options to eliminate additional marine plastic litter by 2050 under the G20 Osaka Blue Ocean Vision (IRP, 2021a). The 2022-2025 Work Programme of the IRP aims to link IRP work with plastics work under the EU initiatives on circular economy (IRP, 2021b). The IRP hosts a global material flows database.[8]
Joint Group of Experts on the Scientific Aspects of Marine Environmental protection (GESAMP)	To provide authoritative, independent, interdisciplinary scientific advice to organisations and governments to support the protection and sustainable use of the marine environment (GESAMP, 2005).	Plastics and microplastics in the marine environment have been a topic of GESAMP reports since 2012. Assessment could benefit from cooperation with relevant working groups established under GESAMP, such as Working Group 40 on Plastics and Microplastics in the Ocean and Working Group 43 on Sea-based Sources of Marine Litter.
Sectoral multilatreal bodies		
Food and Agricultural Organisation of the United Nations (FAO)	To improve nutrition, increase agricultural productivity, raise the standard of living in rural populations and contribute to global economic growth.	In late 2021, FAO released a landmark report assessing the use of plastics in agriculture (FAO, 2021) and has begun development of a new global code of conduct to address agriplastics. The Technical Committees on Agriculture, Commodity Problems, Fisheries and Forestry provides a possible partner for scientific cooperation.
International Maritime Organisation (IMO)	To promote safe, secure, environmentally sound, efficient and sustainable shipping.	Marine Environment Protection Committee (MEPC) is responsible for the protection of the marine environment, addressing environmental issues related to the regulations and operational aspects of shipping.
Organisation for Economic Co-operation and Development (OECD)	To promote policies that will improve the economic and social well-being of people around the world.	In 2022, the OECD released assessments projecting the future dynamics and environmental implications of global plastics use, including drivers, impacts, and policy options. (OECD, 2022a; OECD, 2022b). The Global Plastics Outlook database includes data from 1990 to 2060 covering the full life cycle of plastics.[9] Potential collaborators for scientific and technical partnerships include the Environment Policy Committee, the Working Party on Resource Productivity and Waste, and the Working Party on Integrating Environmental and Economic Policies.
The International Labour Organisation (ILO)	To promote rights at work, encourage decent employment opportunities, enhance social protection and strengthen dialogue on work-related issues. ILO advances social and economic justice by setting international labour standards.	The ILO has raised concerns in the INC process about ensuring a just transition and other social concerns. ILO's Guidelines for a just transition provides a policy framework and guiding principles for governments and social partners to formulate, implement and monitor their policies and actions in such transition (ILO, 2015).
United Nations Conference on Trade and Development (UNCTAD)	To assist developing countries, especially the least developed countries and countries with economies in transition, to integrate beneficially into the global economy in support of inclusive and sustainable growth and development.	UNCTAD, in collaboration with the Graduate Institute, has established a trade classifications database reflecting HS Codes and analysed global trade flows in the plastics life cycle, including waste (UNCTAD, 2020). Additionally, studies have been conducted on the role of substitutes in the sustainable trade of plastics (UNCTAD, 2023).
United Nations Human Rights Council (UNHRC)	To strengthen the global promotion and protection of human rights, and to address human rights violations and situations of concern.	The UN Special Rapporteur on Toxics and Human Rights released reports emphasising the human rights impacts concerning the plastics life cycle and advocating for a human rights-based approach in transitioning to a chemically safe circular economy. Another report underscores the right to science regarding toxic substances, advocating for an effective science-policy interface platform.

Table 3 *(continued)*

Body	Objective	Link to plastic pollution
World Customs Organisation (WCO)	To develop international standards, foster cooperation and build capacity to facilitate legitimate trade, to secure a fair revenue collection and to protect society, providing leadership, guidance and support to Customs administrations.	The HS Codes, managed by the WCO's Review Subcommittee (RSC), provide a standardised classification of traded goods, including plastics. The RSC regularly convenes to consider updates to the HS legal texts.
World Health Organisation (WHO)	The attainment by all peoples of the highest possible level of health.	The WHO investigates health risks from plastic pollution, focusing on microplastics presence in the environment and potential food chain entry. Key studies involve microplastic contamination in drinking water and human exposure through diet and inhalation (WHO, 2019; WHO, 2022). The organisation's Science Division stands as a potential collaborator for scientific research.
World Trade Organisation (WTO)	To ensure that trade flows as smoothly, predictably and freely as possible.	The WTO facilitates the Dialogue on Plastics Pollution and Environmentally Sustainable Plastics Trade, promoting trade policies that encourage sustainable non-plastic alternatives and re-use systems. In partnership with the WCO, it enhances the monitoring and regulation of plastic goods trade via HS Codes.

3.2. Mapping of functions in relevant science-policy interface bodies

Table 4 illustrates a comprehensive mapping of science-policy interface bodies and additional entities, correlating them with the 10 functions outlined in Section 2. For an in-depth understanding, Annex 4 compiles the official mandates of these science-policy interface bodies and other organisations, serving as the foundational reference for this mapping exercise.

The analysis identifies the following shared characteristics and distinctions among the surveyed science-policy interface bodies and other entities concerning their adherence to the 10 functions:

1. Early warning systems are featured in only a few science-policy interface bodies:
   - GESAMP focuses on detecting new threats to marine environments.
   - The International Whaling Commission/SC monitors current threats to cetaceans and potential mitigation strategies.
   - Montreal Protocol/SAP emphasises early detection and analysis of ozone-depleting substances.
   - International Resource Panel contributes to global policy dialogues on emerging challenges.
   - Science-Policy Panel utilises 'horizon scanning' for identification of emerging threats.
2. Scientific criteria for control measures are embedded in science-policy interface bodies reviewing chemicals (Stockholm Convention/POPRC, Montreal Protocol/TEAP) and species conservation (Convention on Migratory Species/SC). Additionally, the Ramsar Convention/STRP evaluates criteria for globally significant wetlands.
3. Assessment is a dominant function across science-policy interface bodies, primarily through research synthesis, occasionally supplemented by original investigations, as seen in GESAMP's efforts.
4. Policy support tools are a frequent undertaking, involving creation of implementation guidelines, monitoring methodologies (e.g., IPCC), and inventory frameworks (e.g., Ramsar Convention/STRP).
5. Knowledge management mechanisms are rarely centralised within science-policy interface bodies, with the International Resource Panel being a notable exception, hosting a global material flows database and the SDG12 Hub.
6. Catalysing knowledge generation is prominent in IPBES and present in Science-Policy Panel's mandate to identify research gaps and the International Resource Panel's knowledge co-creation function. It is an implicit function in others, such as IPCC.
7. Monitoring global progress is generally a supportive role, concentrating on methodology development rather than direct data collection. Featured in:
   - International Whaling Commission/SC's whale stock analyses.
   - Basel Convention/OEWG's ongoing reviews on implementation of the Convention's work plan.
   - Montreal Protocol/SAP's tracking of relevant atmospheric trace gases.
   - GEO assessment and tracking of trends.
   - GESAMP's overview of marine environmental monitoring.

Table 4: Overview how existing science-policy interface bodies fulfil the 10 functions identified in this report.

Body	Agenda setting	Policy formulation		Policy implementation			Policy evaluation		Cross-cutting	
	Early warning	Scientific criteria for control measures	Assess-ment	Policy support tools	Knowledge management mechanisms	Catalysing knowledge generation	Monitoring global progress	Effectiveness evaluation	Capacity building	Communi-cation and outreach
Independent intergovernmental science-policy interface bodies										
IPBES			■	■		■			■	
IPCC			■	■						
SPP	■		■			■			■	■
Science-policy interface bodies within multilateral environmental agreements										
Basel OEWG				■			■		■	
CBD SBSTTA			■	■				■		
CMS SC		■		■						■
IWC SC	■		■	■			■			
Montreal EEAP			■							
Montreal SAP	■		■				■			
Montreal TEAP		■	■							
POPRC		■	■							
Ramsar STRP		■	■	■				■	■	
UNFCCC SBSTA			■	■				■		
Other relevant science-policy interface bodies										
Basel PWP			■	■					■	■
GEO			■			■	■	■	■	
GESAMP	■		■	■			■			
IRP	■		■		■	■				■

8. Effectiveness evaluation is incorporated in certain science-policy interface activities:
   - CBD/SBSTTA and UNFCCC/SBSTA assess the impact of implemented measures.
   - Ramsar/STRP reviews the efficacy of its implementation tools and guidelines.
   - GEO evaluates the effectiveness of global policy responses.
9. Capacity building is explicit in independent bodies (IPBES, GEO, Science-Policy Panel) and the Basel Convention/PWP. Moreover, UNFCCC/SBSTA aims to provide advice for provision of capacity building, while Basel Convention/OEWG aims to identify capacity building needs.
10. Communication and outreach are common but explicitly mandated only in specific entities. Science-Policy Panel and the International Resource Panel are dedicated to communication; outreach occurs in the Science-Policy Panel, Basel Convention/PWP, and CMS/SC, which also promotes engagement with non-Parties.

3.3. Realising synergies in the wider landscape of science-policy interface and other relevant bodies

The preliminary mapping presented above of the mandate and functions of science-policy interface bodies and other relevant bodies already working within the realm of plastic pollution provides an opportunity to understand the scope of each and where overlaps and gaps exist. This information is critical to realising synergies among interlinked agreements and to anticipate and avoid duplication, conflict and problem shifting between agreements. Figure 5 presents a high-level overview of the mapping of relevant science-policy interface bodies and other bodies, proposing a roadmap for fortifying global collaboration in addressing plastic pollution. It is important to recognise that several science-policy interface functions under multilateral environmental agreements have been assigned to subsidiary bodies, (e.g., monitoring and effectiveness evaluation under the Stockholm Convention).

Collaboration with independent intergovernmental bodies

The primary goal is to amplify collaboration and synergy between the Science-Policy Panel and the plastics instrument. Opportunities for such collaboration are extensive and are discussed comprehensively in section 4. Strengthening ties with bodies like the IPCC and IPBES is vital, given their collective mission to inform policy decisions addressing the planetary crises, with plastic pollution at the forefront. Such cooperation should primarily occur between the three independent SPI bodies, given they operate at the same level, and have the shared mandate of focusing on assessment.

To comprehensively address the environmental impact of plastics, there is a clear need to incorporate the plastics sector into existing assessments. For instance, none of the climate and socio-economic models utilised in IPCC reports have provided a detailed representation of the plastics sector (Stegmann et al., 2022). To this end, it will be important to assess the current and projected contributions of plastics to climate change.

Moreover, scientific and technical cooperation to address the climate component on plastic pollution could focus on developing relevant policy support tools to help estimate GHG emissions from plastics. This development could include:

- Guidelines to support the development and use of national plastic flow inventories within national GHG accounts.

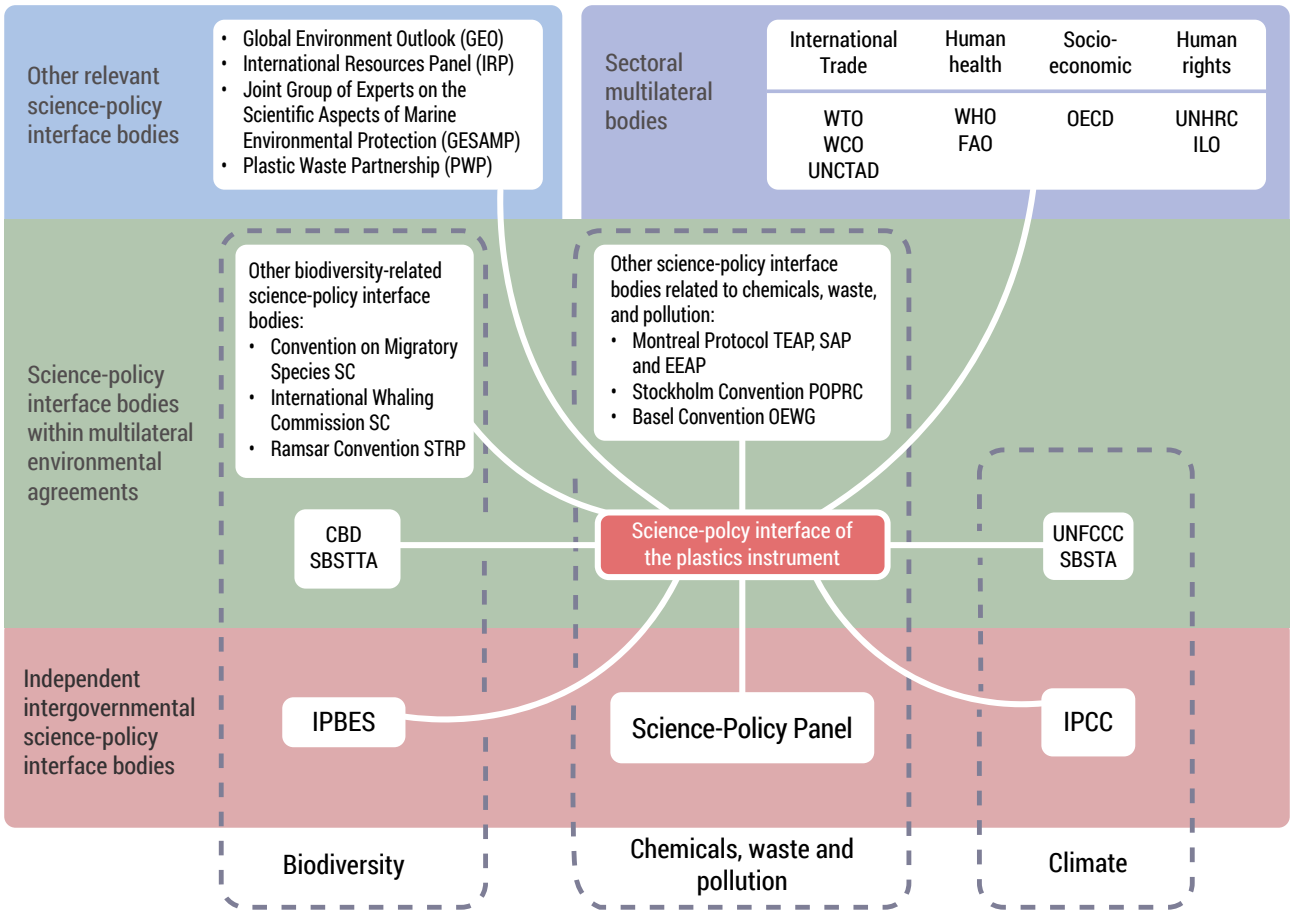


Figure 5: Overview of opportunities for cooperation between the science-policy interface of the plastics instrument and the wider landscape of science-policy interface bodies and other relevant bodies.

- Methods for disaggregating GHG emissions attributed to plastics, aligned with the IPCC guidelines for national GHG inventories.
- Protocols for incorporating plastic considerations into NDCs.

Collaboration with science-policy interface bodies within multilateral environmental agreements

Cooperation with science-policy interface bodies across the multilateral environmental agreement cluster (biodiversity, climate and chemicals, waste and pollution) is important.

Specific attention is needed to align scientific criteria for control measures, such as listing of chemicals and polymers of concern under the plastics instrument, with established conventions so as to prevent overlap. This alignment includes committees such as the Persistent Organic Pollutants Review Committee under the Stockholm Convention and the Technology and Economic Assessment Panel under the Montreal Protocol.

Opportunities for cooperation with the science-policy interface bodies with the biodiversity cluster of multilateral environmental agreements is particularly relevant for monitoring the presence of plastic pollution in the environment and biota, including their impacts. This could include cooperation in developing indicators and relevant methodologies for data collection to support global monitoring of Target 7 of the Kunming-Montreal Global Biodiversity Framework (GBF) that aims to reduce pollution risks and the negative impact of pollution from all sources, by 2030, including working towards ending plastic pollution. Moreover, plastic pollution and its impacts also cut across the activities of the International Whaling Commission's Scientific Committee and the Convention on Migratory Species' Scientific Council.

The cooperative development of policy support tools is particularly relevant for the Basel Convention OEWG. Other opportunities for cooperation in this realm could include preparing guidelines for wetlands management to mitigate the impact of plastic pollution to support the implementation of the Ramsar Convention.

Collaboration with other relevant science-policy interface bodies

Other pertinent science-policy interface bodies also present opportunities to leverage existing functions and initiatives addressing plastic pollution. Utilising established knowledge management structures, such as the global material flows database under the International Resource Panel can be particularly beneficial.[10]

Moving forward

Going forward, a strategic approach is imperative for fostering effective collaboration. The initial step could include deepening understanding of the science-policy interface landscape by conducting a mapping of relevant science-policy interface bodies, as well as their potential relationship to the science-policy interface of the plastics instrument and the Science-Policy Panel. Once an understanding of the science-policy interface landscape of plastic pollution is established, it will be important for the plastics science-policy interface to establish clear interfaces with existing multilateral environmental agreements and intergovernmental scientific bodies. This could include the development of a mechanism for coordination and cooperation among existing interface bodies and/or existing activities. The interface/s could be established through a memorandum of understanding (MoU) that outlines mechanisms for:

- Sharing of information on areas and work of common interest/concern, including monitoring and other relevant data.
- Cross-participation in the relevant task force and working group meetings.
- Requesting advice, including for horizon scanning and development/updating of criteria.
- Shared task forces and working groups on thematic issues.
- Co-generation of policy support tools.
- Co-generation of guidelines for common areas of implementation.
- Cross-consultation in the development of programmes of work.
- Shared awareness-raising campaigns and educational tools.

4 Institutional approaches and the possible division of labour between the Science-Policy Panel and the science-policy interface of the plastics instrument

Institutional requirements for the science-policy interface of the plastics instrument will depend on its objective, scope, and obligations. The interplay and division of labour with the Science-Policy Panel is a critical factor affecting the institutional arrangements.

4.1. Science-Policy Panel for chemicals, waste and pollution prevention

The benefits for receiving scientific and technical support from an independent science-policy body to support the new instrument on plastic pollution are manifold. The establishment of an independent Science-Policy Panel to provide scientific and technical support to the broader science-policy interface will provide several key benefits:

- Enhanced authority and credibility: Drawing from respected reputations of similar independent bodies established to strengthen the science-policy interface for climate change (i.e., IPCC) and biodiversity (i.e., IPBES), the Science-Policy Panel would gain heightened authority. This recognition would bolster the confidence of stakeholders in the accuracy and credibility of the information provided.
- Complementary role: The Science-Policy Panel can serve to complement and reinforce the work of a possible subsidiary scientific and technical body established by the plastics instrument. This collaboration would enhance the comprehensiveness and effectiveness of the decision-making process.
- Broad mandate: The Science-Policy Panel's broad mandate, intended to encompass chemicals, waste and pollution, holds the potential to address the life cycle of plastics comprehensively. This inclusive approach creates strong interlinkages to chemical and waste management, ensuring a holistic approach.
- Equal status with other science-policy interface bodies: The Science-Policy Panel, having a status similar to other influential science-policy interface bodies (e.g., IPBES and IPCC), offers the opportunity to forge robust linkages with them. This interconnectedness aids in a better understanding of how the global plastic pollution crisis relates to climate change and biodiversity loss, with the potential to strengthen and expedite responses to the triple planetary crisis.

Specific science-policy interface functions could be partly or fully outsourced to the Science-Policy Panel, especially those falling within its purview, including assessment, horizon scanning, communication and outreach, and capacity building. It is essential, however, to acknowledge the Science-Policy Panel's limitations, particularly its broad scope, which may restrict its ability to cater to diverse needs: the Science-Policy Panel is relevant for the work of 25 bodies, including regional and global multilateral environmental agreements (10), intergovernmental organisations (IGOs) (10), voluntary instruments (2) and other science-policy bodies (3) (UNEP, 2022a).

Additionally, the plastics instrument could also seek scientific and technical advice on an ad hoc basis as need arises. This could include requests from the governing body, as well as more nuanced complementary inquiries from the possible subsidiary scientific and technical body of the plastics instrument.

The Science-Policy Panel, as an independent body, faces the critical task of delivering policy-relevant, but not policy-prescriptive, advice to the policymakers, particularly those engaged in the chemicals and waste conventions. A model similar to IPCC's engagement with governments could be adopted, involving the collaborative development of report outlines with government representatives to ensure the presented information remains highly relevant. Subsequently, the content of the report would be completed independently by the scientific community.

4.2. Scientific and technical work under the plastics instrument

Scientific and technical work under the plastics instrument would necessitate the establishment of one or more subsidiary scientific and technical bodies. Further organisation within these bodies can include sub-committees with more nuanced mandates, allowing for a specialised focus on particular aspects of plastic pollution.

Participation in these subsidiary bodies can enable contributions from individuals as either independent experts or as government-nominated representatives, as defined by the instrument. These bodies can strive for balanced regional representation through governmental nominations by drawing from successful models, such as the Stockholm and Rotterdam conventions.

Additionally, the participation of independent experts can be considered based on the flexible approach of the Montreal Protocol's TEAP panel, which is organised into six technical options committees (TOCs) for industrial sectors that have industry, government, and academic experts nominated by Parties and selected primarily based on technical expertise.[11]

The need for scientific expertise for such subsidiary bodies may encompass natural sciences (such as chemistry and biology), social sciences and humanities, economics, and other relevant disciplines.

It will be necessary to agree on a procedure to deal with potential conflicts of interest, noting that the IPCC has established a conflict of interest committee and the Stockholm Convention POPRC has adopted a procedure for dealing with conflicts of interest.

To enhance the policy relevance of the outputs produced by these bodies, Parties could provide regular guidance on the workstreams, and reports/assessments produced, similar to the practice of the Meeting of Parties (MOP) of the Montreal Protocol. Where policy recommendations may be made, the feasibility of implementation may require government input, ensuring practicality and effectiveness.

4.3. Options for the institutional arrangements for the science-policy interface for plastic pollution

Table 5 provides a summary of how the functions can be covered across the four phases of the policy cycle. Instead of a linear progression, the phases engage in a complex, multi-directional interplay, where each stage is interconnected through numerous iterative cycles, reflecting a network of influence and feedback (UNEP, 2020). This report suggests that functions primarily within phases 1 and 2 require significant scientific and technical support, starting from detection of signs of early threats to the assessment of chemicals, polymers and products of concern, along with broader assessments. Policy support tools, knowledge management mechanisms and knowledge generation are primarily aimed at supporting implementation (phase 3). Monitoring global progress and evaluation of effectiveness will benefit from science-based indicators and methodologies (phase 4). Capacity building, along with communication and outreach, are cross-cutting functions.

4.3.1. Phase 1: Agenda setting

The scientific community plays a pivotal role in the initial phase of policymaking, known as the agenda setting phase, by first focusing on horizon scanning to identify critical issues and assisting in the selection of concerns that require attention. This is followed by defining a problem that might need to be addressed by policymakers on a regional or global scale (UNEP, 2020).

Horizon scanning

Integrating horizon scanning into the process of agenda setting is essential to ensure that decisions made within the plastics instrument not only address current concerns but also proactively anticipate future developments. An area that stands to benefit significantly from horizon scanning is the listing of chemicals, polymers and products that may become concerns in the future.

Since horizon scanning is one of the key functions of the Science-Policy Panel, it is prudent to explore how the plastics instrument could leverage its capabilities. By conducting horizon scanning independently, the Science-Policy Panel can identify potential chemicals, polymers, and products of concerns before their

Table 5: Summary of how the science-policy interface functions align with the four phases of the policy cycle.

Policy phase	Functions	UNEA Res. 5/8	UNEA Res. 5/14
Phase 1: Agenda setting	• Early warning	para 2a	
Phase 2: Policy formulation	• Scientific criteria for control measures • Assessment	para 2b	para 3b para 3i
Phase 3: Implementation	• Policy support tools • Knowledge management mechanism • Catalysing knowledge generation	para 2c	para 3o
Phase 4: Evaluation	• Monitoring global progress • Effectiveness evaluation		para 3g para 3h
Cross cutting	• Capacity building • Communication and outreach	OEWG 1.2 para 2c-2d	

introduction to the market, minimising the risks of contamination. In this proactive role, the Science-Policy Panel could submit proposals, grounded in scientific and technical information, for review to a prospective review committee functioning as a subsidiary body of the plastics instrument. This would complement the listing proposals submitted by Parties, enhancing the overall effectiveness of the decision-making process.

There is also scope to anticipate the cumulative and synergistic impacts of plastic pollution and its relationship with other relevant agreements. This is necessary to address the division of labour among agreements and to avoid problem shifting (Kim & von Asselt, 2016).

4.3.2. Phase 2: Policy formulation

Many agreements are intentionally crafted to be dynamic, allowing them to address evolving problems and integrate new information over time (UNEP, 2020). Such adaptability becomes crucial during the policy formulation phase, particularly when advancing control measures that target plastic pollution. Decision-making in this phase requires a robust foundation in the scientific and technical knowledge. It is thus prudent to consider establishing a specialised subsidiary body tasked with scientific and technical responsibilities, including supporting the listing of chemicals, polymers and products of concern, based on rigorous scientific criteria. Furthermore, policymakers should carefully delineate the role of the Science-Policy Panel, particularly its responsibilities in conducting assessments.

Scientific criteria for control measures

Scientific criteria for control measures discussed here include:

1. Criteria for listing of chemicals, polymers and products of concern.
2. Criteria for alternatives and non-plastic substitutes.
3. Criteria for sustainable and safe design.

Listing of chemicals, polymers and products of concern would benefit from guidance from a subsidiary scientific and technical body. The plastics instrument could consider proposals from Parties to list chemicals, polymers and products of concern to be eliminated or restricted. Typically, this occurs after they have entered the market and their negative impacts have been documented. A dedicated scientific and technical body would undertake the evaluation of these listing proposals. In some cases, time-limited exemptions may be granted to countries facing challenges in meeting agreed-upon timelines. Two procedural models are viable:

1. The Stockholm Convention employs a rigorous three-step scientific process managed by the POPRC. This process includes screening, risk profile, and risk management evaluation, taking at least three meetings/years to conclude. It starts by reviewing proposed POPs against criteria on hazardous properties listed in Annex D (persistence, bioaccumulation, adverse effects, and long-range environmental transport potential). Subsequently, the assessment focuses on significant adverse effects on human health and the environment, as outlined in Annex E, before addressing control measures and socio-economic aspects as stipulated in Annex F.
2. The Rotterdam Convention relies on information already compiled together with regulatory actions taken by national authorities. Article 5 of the Convention stipulates that any Party that has banned or severely restricted a chemical is required to notify the Secretariat. Once the Secretariat has received notifications from two parties from two different PIC regions regarding the same chemical, the notifications shall be forwarded to the Chemical Review Committee (CRC) for review and consideration for recommending the chemical for inclusion in Annex III to the Convention.

Assessing alternatives and substitutes will be important in order to avoid regrettable substitutions and to comprehensively consider other aspects, including costs. This ensures that decisions align not only with environmental goals but also with economic realities. For instance, based on Annex F regarding information on socio-economic considerations, the POPRC reviews alternatives for POPs proposed for listing, including technical feasibility, costs, efficacy, risk, availability and accessibility. Considering the extensive range of chemicals, polymers, and products of concern, establishing a dedicated sub-committee to identify and understand the characteristics of alternatives and substitutes would be prudent.

The development of criteria for sustainable and safe design of plastics is needed for plastic products that cannot be avoided or substituted (BRS, 2023; NCM, 2020; NCM, 2022; OECD, 2021). Criteria for sustainable design could be developed and updated by the subsidiary body. The criteria could guide sustainable product design at the national level focusing on environmental performance, safety and transparency. This may require the development of specific guidelines for different sectors.

Against this backdrop, it is advisable to establish a scientific and technical subsidiary body on chemical, polymer and product safety within the plastics instrument's structure, illustrated in Figure 6. This body would have the following committees and tasks:

1. Committee responsible for reviewing chemicals, polymers, and products based on proposals from Parties and/or the Science-Policy Panel. This review

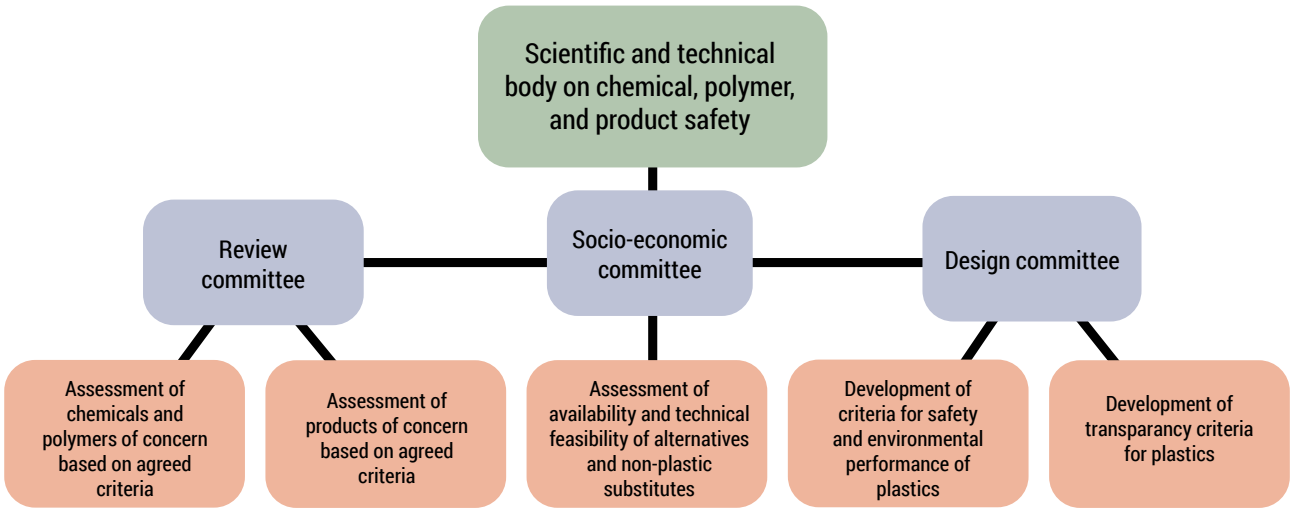


Figure 6: The structure of the proposed subsidiary scientific and technical body on chemical, polymer, and product safety.

committee could consist of separate subcommittees for chemicals/polymers and products.
2. Committee tasked with analysing the feasibility, effectiveness, and possible risks of alternatives and non-plastics substitutes based on socio-economic assessment.
3. Committee responsible for developing and continually updating criteria for the sustainable and safe design of plastics.
4. The subsidiary body could also undertake other tasks, including to address functions in other policy spheres, if deemed necessary.

The interplay between the review committee and socio-economic committee requires careful consideration. The proposed two-committee model separates the responsibilities into two distinct committees, each populated with experts specialised in their respective areas. The advantage of this model is the depth of expertise each committee brings to their specific domains, which might lead to more thorough evaluations and recommendations. Organising regular inter-committee meetings would ensure cohesive policy recommendations but would require coordination and be more resource intensive. This model is based on the European Chemicals Agency's Committee for Risk Assessment and Committee for Socio-economic Analysis.

Alternatively, a streamlined one-committee model could be used, where a single committee is responsible for both the hazard/risk assessment and risk management. This approach could bring administrative benefits, such as fewer meetings and reduced resources required for coordination. However, a challenge with this model is that scientific experts, while proficient in hazard/risk assessment, might not be as equipped to evaluate feasibility and suitability of alternatives and non-plastic substitutes. This model is based on the POPRC of the Stockholm Convention.

Figure 7 illustrates the institutional options for assessing chemicals, polymers and products on concern. In weighing the two models, the dual-committee structure

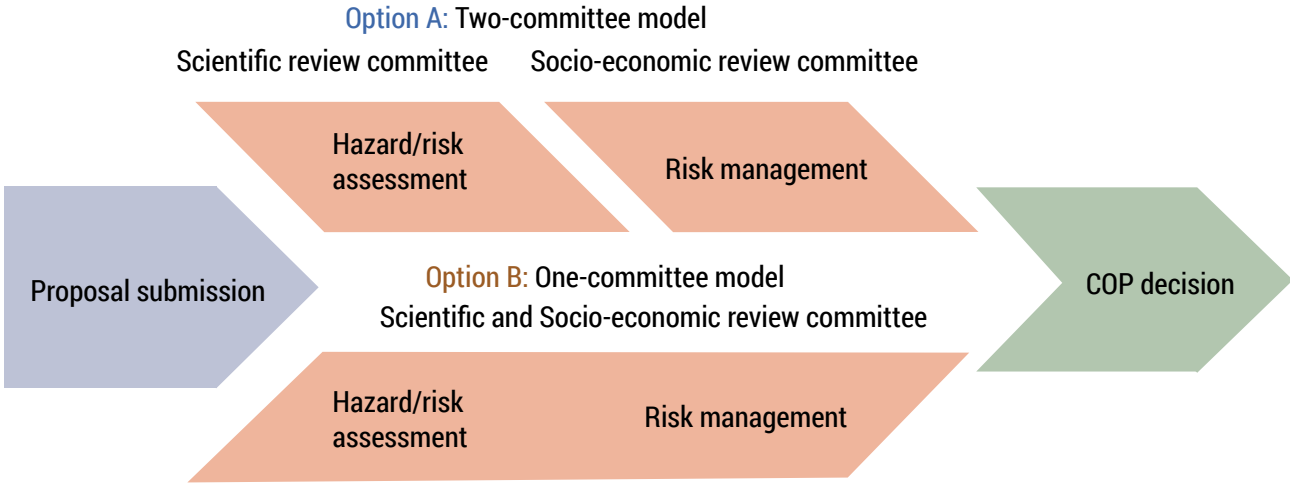


Figure 7: Process for hazard/risk assessment and socio-economic assessment of chemicals, polymers and products of concern with two institutional options.

offers a more nuanced assessment due to its specialised expertise, whereas the single-committee model offers administrative simplicity but might encounter expertise limitations in certain areas. If the one-committee model is chosen for minimalistic administrative simplicity, it will be important to ensure necessary adaptations, such as:

- Regular inclusion of guest experts with needed specialized knowledge.
- Consultation with external bodies (academic, private sector, or other governmental agencies).
- Mandatory interdisciplinary representation within the committee.

Assessment

Assessment of the plastic pollution crisis can be conducted through various approaches, as demonstrated by existing multilateral environmental agreements. For instance, the Montreal Protocol mandates periodic scientific assessments conducted every four years through its subsidiary bodies, the SAP and the EEAP panels. In contrast, the Minamata Convention leverages external inputs via UNEP's global mercury assessment. Both the UNFCCC and CBD benefit from dedicated intergovernmental bodies, the IPCC and IPBES respectively, with robust assessment mechanisms.

A balance should be struck in determining the role of scientific assessments within the context of the plastics instrument vis-à-vis the Science-Policy Panel. While both entities are pertinent for thematic assessments, the primary accountability for iterative global assessments needs clear demarcation. Table 6 presents pros and cons of assigning global assessment responsibilities within the plastics instrument as opposed to the Science-Policy Panel.

While the Science-Policy Panel can play a crucial role in providing scientific guidance and input, it is essential to carefully consider its capacities and potential limitations, as well as the need for reliable and continuous support for global assessments. It is equally vital to address the risk of diminished scientific authority and independence if the plastics instrument were to oversee these assessments, perhaps through a specialised subsidiary body.

Pursuing the development of global assessments under the Science-Policy Panel should be a priority, given its independent role that will guarantee highest credibility, authority and reach of the global outputs. If this is not feasible, adopting a collaborative approach, spearheaded by the plastics instrument and incorporating the Science-Policy Panel and other relevant entities, emerges as a sensible strategy.

The development of global assessments must also be considered in light of effectiveness evaluations, which is integral to the plastics instrument pursuant to UNEA Resolution 5/14. A component of an effectiveness evaluation of a multilateral environmental agreement may also be outsourced to external global assessments, as was the case with the first IPBES global assessment that evaluated the achievement of the 20 Aichi Biodiversity Targets. Similarly, if global assessments are developed by the Science-Policy Panel, its efforts could complement and reinforce the effectiveness evaluation of the plastics instrument.

4.3.3. Phase 3: Implementation

As policymaking transitions to the implementation stage, the needs and expectations of a science-policy interface might evolve considerably (UNEP, 2020). During this phase, decision-making may necessitate targeted input on narrowly defined issues, or comprehensive advice on various policy options. This advice should reflect a thorough understanding of the problem's nature, the potential trade-offs involved, and the cost-effectiveness, feasibility, and efficacy implications of each policy's deployment (UNEP, 2020). Institutionalisation of scientific

Table 6: Pros and cons of conducting global assessment: Plastics instrument vs. Science-Policy Panel.

Body	Pro	Cons
Subsidiary scientific and technical body under the plastics instrument	• Outputs, finely tuned to the instrument's requirements, contribute directly to its operational framework. • Integrating the scientific community into the instrument's nucleus potentially strengthens the science-policy interface concerning core obligations.	• Affiliation with a multilateral environmental agreement may question the impartiality and perceived objectivity of the assessments. • Centralising scientific tasks risks overextending the plastics instrument's responsibilities, straining its operational focus.
Science-Policy Panel on chemicals, waste and pollution prevention	• The Science-Policy Panel's broad scope accommodates a comprehensive approach to plastic pollution, encompassing chemical and waste perspectives. • Its autonomous status lends greater legitimacy and could extend the reach and influence of the assessments. • The assessments can be considered as independent inputs to the effectiveness evaluation, thus enhancing their credibility.	• The Science-Policy Panel's broad scope, relevant to multiple multilateral environmental agreements, raises concerns about resource allocation and availability. • Dependence on an external body introduces an element of uncertainty in the systematic execution of assessments. • The Science-Policy Panel's shifting priorities over time diminishes assurance of ongoing support.

support through a subsidiary body may not be needed in most cases in this phase, but could be considered in the development of policy support tools.

Policy support tools
Policy support tools are essential for effective decision-making. The primary avenue for their development would be the plastics instrument, presenting two viable options. The first is a streamlined institutional approach where the development of policy support tools relies on ad hoc expert working groups and task forces, established based on specific needs. Alternatively, these tools could be developed under the guidance of a dedicated subsidiary body, with the Open-ended Working Group of the Basel Convention serving as a potential model. This approach may require broadening of the remit of the proposed scientific body on chemical, polymer, and product safety (see section 4.3.2) to oversee the development of policy support tools.

When designing these tools, collaboration with other MEAs is crucial. In some cases, such as the Basel Convention, tool development may be outsourced to specific MEAs. Moreover, while this function has not been explicitly articulated in the responsibilities of the Science-Policy Panel, it could also have a role in supporting the development of specific policy support tools, drawing from experiences from the IPCC and the IPBES.

Knowledge management mechanisms
A global knowledge hub on plastic pollution is needed for collecting and displaying information on various aspects of plastic pollution. While the UNEA resolutions establishing the Science-Policy Panel (Resolution 5/18) and the plastics instrument (Resolution 5/14) do not specify knowledge management mechanisms, Resolution 5/8 implies its inclusion, highlighting the panel's main roles in communication, information-sharing, and stakeholder engagement. In response, the Science-Policy Panel could spearhead the creation of a comprehensive data repository covering all chemicals and forms of pollution, including plastic pollution. Alternatively, the Secretariat of the plastics instrument could be tasked with setting up a data repository centred exclusively on plastic pollution, ensuring close collaboration with the scientific community to ensure an evidence-based approach. It is also advisable to seek cooperation with existing science-policy interface bodies, an example being the integration with databases such as the IRP's Global Material Flows Database.

Catalysing knowledge generation
Encouraging activities for catalysing knowledge development at the national and regional levels, as well as among relevant international institutions, is needed to facilitate the implementation of the plastics instrument. This may include, inter alia, research on alternatives and non-plastic substitutes, including their socio-economic impacts. Institutional arrangements should aim to empower relevant bodies and initiatives, encouraging cooperation between them. Such collaborative approaches could involve delegating specific tasks to leading initiatives or establishing partnerships for purposes such as the collection of monitoring data. The Science-Policy Panel's related role to identify gaps in scientific research pertaining to plastic pollution, including formulating recommendations for directing future research efforts, could involve interdisciplinary studies, monitoring, and innovative technologies.

4.3.4. Phase 4: Evaluation

The evaluation phase of the plastics instrument will demand significant scientific and technical input to help measure both progress and effectiveness. Fulfilling this need may involve a strategic combination of efforts: active engagement by the Secretariat of the plastics instrument and direct involvement of scientific experts. Expert input is needed for shaping monitoring efforts and in evaluating the instrument's effectiveness, in particular the development of relevant indicators and methodologies for data collection. Moreover, the Science-Policy Panel could enrich the evaluation of the effectiveness of the plastics instrument, drawing on precedents, such as the first IPBES regional and global assessments that evaluated the achievement of the twenty Aichi Biodiversity Targets (UNEP, 2020).

Monitoring progress against key elements
Effective monitoring of key elements will necessitate the development of monitoring programs, requiring scientific and technical expertise to establish an indicator framework and standardise data collection methodologies. This involves data collection at both national and regional levels, engaging relevant institutions, and compiling and synthesising collected data to understand global trends comprehensively.

Valuable insights can be drawn from the Stockholm Convention's Global Monitoring Plan. An applicable approach could entail the creation of regional organisational groups, tasked with defining and executing regional strategies for information gathering. These strategies encompass critical components such as capacity building and the formation of strategic partnerships. In the context of the Stockholm Convention, these groups consist of three members from each region, nominated by their respective regional coordination groups.

Another illustrative example is the monitoring framework for the Global Biodiversity Framework, which is

supported by an Ad Hoc Technical Expert Group (AHTEG) on Indicators. The AHTEG's objective is to address critical gaps to improve the monitoring framework, in particular on headline indicators that do not have an existing methodology, and advise on their implementation at the national level. The AHTEG is composed of 45 experts, 30 nominated by Parties and 15 by Observers. Noteworthy is the Biodiversity Indicators Partnership (BIP), comprising over sixty international organisations supporting data collection.

Monitoring under the Montreal Protocol encompasses multiple aspects, such as quantitative reporting on substances and assessment panels. A distinctive aspect of the Protocol lies in its commitment to capacity building initiatives. The Multilateral Fund plays a crucial role in supporting projects in developing countries to phase out ODS, while simultaneously strengthening monitoring and reporting capabilities. This includes setting up National Ozone Units responsible for implementing the protocol at the national level that play a crucial role in data collection, reporting, and ensuring compliance.

In light of these considerations, initiating the development of an indicator framework covering the full spectrum of control measures for plastic pollution becomes imperative, as soon as possible after the first draft of the agreement has been made available. The eventual adoption of these indicators in conjunction with the agreement may necessitate a global monitoring plan to help operationalise data collection. Additionally, fostering a partnership on indicators, and uniting organisations committed to championing data collection, could significantly augment the implementation of the indicator framework.

The Science-Policy Panel's potential function lies in supporting the development of a monitoring plan. The successful execution of the monitoring plan will require inventory data spanning the entire life cycle of plastics. This will require developing and regularly updating guidelines for national inventories comparable to the GHG inventories crafted for the IPCC and employed by UNFCCC Parties. This responsibility could potentially be entrusted to the Science-Policy Panel, although it lacks an explicit mandate to develop policy support tools.

Effectiveness evaluation

Effectiveness evaluation is closely related to monitoring progress, thus, it should be considered and designed in an integrated manner. Effectiveness evaluation plays a vital role in informing agenda setting as well as agreement design and review.

In the case of the Stockholm Convention, the effectiveness evaluation is informed by reports from the Global Monitoring Plan and other sources. The six-year evaluation cycle is overseen by an effectiveness evaluation committee, with two members appointed from each regional group. The evaluation is guided by an effectiveness evaluation framework, adopted by the Conference of Parties (COP), which includes indicators to assess the core obligations of the treaty.

Given that the plastics instrument spans multiple chemicals, polymers and products, the model provided by the Stockholm Convention may not be directly applicable to the plastics instrument. It will likely require a larger pool of expertise; thus, it may be relevant to consider including data from citizen science initiatives, research institutions, industry reports, and other relevant sources to enhance the evaluation's comprehensiveness.

More specifically, it may be worth considering establishing a mechanism to bring the scientific community closer to the evaluation process, for instance by forming an expert advisory group or collaborating with research institutions to provide input, validate methodologies, and analyse results. In this context, it is important to recognise that the impact of plastics spans various disciplines, thus, encouraging collaboration between scientists, economists, sociologists, and experts from diverse backgrounds is imperative to provide a holistic perspective on effectiveness.

Lastly, it could be worthwhile to consider possibilities to execute the global review as a living online platform – a global observatory on plastic pollution – which could bring together the information needed to provide an ongoing assessment of progress towards the agreement in an accessible and visually compelling way, building on lessons learned from the WHO and others. The online platform also opens opportunities for stakeholders, including NGOs, industries, and local communities, to contribute data, insights, and feedback through the online platform, fostering a sense of collective ownership. The GPML Digital Platform could be considered for this platform.

4.3.5. Cross-cutting functions

Science-policy interface functions are intricately interlinked, mutually reinforcing each other across various dimensions. Notably, capacity building, along with communication and outreach, plays a pivotal role throughout all stages of the policy cycle. These functions provide comprehensive support that is essential to consider during each phase of the policy cycle.

Capacity building

Within the capacity building function, different tiers can be identified. The Science-Policy Panel may take on

the role of enhancing the foundational competencies of scientists, representing a comprehensive approach. This initiative could encompass, among other strategies, the implementation of fellowship programs, inspired by the IPBES's successful use of such schemes to enhance fellows' abilities in conducting assessments.

In a complementary vein, the plastics instrument, in synergy with other multilateral environmental agreements, might handle capacity building more effectively where it is directly related to the implementation of the science-policy interface functions. For instance, within the realm of policy support tools, one focus could be crafting methodologies for data collection that resonate with local conditions, providing the necessary support to enable their effective application. Furthermore, in the sphere of catalysing knowledge generation, capacity building can help integrate traditional, indigenous, and local knowledge systems into research, focusing on developing sustainable, affordable, and innovative approaches in line with paras 4d and 4o of the Resolution 5/14.

Prioritising effective participation from representatives of developing countries is crucial to the overall work and meetings conducted under the science-policy interface functions of the plastics instrument. Facilitating their significant engagement through dedicated support is instrumental in paving the way for a successful implementation and subsequent follow-through of the plastics instrument. This inclusive approach ensures that a diverse range of perspectives and expertise informs the global effort against plastic pollution. Active participation in meetings not only provides new insights, but also serves as a catalyst for enhancing scientific networks and creating strategic partnerships.

Communication & Outreach

During the policy formulation and decision-making phase, establishing robust communication channels between researchers and decision-makers is essential. Ensuring that the rights and voices of people in vulnerable situations, indigenous peoples, and local communities are respected necessitates transparent, accessible, and accountable consultations. Their meaningful participation in decision-making processes is a cornerstone of inclusive and fair policy development (Dauvergne, 2023).

In this vein, the science-policy interface for the plastics instrument should also prioritise the development of modalities that foster effective communication between scientists and decision-makers. To enhance implementation, the Secretariat of the plastics instrument could facilitate a proactive interface with civil society and the private sector, both of which can offer indispensable information, including insights into the availability and feasibility of local alternatives and non-plastic substitutes. The multi-stakeholder action agenda on plastic pollution could provide a possible avenue for communication.

Concurrently, the integrity of these communications is paramount. It is imperative to establish rigorous procedures for identifying, preventing, and managing potential conflicts of interest. This ensures that the decision-making process is not only inclusive and informed, but also unbiased and objective, safeguarding the public interest and environmental integrity against possible conflicting private gains.

4.4. Summary of recommendations

Table 7 provides a summary of recommendations for the institutional arrangements to fulfil science-policy interface functions for plastic pollution.

Table 7: Summary of possible institutional arrangements to fulfil science-policy interface functions for plastic pollution.

Policy phase	Science-policy interface of the plastics instrument	Science-Policy Panel	Relevant science-policy interface bodies
Phase 1: Agenda setting		• Utilise the horizon scanning capacity of the Science-Policy Panel to proactively identify potential products, polymers and chemicals of concern.	• UNEP
Phase 2: Policy formulation	• Consider establishing a dedicated scientific and technical body on chemical, polymer, and product safety to underpin the scientific criteria for control measures, responsible for 1. Reviewing nominations for listing chemicals, polymers, and products of concern. 2. Identifying possible safe and sustainable alternatives and non-plastic substitutes based on socio-economic assessments. 3. Developing and updating criteria for sustainable and safe design of plastics. • The subsidiary body could also undertake other tasks, including to address functions in other policy phases, if deemed necessary.	• The Science-Policy Panel could present chemicals, polymers and products of concern emerging from the horizon scanning function for review to the review committee under the plastics instrument. This would complement listing proposals submitted by Parties.	• Stockholm Convention's POPs Review Committee • Rotterdam Convention's Review Committee • Montreal Protocol TEAP
	• Should the Science-Policy Panel not lead the development of global assessments, the plastics instrument could assume a leading role, possibly through a subsidiary scientific and technical body.	• Primarily pursue the development of iterative global assessments under the Science-Policy Panel to ensure maximum credibility, authority, and reach of the outputs.	• Montreal Protocol SAP • Montreal Protocol EEAP • IPBES • IPCC
	• Thematic assessments may be developed by ad hoc expert groups when specific needs arise.	• Develop thematic assessments on plastic pollution, based on needs arising from the panel and requests forwarded to the panel from the plastics instrument.	• UNEP Global Mercury Assessment • IRP • GESAMP • BC PWP
Phase 3: Implementation	• The development of policy support tools, such as technical guidelines, best available techniques, best environmental practices, and toolkits, will need to be considered in context of potentially establishing a subsidiary body on scientific and technical advice. This may require broadening of the mandate to the proposed scientific body on chemical and product safety to oversee development of these tools. Alternatively, ad hoc expert groups or task forces can be established on a needs basis for this purpose. • In crafting these tools, collaboration with other MEAs is crucial. In some cases, as with the Basel Convention, development may be outsourced to specific MEAs.	• While not explicitly defined in its mandate, the SPP could assist in developing specific policy support tools, drawing on precedents from bodies such as the IPCC and IPBES.	• Relevant expert groups under multilateral environmental agreements • UNFCCC SBSTA • Basel Convention's OEWG
	• UNEA Res. 5/14 does not explicitly mention the knowledge management mechanism function. If the Science-Policy Panel does not develop a comprehensive data repository, including on plastic pollution, the Secretariat of the plastics instrument could be tasked to create a specialized database on plastic pollution, working closely with the scientific community.	• Although UNEA Res. 5/8 does not explicitly mention the knowledge management mechanism function, its emphasis on communication and outreach functions presents an opportunity to lead the development of a comprehensive data repository that would encompass all chemicals and pollution forms, including plastic pollution.	• UNEP (World Environment Situation Room) • IRP (Global Material Flows Database) • OECD (Global Plastic Outlook database) • GPML

Table 7 (continued)

Policy phase	Science-policy interface of the plastics instrument	Science-Policy Panel	Relevant science-policy interface bodies
	• Empower relevant institutions at national, regional and global levels, as well as facilitate cooperation between them to catalyse knowledge generation, including deepening understanding, inter alia, on safe and sustainable alternatives and non-plastic substitutes.	• Utilise the Science-Policy Panel's role to identify gaps in scientific research pertaining to plastic pollution, including formulating recommendations for directing future research efforts, which could involve interdisciplinary studies, monitoring, and innovative technologies. This function could be embedded in thematic and global assessments.	• Relevant research institutions, universities, and statistical centres
Phase 4: Evaluation	• Involve scientific and technical experts to contribute to the development of an indicator framework and standardised methodologies for data collection to facilitate global monitoring efforts and the evaluation of the effectiveness of the instrument. • Institutional arrangements may include the development of a Global Monitoring Plan and an effectiveness evaluation process overseen by regional coordination groups appointed by governments and supported by an open-ended scientific group.	• Global assessments conducted under the Science-Policy Panel may also complement and reinforce the effectiveness evaluation of the plastics instrument.	• Stockholm Convention's Global Monitoring Plan • CBD SBSTTA and AHTEG on indicators • UNFCCC SBSTA • CMS Scientific Council • IWC Scientific Committee • GESAMP • BC OEWG
Cross-cutting	• Cover capacity building needs directly related to implementation of science-policy interface functions, such as development of methodologies for data collection that align with local realities. • Facilitate involvement of developing country participants to overall work and meetings conducted under the science-policy interface functions.	• Take a comprehensive approach to capacity building by enhancing the foundational competencies of scientists, including through fellowship programmes. • Facilitate involvement of developing country participants to overall work and meetings conducted under the Science-Policy Panel.	
	• Prioritise the development of modalities to foster effective communication between scientists and decision-makers, as well as consider establishing a proactive interface with civil society and the private sector. In this context, consider the potential role of the multi-stakeholder action agenda and develop procedures to prevent and deal with conflicts of interest.	• Utilise the dedicated communication and outreach capacity of the Science-Policy Panel to generate greater awareness and ownership of scientific outputs.	

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Annex 1. Glossary of terms

For the purposes of this report, the following terminology is used:

- Chemicals: Include monomers, additives, and processing aids used in plastics, as well as associated non-intentionally added substances (Wiesinger et al., 2021).
- Plastic polymers: Any macromolecular substance obtained by polymerization of monomers.
- Material: A synthetic material consisting of a mixture of polymers and additives, which can be moulded, shaped, or spun into different shapes and forms.
- Product: Manufactured combinations of materials that contain plastic polymers, including component items containing plastic polymers and final manufactured products containing plastic polymers. In the context of packaging, it refers specifically to the packaging material, not the contents within (e.g., food).
- Chemicals of concern: Chemicals known to pose potential or significant risks to human health and the environment due to their intrinsic (eco)toxicological properties (hazard) and patterns of use (exposure).
- Microplastics: Small plastic particles up to 5 mm in diameter, composed of mixtures of polymers and additives, potentially including residual impurities.
- Products of concern: Specific plastic products identified as unnecessary, avoidable and problematic plastic products.
- Polymers of concern: Specific polymers that raise health and environmental concerns, identified based on criteria such as hazard classification, molecular weight, residual monomer content, and other factors critical to assessing associated risks (BRS, 2023).
- Non-plastic substitutes: Materials sourced from natural origins—whether mineral, plant, animal, marine, or forestry—that can function equivalently to plastics (UNCTAD, 2023). These substitutes should be non-toxic and demonstrate a lower environmental impact throughout their life cycle.
- Alternatives: Safer and environmentally sound products, polymers and chemicals intended to replace those identified as chemicals, polymers and products of concern. This term also encompasses alternative practices and designs that present a lower risk to health and the environment.

Annex 2. Comprehensive definitions for key principles guiding science-policy interfaces

This annex provides comprehensive definitions for the key principles for guiding science-policy interfaces identified in existing literature.

Scientific literature emphasises the following key principles to establish scientific authority among governance actors:

- Credibility: Defined as the perceived scientific adequacy of scientific products and arguments (Cash, 2003). It is based on authoritative and convincing information and analysis. It derives from 1) the application of peer review, 2) the credentials and related experience of individual members, and 3) the number of scientific entities involved (van der Hel & Biermann, 2017). To ensure credibility, it is essential to implement conflict of interest policies that address prevention, disclosure of existing conflicts, and provide guidance on recusal from specific tasks (UNEP, 2020).
- Legitimacy: Defined as the perceived fairness of knowledge production and assessment, respecting divergent values, interests and believes (Cash, 2003). It enjoys endorsement of the main target audience. It derives from 1) representation of various scientific fields and consideration of geographical and gender balance; 2) formal recognition by the UN system; and 3) participation of non-academic actors (van der Hel & Biermann, 2017).
- Salience: Defined as the perceived relevance of science institutions and the knowledge they provide (Cash, 2003). It is directly relevant to the needs of users. It derives from: 1) the comprehensive and integrated nature of their products, 2) the independent nature of scientific advice, and 3) the application of a solution-oriented approach (van der Hel & Biermann, 2017).

Other principles suggested for an effective science-policy interface are listed below:

- Access to information: The right to seek, receive and impart information on health and safety of humans and the environment. This principle is mirrored in Art. 9 of the Stockholm Convention: "For the purposes of this Convention, information on health and safety of humans and the environment shall not be regarded as confidential.
- Agility: Defined as having efficient organisational practices that minimise duplication of work and allow for flexibility and the ability to adapt to changing circumstances (Wang et al., 2019). This can be achieved by forming working groups with specific tasks and mandates of limited terms (e.g., 1-3 years) after which the group is disbanded, emphasising intersessional work, and scheduling meetings according to the actual needs of the work and not at fixed time intervals (Wang et al., 2019).
- Effectiveness: Is achieved by establishing structures that allows for efficient processes and minimise bureaucracy (UNEP, 2020).
- Flexibility: Refers to the extent to which a structure can quickly respond to emerging knowledge or adapt to changing context (UNEP, 2020). This may be viewed in light of organisation of one-off reports/meetings/ad-hoc working groups vs. continuous arrangements, and whether topics addressed are adjusted/evolve based on continuous input and review of relevant knowledge (UNEP, 2020).
- Human rights-based approach: Ensures inclusive and informed decision-making aligned with scientific evidence and the needs of individuals, groups and Peoples that have experienced systemic discrimination in the enjoyment of their rights (OHCHR, 2023). It also ensures that plastic alternatives are assessed regarding their implications for human rights and the environment, guaranteeing that they are not misleading, short sighted and do not lead to further harm. This also relate to fair treatment that refers to treatment in which groups of people should not bear a disproportionate burden of the adverse environmental consequences from plastics operations or policies (Beretta, 2012).
- Inclusivity: Embracing a wide representation across various dimensions ensures legitimacy. This means ensuring balanced regional and gender representation in expert contributions, integrating insights from the natural sciences, social sciences and humanities as well as from local, traditional and indigenous knowledge systems (Díaz-Reviriego et al., 2019). Inclusiveness in terms of stakeholder inputs (industry, civil society, etc.) is also important. Inclusivity relates to meaningful involvement that is critical to ensure procedural and distributive justice to ensure the full enjoyment of human rights at every stage of the plastics cycle. It requires efforts to facilitate the involvement of people or communities in decisions about plastic activities that may affect their health or environment and that their contribution and concerns are considered and can influence the decision-making process (Beretta, 2012).
- Integrity (avoiding conflicts of interest): The ability to maintain integrity of scientific processes and avert any conflicts of interest. This is underpinned by the principles guiding the work of the International

Resources Panel (IRP, 2016).

- Iteration: Defined as a continuous multi-directional interaction that goes beyond simple repetition, building on previous practices, learning from success and failure, and fostering evolution of constructive relationships and knowledge itself among all participants at the interface, and between science-policy interfaces and external audiences (Sarkki et al., 2015)
- Leveraging advanced technologies: Emphasises the use of state-of-the-science models for data collection and analysis, modern tools for data visualisation, web-based systems, artificial intelligence to assist identification of relevant evidence (UNEP, 2020).
- Objectivity: The ability to undertake critical, unbiased studies and assessments of best available science, follow robust methodologies and peer-review processes, and ensure open and transparent decision-making processes. This is underpinned by the principles guiding the work of the International Resources Panel (IRP, 2016).
- Policy-relevance: The ability to provide scientific knowledge and science-based policy options in a nonprescriptive manner. This is underpinned by the principles guiding the work of the International Resources Panel (IRP, 2016).
- Precautionary principle: Advocates for or proactive measures even in the absence of complete scientific certainty, especially when faced with potential serious or irreversible harm to the environment (as per Rio Principle 15) (UN, 1992). In other words, it requires preventive action in the face of uncertainty. This principle is included in many multilateral environmental agreements as well as national legislations on environmental protection. For instance, the principle is included in the Agreement on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction (Art. 5-d); the Convention on Biological Diversity (para 9 of the Preamble); the Stockholm Convention (Art. 1); the Basel Convention (Arts. 2, 4, 6); and the 1997 MARPOL Convention (Protocol - Annex VI).
- Relevance: Emphasises the alignment of scientific outputs with needs of decision-makers (UNEP, 2020). It necessitates producing assessments that are demand-driven, policy relevant, cognizant of key uncertainties, taking into account the needs of different stakeholders (UNEP, 2020). Approval of work programmes by members of the government is a crucial part of relevance (UNEP, 2020).
- Transparency on procedural issues: This include taking steps, such as publishing the names of all experts involved in preparing outputs (including peer review), allowing accredited observers to attend plenary sessions, proving information on the procedures used in elaborating recommendations, and publishing conflict of interest declarations for members in scientific committees (UNEP, 2020). Transparency also produces information on state and industry conduct that can provide incentive to conform with international standards (Harrould-Kolieb, 2023).
- Visibility: Ensuring advice and outputs to both the public and decision-makers can be achieved thorough impactful outreach and communication strategies (UNEP, 2020).

Annex 3. Examples of relevant science-policy interface functions in multilateral environmental agreements and in other fora

1. EARLY WARNING

1. Horizon Scanning

2. Foresight

Other examples include:

- Since 2017, UNEP has published 30 foresight briefs to present emerging issues, systemic insights and possible policy solutions on a wide range of topics. Presently, UNEP is establishing an institutionalised approach to strategic foresight and horizon scanning to assist in anticipating trends, risks and emerging issues. For this approach, biennial Global Foresight Reports will be issued; the first will be launched at UNEA-6 in February 2024. The preparation of the first report involves several stages, including scoping, developing scenarios, sourcing and data gathering, interpretation through a structured expert panel debate and organisation of regional foresight workshops (UNEP, 2023e).

2. SCIENTIFIC CRITERIA FOR CONTROL MEASURES

1. Criteria to identify chemicals and polymers of concern

Examples from multilateral environmental agreements include:

- The Montreal Protocol establishes criteria for identifying controlled substances, taking into account the ozone-depleting potential (ODP[12]) for ozone-depleting substances (ODS) and the greenhouse warming potential (GWP[13]) for hydrofluorocarbons (HFCs). Any Party to the Protocol may notify the Secretariat about new substances that meet these criteria. For ODS, the notification should include information on the likelihood of substantial production. The Secretariat then forwards such notifications to the SAP and TEAP for assessment and possible recommendation for listing by the MOP. In addition to the ODP and GWP, the assessment panels also consider other criteria, such as atmospheric lifetime, global dispersion potential and availability and performance of alternatives.
- The Stockholm Convention POPs Review Committee (POPRC) serves as a scientific mechanism for reviewing proposals to list new chemicals under the Convention as POPs. Any Party to the convention may propose a chemical for inclusion in Annex A (elimination), Annex B (restriction) and/or Annex C (unintentional POPs) based on specific criteria detailed in Annex D. The criteria include persistence (P), bioaccumulation (B), adverse effects (T) and its potential to undergo long-range environmental transport potential (LRTP). This is followed by an evaluation of significant adverse effects on human health and the environment outlined in Annex E, and concludes with consideration of control measures and socio-economic aspects per Annex F. The review of chemicals takes at least three meetings/years to conclude as it includes three steps: screening, risk profile, and risk management evaluation.
- The Rotterdam Convention Chemical Review Committee has 31 experts in chemicals management that are nominated by governments and confirmed by the COP. After receiving notifications of final regulatory action from two different regions that meet the criteria for information outlined in Annex I, the Secretariat assigns the notifications to the Chemical Review Committee. A task group of the Committee reviews this against the criteria of Annex II (chemicals) and Annex IV (severely hazardous pesticide formulations). If the criteria are met, a decision guidance document is prepared for the COP to consider the recommendation for listing in Annex III, making them subject to the PIC procedure.

2. Criteria to identify products of concern

Examples from multilateral environmental agreements include:

- The Stockholm Convention establishes criteria for prohibition and restriction of POPs, which are used by the POPRC to review chemicals proposed for listing. While focus is on chemicals the model could be adjusted for reviewing potential products of concern.
- The Basel Convention provides a list of characteristics to determine if wastes subject to transboundary movement are to be deemed hazardous (Art. 1.1a).

Other examples include:

- The EU Single-Use Plastics Directive restricts placing on the market single-use plastics listed in Annex B (e.g., cutlery, plates, straws, beverage and stirrers) and products made from oxodegradable plastics (EU, 2019).

The following UNEA resolutions provide guidance on the matter:

- UNEA Resolution 4/9 encourages Member States to promote the identification and development of environmentally friendly alternatives to single-use

plastic products, taking into account the full life cycle implications of those alternatives (para 2); and encourages and Member States and the private sector to promote the more resource-efficient design, production, use and sound management of plastics across their life cycle (para 5).
- UNEA Resolution 4/6 invites Member States and other stakeholders to encourage sustainable consumption and production of products likely to generate marine litter, including plastic litter and microplastics (para 6b).

3. Criteria to promote safe and sustainable design of plastics

Examples from multilateral environmental agreements include:
- The Stockholm Convention Expert Group on Best Available Techniques and Best Environmental Practices is developing guidance for intentionally used chemicals with exemptions for known on-going use, including by non-Parties.

Other examples include:
- The EU's Ecodesign Directive sets environmental and energy performance criteria for products (EU, 2012). The Commission has prepared a proposal for revised legislation (Ecodesign for Sustainable Products Regulation, ESPR) to replace the directive that will set requirements to promote product durability, reliability, reusability, upgradability and reparability, as well as to restrict the presence of chemicals that inhibit the circularity, among others (European Commission, 2022)
- The EU's Single-Use Plastics Directive includes plastic product requirements, including for increasing recycled content in PET bottles and for attaching caps and lids made of plastic in certain single-use plastic products (EU, 2019).
- France has developed a repairability index based on five criteria of to give a score out of ten that must be displayed to consumers. The criteria are 1) documentation; 2) disassembly, accessibility, tools, fasteners; 3) availability of spare parts; 4) price of spare parts; and 5) criterion specific to the category of equipment concerned.[14]

The following UNEA resolutions provide guidance on the matter:
- UNEA Resolution 4/7 invites Member States to prevent and reduce waste at the source of origin by minimising packaging materials, discouraging planned obsolescence of products, improving their safety, reusability, recyclability and resource efficiency through improved product design, using easy-to-recycle materials and using secondary raw materials, where feasible, rather than primary raw materials (para 1b).
- UNEA Resolution 5/11 invites Member States, in cooperation with the private sector, to enhance the design of products, taking into account life cycle assessments, to favour product lifetime extension, repair, re-use and easier recycling in the context of a circular economy, thereby contributing to resource efficiency (para 2).

4. Criteria to promote safe and sustainable alternatives and non-plastic substitutes

Examples from multilateral environmental agreements include:
- The Stockholm Convention defines the following criteria for alternatives (products and processes) to chemicals proposed for listing: technical feasibility, costs (including environmental and health costs), efficacy, risk, availability and accessibility (Annex F, para b). The persistent organic pollutants review committee uses the criteria as part of the risk management evaluation before providing recommendations for listing chemicals.
- The Montreal Protocol defines the following criteria for alternatives: commercially available; technically proven; environmentally sound; economically viable and cost effective; safe to use in areas with high urban densities considering flammability and toxicity issues, including, where possible, risk characterization; easy to service and maintain (in Decision XXVI/9, para 1a). Decision IV/25 defines that a use of a controlled substance should qualify as "essential" only if there are no available technically and economically feasible alternatives or substitutes that are acceptable from the standpoint of environment and health (para 1.1.2). The Technology and Economic Assessment Panel (TEAP) under the Protocol assesses the technical and economic feasibility of known alternatives. The Panel produces yearly progress reports to review the status of alternatives.

5. Criteria to facilitate access to information on plastics (transparency)

Examples from multilateral environmental agreements include:
- The Aarhus Convention requires Parties to ensure that sufficient product information is made available to the public in a manner which enables consumers to make informed environmental choices. The treaty links human and environmental rights to ensure participatory and

procedural rights to environmental justice.

- The Kyiv Protocol requires the development of Pollutant Release and Transfer Registers (PRTRs), which are information systems designed to enhance transparency and provide public access to data on the release and transfer of pollutants into the environment.
- The Stockholm Convention includes measures for Prior Informed Consent (PIC) for the trade of regulated chemicals, whereas the Basel Convention requires such procedures only for certain types of plastic waste.
- The ILO Chemicals Convention (C170) mandates suppliers, including manufacturers, importers, and distributors, to clearly mark and label hazardous chemicals and provide safety data sheets to employers (Art. 7–9). Employers must maintain similar labelling standards for workplace chemicals and ensure the availability of safety data sheets (Art. 10). If such labelling and information are lacking, the chemicals shouldn't be used.
- The US Environmental Protection Agency's Office of Environmental Justice works to assist and collaborate with people in vulnerable situations to implement procedural and distributive environmental justice solutions for their environmental and human health challenges. The UN Declaration on the Rights of Indigenous Peoples contains articles pertaining to the rights of indigenous peoples to free, prior, and informed consent with respect to their indigenous knowledge systems and also pertains to other rights such as a right to science, access to justice, meaningful involvement and a right to a clean, healthy and sustainable environment.

Other examples include:

- The EU Ecolabel for footwear[15] provides criteria against which applicants are certified. It guarantees the sustainable management of natural origin raw materials, reduced pollution in production processes, a minimised use of hazardous substances, and products that are tested for durability.
- The EU Ecolabel for textile products[16] provides criteria against which applicants are certified. It guarantees a more sustainable fibre production, a less polluting production process, strict restrictions on the use of hazardous substances, and a long-lasting final product.

6. Criteria to promote environmentally sound waste management

Examples from multilateral environmental agreements include:

- Expert groups established under the Basel Convention consider criteria/technology for the environmentally sound management of plastic waste and other related waste streams, such as rubber, textiles, household waste, medical waste and POPs waste. In 2023, the COP adopted the updated technical guidelines on the identification and environmentally sound management of plastic wastes and for their disposal.

3. ASSESSMENT

1. Global assessments on the status and trends of plastic pollution

Examples from multilateral environmental agreements include:

- The Scientific Assessment Panel (SAP) is one of the three panels established by the Montreal Protocol pursuant to Art. 6 that aim to assess the control measures of the Protocol every four years, based on terms of reference decided by the MOP. SAP focuses on assessing the status of the depletion of the ozone layer and its future evolution, evaluation of trends in emissions, climate impacts, early identification of any other issues of importance to the ozone layer and climate system, and discrepancies between reported emissions and observed atmospheric concentrations, among others (Decision XXXI/2).

Other examples include:

- The Global Mercury Assessment was first produced in 2002 following the request of UNEP's Governing Council (Decision 21/5) and has been updated at periodic intervals with the latest edition being published in 2018. The primary focus of the 2018 edition is on updated global emissions and releases inventories, especially for sectors of relevance for the Minamata Convention. It has also expanded to include an assessment of mercury levels in humans and biota. To this end, the Global Mercury Assessment plays an important role to inform the Minamata Convention, although it is not formally linked to it.
- The IPCC provides at regular intervals assessment reports on the state of knowledge on climate change. IPCC synthesises existing research but does not carry out its own research or monitor climate-related data. The IPCC has, over the years, been firmly established as an independent assessment mechanism serving the SBSTA and the COP of the UNFCCC. Today, the IPCC has three working groups focusing on the physical science basis (WG1), climate change impacts, adaptation and vulnerability (WG2) and mitigation of climate change (WG3).

2. Socio-economic assessment

Examples from multilateral environmental agreements include:

- TEAP is one of the three panels established by the Montreal Protocol pursuant to Art. 6 that aim to

assess the control measures of the Protocol every four years. TEAP focuses on assessing technical progress in transitioning to sustainable alternatives, and challenges faced by Parties regarding substitutes and substitute technologies, and feedstock uses (Decision XXXI/2).
- The POPRC of the Stockholm Convention develops a risk management evaluation document for chemicals under consideration for listing based on information collected from Parties and observers regarding the socio-economic considerations associated with possible control measures specified in Annex F, including efficacy and efficiency of possible control measures, alternatives (products and processes and positive/negative impacts of implementing possible control measures) (Art. 8.7a).
- The financial needs assessment of the Stockholm Convention has been prepared every four years at the request of the COP. The financial needs assessment for 2020-2026 relies on POPs inventory data from several sources. However, the lack of inventory data, particularly for new POPs present in materials, such as plastics, prevents the development of a comprehensive assessment of funding needs (BRS, 2021).

Other examples include:
- The EU has two committees responsible for conducting chemicals assessments: 1) The Committee for Risk Assessment which focuses on evaluating the chemical properties and hazards associated with substances, and 2) the Committee for Socio-Economic Analysis which focuses on assessing the socio-economic aspects, including the impacts on human health, the environment, and society, associated with the use and regulation of substances.

3. Thematic assessment

Examples from multilateral environmental agreements include:
- The Stockholm Convention has established several expert groups, some of which focus on a chemical or a group of chemicals. For instance, the DDT Expert Group is responsible for assessing the elimination of DDT. Each expert group has specific terms of reference, and they all report their findings to the Stockholm Convention COP.
- The CBD COP can mandate the development of Ad Hoc Technical Expert Group (AHTEG) assessments to provide expert guidance and recommendations for the negotiations, such as the development of new guidelines, protocols, or thematic frameworks. The assessments are prepared by a maximum of 15 experts nominated by parties and a limited number of experts from appropriate organisations.

Other examples include:
- IPBES produces thematic assessments based on decisions by the IPBES plenary. Themes of former assessments include, inter alia, pollinators, invasive alien species, restoration and interlinkages with climate change.

4. POLICY SUPPORT TOOLS

Examples from multilateral environmental agreements include:
- The Basel Convention's Open-ended Working Group (OEWG) is supported by technical experts who contribute to the development of technical guidelines for specific waste streams and for specific disposal operations. These guidelines are approved by the COP and include those for POPs, e-waste, mercury wastes, and plastic waste, among others (UNEP, 2022d).
- The Expert Group on Best Available Techniques and Best Environmental Practices under the Stockholm Convention develops and updates technical guidance documents that provide information on best available techniques and best environmental practices for specific POPs or industrial sectors. The group also supports capacity building activities by organising workshops, training programs, and information-sharing events to enhance understanding and implementation of best available techniques and best environmental practices measures.

Other examples include:
- The IPCC develops technical guidelines for GHG inventories, providing standardised methods for estimating and reporting GHG emissions and removals. These guidelines assist countries in fulfilling their reporting obligations under the UNFCCC and Paris Agreement.
- The FAO provides a toolkit for its staff on the application of Free, Prior, and Informed Consent (FPIC) in relation to indigenous knowledge.
- The OECD's Global Plastics Outlook: Policy Scenarios to 2060 provides projections related to plastics up to 2060, including plastics use, waste and environmental impacts. The need to strengthen policies is demonstrated through a series of policy packages designed to provide the necessary environmental benefits, while highlighting the economic consequences of failing to do so. The OECD Environment Policy Committee (EPOC) oversaw the development of the report with reviews provided by the Working Party on Resource Productivity and Waste (WPRPW) and the Working Party on Integrating Environmental and Economic Policies (WPIEEP).

5. KNOWLEDGE MANAGEMENT MECHANISMS

1. Database of chemicals and polymers of concern

Examples from multilateral environmental agreements include:

- The Montreal Protocol's Data Centre[17] hosts a central database with detailed data on production, consumption, trade of ODSs by individual countries.
- The Rotterdam Convention's PIC Circular[18] provides information on the chemicals regulated under the convention, including trade data, regulatory decisions, and risk profiles.
- The CITES Trade Database[19] includes information on trade permits, species listings, and trade volumes to support monitoring and regulation of wildlife trade.

Other examples include

- The IPCC's Task Force on National Greenhouse Gas Inventories develops and maintains guidelines for GHG inventories and provides information on methodologies, emission factors, etc. However, it does not operate as a separate data hub but contributes to the broader availability of GHG inventory data at the national and international levels.
- The European Chemicals Agency (ECHA) carried out the Plastic Additive Initiative, a two-year programme (2016-2018) that aimed to characterise the uses of plastic additives and the extent to which the additives may be released from plastic articles.

2. Knowledge management hub for visualising progress

Examples from multilateral environmental agreements include:

- The Stockholm Convention's Global Monitoring Plan (GMP) Data Warehouse[20] provides comparable, harmonised and reliable information on POPs levels globally in core environmental matrices: air, human tissues (breast milk, blood), and water. This data warehouse helps Parties to monitor the effectiveness of control measures and assess the progress made in reducing POPs worldwide.

Other examples include:

- Progress achieved in the implementation of WHO's International Health Regulations (IHR) is displayed in the Global Health Observatory.[21] The observatory showcases global progress maps and other means of visual representation, allowing stakeholders to track and evaluate the implementation of health regulations worldwide.

3. Knowledge management hub for facilitating implementation and outreach

Examples from multilateral environmental agreements include:

- The UNCCD's Knowledge Hub[22] serves as a platform for sharing knowledge, best practices, research findings, and resources related to sustainable land management and combating desertification. According to an internal review it has the ability to increase awareness of national and regional results, simplify information-finding processes, and consolidate search results for potential linking to mobile applications and other tools (UNCCD, 2015).
- The CBD's Clearing-House Mechanism (CHM) serves as a global biodiversity information network and database, providing access to scientific literature, reports, national biodiversity strategies, and other relevant information. The CHM consists of the CBD website, acting as the central node, and a network of national CHMs.

Other examples include:

- IPBES aims to identify policy-relevant tools and methodologies to support policy formulation and implementation, as one of its main functions (IPBES, 2010). The 2030 work programme includes "supporting policy" as one of its six objectives, aiming to identify and promote the development and use of policy instruments, policy support tools and methodologies. This includes the development of the IPBES policy support web portal.[23] The former Policy Support Gateway is in archive status.[24]

6. CATALYSING KNOWLEDGE GENERATION

1. Assessments of externalised costs of plastic pollution

2. Assessment of substitutes and alternatives for plastics and associated chemicals

Examples from multilateral environmental agreements include:

- The Stockholm Convention requires Parties, within their capabilities, at the national and international levels, to encourage and/or undertake appropriate research pertaining to POPs and, where relevant, to their alternatives and to candidate POPs (Art. 11.1). This includes assessing effects on human health and the environment and socio-economic, and cultural impacts, among others.
- The preamble of the Montreal Protocol highlights the importance of promoting international co-operation in the research, development and transfer of alternative technologies relating to the control and reduction of emissions of substances that deplete the ozone layer, bearing in mind in particular the needs of developing countries.

3. Examine systems to safeguard traditional knowledge, practices and innovations

Other examples include:

- There are several policies from UN agencies on the ethical conduct and engagement with indigenous peoples including from UNESCO, UNEP, and the FAO (UNESCO, 2017; UNEP 2012; FAO, 2010). In addition, the FAO provides specific guidance on the application of Free, Prior, and Informed Consent (FPIC) (FAO, 2014). Principles also exist for Indigenous Data Governance, ensuring it is findable, accessible, interoperable, and reusable, and addressing the robust and fair data care of indigenous knowledge (GIDA, 2023).

7. MONITORING GLOBAL PROGRESS

1. Tracking global trends of plastics in the environment, biota and human populations

Examples from multilateral environmental agreements include:

- Stockholm Convention's Global Monitoring Plan (GMP) for POPs provides a framework for the collection of comparable monitoring data on the presence of POPs from all regions, to identify changes in their concentrations over time, as well as global transportation of pollutants. Core mediums used in the GMP include ambient air, human tissues (milk and blood), water, and other media. The second global monitoring report shows increasing trends over the past decade for more recently listed POPs that have uses in plastics, including PBDEs, HCBD, and PFAS (Stockholm Convention, 2017a). A main challenge has been that, despite the abundance of published information on POPs concentrations, it is difficult or impossible to establish quantitative comparisons due to the differences in the media monitored (i.e., different species, locations, seasons), and lack of common quality assurance and quality control regimes (Stockholm Convention, 2017a).

2. Tracking global trends of plastic flows, including trade flows

Examples from multilateral environmental agreements include:

- The Montreal Protocol requires Parties to provide statistical data on their annual production of each of the controlled substances listed in Annexes A, B, C, E, and F and, separately, for each substance: amounts used for feedstocks; amounts destroyed by technologies approved by parties; and regarding imports from and exports to Parties and non-Parties respectively (Art. 7, paras 2-3).
- While the Stockholm Convention does not mandate the development of POPs inventories, such inventories frequently form an integral part of national implementation plans (NIPs).
- The Basel Convention promotes the establishment of a tracking system, known as the Basel Convention Control System, to monitor and control the movement of hazardous wastes.

Other examples include:

- The global e-waste monitoring programme developed by the Sustainable Cycles (SCYCLE) Programme of the United Nations Institute for Training and Research (UNITAR), and the methodological related model developed by UNITAR-SCYCLE and UNEP-BRS on plastic waste inventories.
- The UNCTAD system of HS codes to track trade. This has been shown to be limited in scope for plastic products and the 'hidden' flows of plastics embedded in other products (UNCTAD, 2020).

3. Tracking global trends of discharge/leakage of plastic waste

4. Track global trends of emissions and releases of microplastics and chemicals

Examples from multilateral environmental agreements include:

- The Minamata Convention requires Parties to establish, as soon as practicable and no later than five years after the date of entry into force of the Convention for it, and maintain thereafter, an inventory of emissions from relevant sources (Art. 8, para 7) and an inventory of releases from relevant sources (Art. 9, para 6).
- The Stockholm Convention states that the action plan for unintentional persistent organic pollutants (UPOPs) shall include source inventories and release estimates of UPOPs (Art. 5, para 1).
- Kyiv Protocol on PRTRs includes reporting on micro/nanoplastic particles from wastewater treatment plants to PRTR systems, but the plastic particle component is currently not reported to PRTRs in a differentiated way (UNECE, 2022).
- The Regional Seas Conventions and Action Plans (RSCAPs) and the CBD use indicator 14.1.1b on plastic debris density of the 2030 Agenda for Sustainable Development

5. Tracking global presence of chemicals of concern in products

Examples from multilateral environmental agreements include:

- The Stockholm Convention, under Art. 6, para 1a, calls for the development of specific strategies for identifying products and articles in use, and wastes consisting of, containing or contaminated with POPs and for identifying stockpiles consisting of, or containing

POPs. The convention emphasises the preparation of inventories to assess the volume of POPs present in products. This often involves the use of toolkits utilising secondary data, such as import and export data, to provide a rough estimate of POPs concentrations. Initial guidance has been prepared for labelling products or articles that contain POPs (Stockholm Convention, 2017b). Decision SC-11/12 further requested the POPRC to explore options for identifying POPs in stockpiles, products and articles in use and in wastes and issues related to the production, import and export of products and articles containing POPs.
- Convention No.170 prescribes the classification of all chemicals by hazards and other properties, the labelling of chemicals with appropriate hazard information and symbols as well as the provision of safety data sheets to workers on all hazardous chemicals used at their workplace

Other examples include:
- SAICM's Chemicals in Products (CIP) programme aims to increase access to information on chemicals in products by focusing on four priority sectors: electronics, building products, toys and textile.
- The Global Harmonized System for Classification and Labelling of Chemicals (GHS) promotes the use of Safety Data Sheets (SDS) that provide detailed information about hazards, handling, storage, and emergency procedures related to chemicals. While product labels may provide some basic information about hazardous substances, the GHS does not require the disclosure of the specific chemical composition or detailed content on product labels.
- The EU Substances of Concern in Products (SCIP) database catalogues articles that contain chemicals that are listed as substances of very high concern (SVHC) on the candidate list under Registration, Evaluation, Authorisation, and Restriction of Chemicals (REACH) legislation. According to the Waste Framework Directive (2008/98/EC), since 2021, manufacturers, importers or distributors of articles released on the EU market containing these chemicals at above 0.1 % of weight must provide information to ECHA.
- Tracking systems in the automotive industry already in place can be used to identify parts in motor vehicles containing listed POPs and facilitate the environmentally sound management of these when they become waste. These include 1) the Global Automotive Declarable Substance List (GADSL) that aims to include substances directly related to the automotive industry that have been regulated from at least one country, and 2) the International Material Data System (IMDS) that, according to its website, facilitates meeting the obligations placed on automobile manufacturers, and thus on their suppliers, by national and international standards, laws and regulations. All materials present in finished automobile manufacturing are collected, maintained, analysed and archived.
- Hewlett Packard (HP) has internal standards for how to physically label which types of plastics as well as which types of phthalates and flame retardants that are used in any plastic pieces that weigh more than 25 grams.

6. Tracking global trends of greenhouse gas emissions across the life cycle

Examples from multilateral environmental agreements include:
- UNFCCC and Paris Agreement include mandatory inventories for GHG emissions and removals in several areas relevant to plastics (energy, industrial processes and waste) that could be used to disaggregate data on GHG across the life cycle of plastics.
- The Ramsar Convention's Scientific and Technical Review Panel is conducting assessments of direct and climate-change-related pressures on wetlands, their impacts, and responses (STRP, 2023).
- Kyiv Protocol on Pollutant Release and Transfer Registers (PRTRs) requires the development of PRTRs that are information systems designed to enhance transparency and provide public access to data on the release and transfer of pollutants into the environment. PRTRs foster accountability by requiring industries to disclose their pollutant releases.
- The Stockholm Convention has established an expert group on best available techniques and best environmental practices that develops an assessment of releases of unintentional persistent organic pollutants based on the information reported in national reports and other credible sources. Although unintentional persistent organic pollutants are not GHG emissions, they are released as a result of combustions, including opening burning.

7. Assess performance progress of the plastics instrument in implementation of core obligations

Examples from multilateral environmental agreements include:
- The Basel Convention has an Open-Ended Working Group (OEWG) in place instead of a dedicated science advisory body. The OWEG is tasked with the development of draft technical guidelines and assisting the COP in developing the workplan for the Convention, as well as reviewing implementation of the workplan. Decisions taken by the COP and operational policies are also reviewed by the OEWG (UNEP, 2022d).

8. EFFECTIVENESS EVALUATION

1. Determine the effectiveness of the plastics instrument in achieving objectives and goals

Examples from multilateral environmental agreements include:

- The effectiveness evaluation of the Stockholm Convention is defined in Art. 16, which states that is needs to be founded on available scientific, environmental, technical and economic information, including reports and other monitoring information on the presence of POPs and their regional and global environmental transport, national reports and non-compliance information. The effectiveness evaluation is prepared in a six-years cycle that is initiated by the Secretariat that compiles information gathered through existing arrangements under the Convention, which is then made available for the Effectiveness Evaluation Committee that consist of experts nominated by governments to prepare an assessment report for COP's consideration. Scholars highlight that the effectiveness evaluation could benefit from complementary contributions from the scientific community (Wang et al., 2022).
- The effectiveness evaluations of the Minamata Convention must be based on available scientific, environmental, technical, financial and economic information, monitoring information, national reports, non-compliance information, and information on financial assistance, technology transfer and capacity building (Art. 22). Decision MC-4/11 established an Open-ended Scientific Group to, inter alia, compile, analyse and synthesise comparable mercury monitoring data, and draw conclusions for the consideration of the Effectiveness Evaluation Group.
- The Montreal Protocol's SAP prepares Quadrennial Assessment reports every four years, which provide a comprehensive evaluation of the state of the ozone layer, the effectiveness of control measures, and the progress made in phasing out ODS.
- The Global Stocktake under the Paris Agreement evaluates every 5 years the collective efforts of Parties and the overall effectiveness of climate action. It considers multiple aspects of effectiveness, including the adequacy of emission reduction efforts, the level of ambition in NDCs, the implementation of adaptation measures, the provision of financial resources, technology transfer, capacity building efforts, and overall progress towards the goals of limiting global warming to well below 2 degrees Celsius and pursuing efforts for 1.5 degrees Celsius.

Other examples include:

- IPBES indirectly supports the supports the effectiveness evaluation of the CBD with the development and use of indicators and monitoring systems to track progress towards the Aichi Biodiversity Targets. A comprehensive assessment of progress towards the Aichi Biodiversity Targets was included in the first global biodiversity assessment (IPBES, 2019).
- IPCC indirectly support the Global Stocktake of the Paris Agreement by providing scientific assessments, reviewing information, synthesising knowledge, and assisting policymakers in developing effective responses to climate change

2. Determine the effectiveness of national actions

Examples from multilateral environmental agreements include:

- The technical expert review (TER) is established under Art. 13 of the Paris Agreement to track progress made in implementing and achieving nationally determined contributions (NDCs). The review is intended to provide useful information to individual parties through identification of areas in need of improvement. The individual review process under the UNFCCC relies on three sources: desk reviews, where experts review the information at their office; centralized reviews, where experts meet to review the information of various countries; and in-country reviews, where experts visit the country under review and engage with policymakers and other relevant national stakeholders (Dagnet et al., 2017). Currently, the review process depends on volunteer experts, and it is estimated that almost 800 experts will be needed to cover review obligations under the Paris Agreement (Dagnet et al., 2017).

Other examples include:

- UNHRC's universal periodic review (UPR) is of interest, as it appears to have a more comprehensive review process, through giving a formal role to civil society organisations (CSOs) in the review of states' performance (Ulloa et al., 2018).

3. Determine the effectiveness of individual response options

Examples from multilateral environmental agreements include:

- The Stockholm Convention requires encouraging and/or undertaking appropriate research for proposed alternatives for POPs to assess, inter alia, their sources and releases into the environment; environmental transport, fate and transformation; effects on human health and the environment; and socio-economic and cultural impacts (Art. 11.1).

9. CAPACITY BUILDING

Examples from multilateral environmental agreements include:

- The Stockholm Convention states that Parties must encourage and/or undertake research, development, monitoring, and cooperation pertaining to POPs and, where relevant, to their alternatives and to candidate

POPs (Art. 11.1). In doing so, Parties must support efforts to strengthen national scientific and technical research capabilities, particularly in developing countries and countries with economies in transition (Art. 11.2b).
- The Basel and Stockholm conventions have endorsed (sub-)regional centres for capacity building and technology transfer relating to the conventions' implementation. The regional centres play an important role in facilitating the sharing of scientific knowledge, best practices, and experiences among member countries, as well as supporting in collecting, analysing, and sharing data related to POPs.

Other examples include:
- IPBES aims to identify and prioritise key capacity building needs to improve the science-policy interface as one of its key functions (IPBES, 2010). The work programme includes building capacity as one of its six objectives, aiming to enhance knowledge and skills of institutions and individuals to enable and facilitate engagement in the production and use of IPBES products. The achievement of this objective is supported by the three components of the capacity building rolling plan. 26 capacity building needs have been agreed upon by the IPBES Plenary (IPBES, 2023).
- The International Atomic Energy Agency's (IAEA) NUTEC Plastics Initiative aims to improve national capacities to use radiation technology for plastic waste recycling through its technical cooperation programme and research projects. Moreover, the initiative aims to enhance monitoring of microplastics in the ocean by quipping over 50 laboratories worldwide with the technology and know-how required to sample and analyse marine microplastics.

10. COMMUNICATION AND OUTREACH

1. Internal communication

Examples from multilateral environmental agreements include
- The Aarhus Convention, under the United Nations Economic Commission for Europe, sets provisions for enhancing access to information, public participation in decision-making, and access to justice in environmental matters. The Escazú Agreement for Latin America and the Caribbean mirrors these values. These multilateral environmental agreements exemplify how to increase access to justice and legal empowerment in health and environmental matters, to empower stakeholders in plastic pollution by enforcing, claiming and defending their human and environmental rights.

Other examples include (emphasis on good practice in environmental justice):
- The United States Environmental Protection Agency National Environmental Justice Advisory Council. The Council is a federal advisory committee that improves public and environmental health through the meaningful involvement of the community and experts in the scientific, technological, and regulatory decision-making related to environmental justice.
- The Arctic Council introduced an Arctic Contaminants Action Programme which has four working groups including the Indigenous Peoples' Contaminant Action Programme. The working groups operate as subsidiary bodies to strengthen and support the Arctic Contaminants Action Programme. The functions of the Indigenous Peoples' Contaminant Action Programme are to coordinate local participation and ownership solutions to reduce pollution impacts on the health and environment of Arctic indigenous peoples.

2. External communication

Other examples include
- The CBD COP has defined engagement procedures with IPBES, requiring SBSTTA to submit to IPBES work program requests for approval to the COP. Moreover, SBSTTA is authorized to exchange scientific and technical information with IPBES, where the subject is within the mandate given to it by the COP (decision XII/25, paras 1-2).
- UNFCCC COP repeatedly requests SBSTA to strengthen cooperation with the IPCC. According to Art. 21.2 of the Convention, the secretariat "will cooperate closely with the IPCC to ensure that the Panel can respond to the need for objective scientific and technical advice". In 1995, UNFCCC COP 1 established the joint working group (JWG) between SBSTA and IPCC to coordinate and exchange information (Decision 6/CP.1). The JWG includes Chairs of SBSTA and IPCC, presiding officers of both, and secretariat members.

Annex 4. Functions of key science-policy interface bodies and other relevant bodies analysed

Body	Function
Independent intergovernmental science-policy interface bodies	
Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)	Busan Outcome (para 6) b. The new platform should identify and prioritise key scientific information needed for policymakers at appropriate scales and catalyse efforts to generate new knowledge by engaging in dialogue with key scientific organisations, policymakers and funding organisations, but should not directly undertake new research; c. The new platform should perform regular and timely assessments of knowledge on biodiversity and ecosystem services and their interlinkages, which should include comprehensive global, regional and, as necessary, subregional assessments and thematic issues at appropriate scales and new topics identified by science and as decided upon by the plenary. These assessments must be scientifically credible, independent and peer-reviewed, and must identify uncertainties. There should be a clear and transparent process for sharing and incorporating relevant data. The new platform should maintain a catalogue of relevant assessments, identify the need for regional and subregional assessments and help to catalyse support for subregional and national assessments, as appropriate; d. The new platform should support policy formulation and implementation by identifying policy-relevant tools and methodologies, such as those arising from assessments, to enable decision makers to gain access to those tools and methodologies, and, where necessary, to promote and catalyse their further development; e. The new platform should prioritise key capacity building needs to improve the science-policy interface at appropriate levels and then provide and call for financial and other support for the highest-priority needs related directly to its activities, as decided by the plenary, and catalyse financing for such cap
Intergovernmental Panel on Climate Change (IPCC)	Principles governing IPCC work 2. Assess on a comprehensive, objective, open and transparent basis the scientific, technical and socio-economic information relevant to understanding the scientific basis of risk of human-induced climate change, its potential impacts and options for adaptation and mitigation. 13. Major reports, including Assessment Reports, Special Reports and Methodology Reports, basic documentation and other available reports for consideration at the sessions of the Panel and its Working Groups shall normally be made available by the IPCC Secretariat at least four weeks in advance of the session and, to the extent possible, in all official UN languages
Science Policy Panel on chemicals, waste and pollution prevention (SPP)	UNEA Resolution 5/8 para 2) Considers that the principal functions of the panel should include, among other things: a. Undertaking "horizon scanning" to identify issues of relevance to policymakers and, where possible, proposing evidence-based options to address them; b. Conducting assessments of current issues and identifying potential evidence-based options to address, where possible, those issues, in particular those relevant to developing countries; c. Providing up-to-date and relevant information, identifying key gaps in scientific research, encouraging and supporting communication between scientists and policymakers, explaining and disseminating findings for different audiences, and raising public awareness; d. Facilitating information-sharing with countries, in particular developing countries seeking relevant scientific information; Report from OEWG 1.2 • It was agreed by the OEWG that a fifth function on capacity building will be added but that further discussions were needed to finalise the text of the function
Science-policy interface bodies under multilateral environmental agreements	
Basel Convention Open-ended Working Group (OEWG)	Decision VI/36 (para 8) Decides also that the Open-ended Working Group will have the following mandate: a. To assist the Conference of the Parties in developing and keeping under continuous review the implementation of the Convention's work plan, specific operational policies and decisions taken by the Conference of the Parties for the implementation of the Convention, as specified in article 15; b. To consider and advise the Conference of the Parties on issues relating to policy, technical, scientific, legal, institutional, administration, finance, budgetary and other aspects of the implementation of the Convention within the approved budget, including identification of the specific needs of different regions and subregions for training and technology transfer and to consider ways and means of ensuring the establishment and functioning of the Basel Convention Regional Centres for Training and Technology Transfer; c. To prepare its work plan for consideration by the Conference of the Parties; d. To report to the Conference of the Parties on the activities it has carried out between meetings of the Conference of the Parties;

Body	Function
Convention on Biological Diversity (CBD) Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA)	Article 25.2 Under the authority of and in accordance with guidelines laid down by the Conference of the Parties, and upon its request, this body shall: a. Provide scientific and technical assessments of the status of biological diversity; b. Prepare scientific and technical assessments of the effects of types of measures taken in accordance with the provisions of this Convention; c. Identify innovative, efficient and state-of-the-art technologies and know-how relating to the conservation and sustainable use of biological diversity and advise on the ways and means of promoting development and/or transferring such technologies; d. Provide advice on scientific programmes and international cooperation in research and development related to conservation and sustainable use of biological diversity; and e. Respond to scientific, technical, technological and methodological questions that the Conference of the Parties and its subsidiary bodies may put to the body.
Convention on Migratory Species (CMS) Scientific Council (SC)	Resolution 1.4 Directs the Scientific Council to address the following questions and tasks, in order of priority: a. To assist in the development of indicative and exemplary agreements between Range States according to the Convention; b. To formulate guidelines for the application of such terms of the Convention as "endangered" and "migratory species"; c. To review, in the light of these guidelines, the existing list of species on the appendices of the Convention; d. To recommend, in accordance with article VIII, paragraph 5 (c), of the Convention, species to be included in appendices I or II, such additions to be made according to a clear, defined set of principles; e. To develop a comprehensive and consistent candidate list of species which would benefit by future inclusion in appendices I and II, as they put forward; f. To provide information, channelled through the secretariat, to all Range States of particular species, with a view to encouraging all non-party Range States to become Parties to the Convention and to participate in its implementation
International Whaling Commission (IWC) Scientific Committee (SC)	Scientific Committee Handbook The primary Terms of Reference of the Scientific Committee are drawn from the text of the International Convention for the Regulation of Whaling which established the IWC, including its Schedule: • Encourage, recommend, or if necessary, organise studies and investigations related to whales and whaling (Convention Article IV.1(a)) • Collect and analyse statistical information concerning the current condition and trend of whale stocks and the effects of whaling activities on them (Article IV.1 (b)) • Study, appraise, and disseminate information concerning methods of maintaining and increasing the population of whale stocks (Article IV.1 (c)) • Provide scientific findings on which amendments to the Schedule shall be based to carry out the objectives of the Convention and to provide for the conservation, development and optimum utilisation of the whale resources (Article V.2 (a) and (b)) • Publish reports of scientific activities and findings (Article IV.2) • Review current threats and methods to mitigate them in order to maintain cetacean populations at viable levels (Rule of Procedure M.4) • Receive, review and comment on Special Permits issued for scientific research (Article VIII.3 and Schedule paragraph 30) • Assess stocks subject to aboriginal subsistence whaling (Schedule paragraph 13(b)) • Review research programmes of Contracting Governments and other bodies (Rule of Procedure M.4)
Montreal Protocol Environmental Effects Assessment Panel (EEAP)	Decision XXXI/2 (para 4) To request the Environmental Effects Assessment Panel, in preparing its 2022 assessment report, to pay particular attention to the most recent scientific information together with future projections and scenarios to assess the effect from changes in the ozone layer and ultraviolet radiation, and their interaction with the climate system, as well as the effects of breakdown products from controlled substances and their alternatives on: a. The biosphere, biodiversity and ecosystem health, including on biogeochemical processes and global cycles; b. Human health; c. Ecosystem services, agriculture and materials, including for construction, transport, photovoltaic use and microplastics;

Body	Function
Montreal Protocol Scientific Assessment Panel (SAP)	Decision XXXI/2 (para 5) The 2022 report of the Scientific Assessment Panel should include: a. An assessment of the state of the ozone layer and its future evolution; b. An evaluation of global and polar stratospheric ozone, including the Antarctic ozone hole and Arctic winter/spring ozone depletion and the predicted changes in those phenomena; c. An evaluation of trends in the top-down derived emissions, abundances and fate in the atmosphere of trace gases of relevance to the Montreal Protocol, in particular controlled substances and other substances of importance to the ozone layer, which should include a comparison of bottom-up and top-down estimations of such emissions with a view to addressing unidentified emission sources and discrepancies between reported emissions and observed atmospheric concentrations; d. An evaluation of consistency with reported production and consumption of those substances and the likely implications for the state of the ozone layer, including its interaction with the climate system; e. An assessment of the interaction between changes in stratospheric ozone and the climate system, including possible future policy scenarios relating to ozone depletion and climate impacts; f. Early identification and quantification, where possible, of any other issues of importance to the ozone layer and the climate system, consistent with the objectives of the Vienna Convention for the Protection of the Ozone Layer and the Montreal Protocol; g. An assessment of information and research related to solar radiation management and its potential effect on the stratospheric ozone layer; h. Relevant information on any newly detected substances that are relevant for the Montreal Protocol;
Montreal Protocol Technology and Economic Assessment Panel (TEAP)	Decision XXXI/2 (para 6) In its 2022 report, the Technology and Economic Assessment Panel should include an assessment and evaluation of the following topics: a. Technical progress in the production and consumption sectors in the transition to technically and economically feasible and sustainable alternatives and practices that minimise or eliminate the use of controlled substances in all sectors; b. The status of banks and stocks of controlled substances and the options available for managing them so as to avoid emissions to the atmosphere; c. Challenges facing all parties to the Montreal Protocol in implementing Montreal Protocol obligations and maintaining the phase-outs already achieved, especially those on substitutes and substitution technologies, including challenges for parties related to feedstock uses and by-production to prevent emissions, and potential technically and economically feasible options to face those challenges; d. The impact of the phase-out of controlled ozone-depleting substances and the phase-down of HFCs on sustainable development; e. Technical advancements in developing alternatives to HFCs suitable for usage in countries with high ambient temperatures, particularly with regard to energy efficiency and safety The Technology and Economic Assessment Panel Primer The TEAP assesses technical and economic information that serves as the basis for parties' assessment of control measures of substances under the purview of the Montreal Protocol. Such information is related to substitutes that may replace the substances controlled under the Protocol and alternative technologies that may be used without adverse impact on the ozone layer and climate, production and consumption of controlled substances, emissions of controlled substances, potential alternatives for exempted uses and others, as mandated by the parties.
Ramsar Convention on Wetlands Scientific and Technical Review Panel (STRP)	Resolution 5.5 Shall perform the scientific and technical review tasks entrusted to it on an annual basis by the Standing Committee, for example: • Review of the Bureau's annual scientific and technical programme; • Review of the `Criteria for identifying wetlands of international importance', particularly as regards habitat for fish populations; • Evaluation of the application of the `Procedure for initial designation of sites for the List of wetlands of international importance'; • Review of the `Montreux Record'; • Identification of priorities for application of the `Monitoring Procedure'; • Review of projects submitted to the Wetland Conservation Fund; • Evaluation of the application of the `Guidelines for the implementation of the wise use concept' and of the `Additional guidance for the implementation of the wise use concept'; • Evaluation of the application of the `Guidelines on management planning for Ramsar sites and other wetlands'; • Consideration of a definition of ecological character and of guidelines on monitoring change in ecological character. Five STRP thematic work areas for the 2023-2025 triennium are defined in Resolution XIV.14, Annex 2: • Thematic Work Area 1: Wetlands of International Importance, development of the Site network and application of criteria. • Thematic Work Area 2: Tools for wetland assessment, mapping and monitoring, and development of inventories. • Thematic Work Area 3: Direct and climate-change-related pressures on wetlands, their impacts and responses. • Thematic Work Area 4: Wise use, sustainable management and restoration of wetlands in the wider landscape/seascape. • Thematic Work Area 5: Cross-cutting issues, supporting functions, and synergies with other multilateral environmental agreements.

Body	Function
Stockholm Convention Persistent Organic Pollutants Review Committee (POPRC)	Art. 8[25] 1. Any Party may submit a proposal to the Secretariat for listing a chemical in Annex A, Annex B, and/or Annex C of the Convention. The Secretariat verifies that the proposal contains information specified in Annex D and forwards it to the POPRC for consideration. 2. The POPRC examines the proposal and applies the screening criteria specified in Annex D. 3. If the POPRC is satisfied that the screening criteria have been fulfilled, it invites Parties and observers to submit information specified in Annex E and develops a risk profile. Based on the risk profile, the POPRC makes decision on whether the chemical is likely, as a result of its long-range environmental transport, to lead to significant adverse human health and/or environmental effects such that global action is warranted. 4. If the POPRC decides that the proposal shall proceed, it invites Parties and observers to submit information related to the socio-economic considerations specified in Annex F and develops a risk management evaluation. On the basis of the risk profile and risk management evaluation, the POPRC recommends whether the chemical should be considered by the Conference of the Parties for listing in Annexes A, B and/or C. 5. The Conference of the Parties, taking due account of the recommendations of the POPRC, including any scientific uncertainty, shall decide, in a precautionary manner, whether to list the chemical, and specify its related control measures, in Annex A, Annex B and/or Annex C.
United Framework Convention on Climate Change (UNFCCC) Subsidiary Body for Scientific and Technological Advice (SBSTA)	Art. 9 (para 2) Under the guidance of the Conference of the Parties, and drawing upon existing competent international bodies, this body shall: a. Provide assessments of the state of scientific knowledge relating to climate change and its effects; b. Prepare scientific assessments on the effects of measures taken in the implementation of the Convention; c. Identify innovative, efficient and state-of-the-art technologies and know-how and advise on the ways and means of promoting development and/or transferring such technologies; d. Provide advice on scientific programmes, international cooperation in research and development related to climate change, as well as on ways and means of supporting endogenous capacity building in developing countries; and e. Respond to scientific, technological and methodological questions that the Conference of the Parties and its subsidiary bodies may put to the body.
Other relevant science-policy interface bodies	
Basel Convention Plastic Waste Partnership (PWP)	Terms of reference (para 3) The overall tasks of the Partnership are the following: a. Collect information and undertake analysis on environmental, health, economic and social impacts of global, regional and national policy frameworks and strategies relevant to prevention, minimisation, collection and environmentally sound management of plastic waste; b. Identify the gaps and barriers to the prevention, minimisation, collection and environmentally sound management of plastic waste and identify best practices, lessons learnt and possible solutions to the same; c. Promote the development of policy, regulation and strategies on the prevention and minimisation of plastic waste, in particular in relation to single-use plastics, inter alia, via better design and innovation to improve durability, reusability, repairability and recyclability of plastics and to avoid hazardous substances in plastics and on environmentally sound management of plastic waste, taking into account the entire life cycle of plastics; d. Advance the prevention, minimisation, collection and environmentally sound management of plastic waste; e. Undertake pilot projects which support the delivery of the other overall tasks; f. Collect, analyse and consider possibilities to improve information on transboundary movements of plastic waste; g. Facilitate knowledge sharing, capacity building, technical advice, and technology transfer to strengthen and implement policies, strategies, public-private initiatives for the prevention, minimisation, collection and environmentally sound management of plastic waste; h. Undertake and/or contribute to outreach, education and awareness raising activities to widely disseminate the information and knowledge gathered and generated through the activities of the Partnership; i. Encourage and promote relevant innovation, research and development.
Global Environment Outlook (GEO)	UNEA Res. 5/3 5. Decides that the core function of the GEO process should be to undertake, every four years, an intergovernmental, expert-led, global authoritative assessment with regional specificities that assesses and tracks trends, evaluates the effectiveness of the global policy response, evaluates future perspectives for all five environmental themes addressed in previous GEO assessments, and evaluates the drivers of environmental change and the interactions across these environmental themes, while benefitting from but not duplicating existing assessments, and supplemented, as needed, by GEO thematic assessments at the request of the Environment Assembly, to fill knowledge gaps; 7. Decides that the GEO process should identify intergovernmentally defined needs and terms for the provision of support for capacity-building, knowledge generation and policymaking, in line with the mandate of UNEP, and should provide support services for addressing those needs, in partnership with relevant institutions as appropriate;

Body	Function
International Resources Panel (IRP)	2022-2025 Work Programme • Prepare independent, coherent, and authoritative scientific studies and assessments of policy relevance on the sustainable use and management of natural resources and in particular their environmental impacts over the full life cycle • Inform international policy discourse and development on emerging challenges and opportunities for the sustainable use and management of and equitable access to natural resources • Influence policy by creating relevant, reliable, timely and targeted knowledge; co-creating knowledge with multi-scale partners; having clear policy 'hooks' (particularly relating to the 2030 Agenda for Sustainable Development); stipulating impact pathways for agents of change; Translating knowledge to the regional and national levels; and tailoring communication to different stakeholders.
Joint Group of Experts on the Scientific Aspects of Marine Environmental protection (GESAMP)	A strategic vision for GESAMP and Work Programme • Integrate and synthesise the results of regional and thematic assessments and scientific studies to support global assessments of the marine environment • Provide scientific and technical guidance on the design and execution of marine environmental assessments • Provide scientific reviews, analyses, and advice on specific topics relevant to the condition of the marine environment, its investigation, protection and/or management. • Provide an overview of the marine environmental monitoring, assessment, and related activities of UN Agencies and advise on how these activities might be improved and better integrated and coordinated. • Identify new and emerging issues regarding the degradation of the marine environment that are of relevance to Governments and Sponsoring Organisations.

Notes

[1] Annex 1 includes a glossary of key terms.

[2] The U.S. Environmental Protection Agency (EPA) provides further details about the context and definition of the term "meaningful involvement." Environmental justice (EJ) is the fair treatment and meaningful involvement of all people regardless of race, colour, national origin, or income with respect to the development, implementation and enforcement of environmental laws, regulations and policies. Meaningful involvement means:
- People have an opportunity to participate in decisions about activities that may affect their environment and/or health.
- The public's contribution can influence the regulatory agency's decision.
- Community concerns will be considered in the decision-making process.
- Decision makers will seek out and facilitate the involvement of those potentially affected.

[3] https://ozone.unep.org/countries/data

[4] https://www.pic.int/PICCircular/tabid/1168

[5] https://trade.cites.org/

[6] https://www.pops-gmp.org/

[7] https://www.unccd.int/data-knowledge

[8] https://www.resourcepanel.org/global-material-flows-database

[9] https://www.oecd-ilibrary.org/environment/data/global-plastic-outlook_c0821f81-en

[10] https://www.resourcepanel.org/global-material-flows-database#:~:text=The%20Global%20Material%20Flows%20Database,growth%20and%20raw%20material%20usage .

[11] Terms of reference for the TEAP can be found online: Decision XXIV/9.

[12] The ODP quantifies a substance's ability to deplete the ozone layer compared to chlorofluorocarbon-11 (CFC-11), which has an ODP of 1. Substances with an ODP greater than zero are considered ODS.

[13] The GWP quantifies the global warming potential of a substance compared to carbon dioxide (CO2), which has a GWP of 1. HFCs that have high GWPs and are considered potent greenhouse gases.

[14] https://www.ecologie.gouv.fr/indice-reparabilite#scroll-nav__6

[15] Commission Decision (EU) 2016/1349 of 5 August 2016

[16] Commission Decision (EU) 2014/350 of 5 June 2014

[17] https://ozone.unep.org/countries/data

[18] https://www.pic.int/PICCircular/tabid/1168

[19] https://trade.cites.org/

[20] https://www.pops-gmp.org/

[21] https://www.who.int/data/gho/data/major-themes/health-emergencies

[22] https://www.unccd.int/data-knowledge

[23] https://www.ipbes.net/policy-tools-methodologies

[24] https://www.ipbes.net/policy-support

[25] The text of the Art. 8 of the Stockholm Convention is based on a summary from the Stockholm Convention website: https://chm.pops.int/TheConvention/POPsReviewCommittee/OverviewandMandate/tabid/2806/Default.aspx#:~:text=Based%20on%20the%20risk%20profile,that%20global%20action%20is%20warranted.

This report offers a critical and timely contribution to how decision makers can establish the scientific and technical functions needed for an effective global plastic instrument.

The report not only lays the groundwork on the needs for a Science-Policy Panel, but also draws lessons from well-established panels such as the Inter-governmental Panel on Climate Change.

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