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PERSPECTIVE

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Informing the Plastic Treaty negotiations on science - experiences from the Scientists' Coalition for an Effective Plastic Treaty

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Abstract

The ongoing international negotiations on a global plastics treaty will have pivotal implications for future efforts to transform the plastic economy. This is essential since the current use of plastic in the economy impacts the environment beyond the planetary carrying capacity. To ensure that the forthcoming Treaty can provide the foundation for this transition, the best available science must be made available in the negotiations, but with no formal scientific mechanism to inform the negotiations process, this is not ensured. The Scientists' Coalition for an Effective Plastic Treaty serves as an example of how the global scientific community has self-organized and come together to address this task, working with five different categories of science-policy communication. The Scientists' Coalition's work is made transparent here with the hope that it can inspire organization of scientific input into other future policy areas.

Keywords Plastic treaty, Plastic pollution, Science to policy, Science communication

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Introduction

According to the United Nation Environmental Programme (UNEP) the triple planetary crisis of climate change, biodiversity loss, and pollution is threatening the health of the planet and all its inhabitants [44]. This unprecedented challenge requires strong partnerships where the relevant stakeholders come together to seek out responses. These responses must be built on a foundation of robust scientific evidence, which implies an understanding of the drivers and potential solutions to this crisis while avoiding misinformation which could lead to regrettable solutions. This will require robust independent science and knowledge systems that are free of conflicts of interest (CoI). Indeed, CoI is a central topic in international policymaking. For example, the United Nation's Working Group on Human Rights discusses the importance of strict CoI policies as a means to ensure balanced access and participation for all stakeholders in policy processes [48]. The group mentions that strict CoI policies can be an important measure to ensure such participation. Disclosure of information that is supportive of the human rights to science [9] and access to information [22] will "ensure that environmental policy is driven by facts and evidence instead of denialism, greed, and profit" [41]. In the UN Special Rapporteur's report on the implications for human rights on sound management of hazardous chemicals [47] several examples are provided showing the implications of not having sufficient CoI policies. These include the hazards of asbestos and certain pesticides not being sufficiently addressed. The report also mentions the plastics industries' portrayal of recycling as an allegedly sufficient means to control plastic pollution [47].

Science plays a pivotal role in guiding policymaking and promoting informed evidence-driven development of different policy landscapes [32]. The science-policy interface can be defined as "*social processes which encompass relations between scientists and other actors in the policy process, and which allow for exchanges, co-evolution, and joint construction of knowledge with the aim of enriching decision-making*" [49]. Recent years have sometimes been referred to as a post-truth era where a growing disbelief in facts occurs [36], making the playing field for science-policy communication more difficult for scientists to engage in [18]. This implies that experiences from successful ways of communicating science to policymakers are increasingly important and that such experiences should be documented to strengthen future efforts to ensure that future policymaking is also based on robust science. It further implies that means to avoid distrust in science should be taken where appropriate. Science funded by associated industries has been known to produce results "*that are favorable to the sponsoring*

industry" [48]. Examples are the tobacco industry [5] and the food and beverage industry [33]. It is important to stress that the majority of industry funded studies are good and robust science, but that organizations such as the UN and OECD recommend strong CoI policies to ensure that the science communicated to policymakers is indeed free of vested interests.

While the communication of science to policymakers is important across a broad range of topics, it is especially relevant for complex and transdisciplinary topics, and where scientific understanding is rapidly evolving [35], such as the issue of plastics. With an annual plastics production in excess of 400 million tons, distributed across almost all economic sectors, and with prospects to increase production exponentially in the future, the challenge of adequately regulating plastics pollution is of high global concern [29]. Plastic pollution is a wicked problem, requiring inter- and transdisciplinary scientific insight into areas such as atmospheric, terrestrial, and aquatic pollution, material science, waste management, circular economy, health impacts, behavioral psychology, political science, anthropology, and economics, among other disciplines. Understandings within this field are constantly evolving as illustrated by the 1951 peer-reviewed articles published on the issue of plastic pollution in 2022 and 2023 alone (Web Of Science search conducted with "plastic pollution" as the search term on 24.04.24). At the same time, there is a lot of misinformation being spread by stakeholders with special interests, and a need to increase science communication regarding plastic pollution [2].

The aim of this perspectives article is to present the approach taken by the Scientists' Coalition for an Effective Plastics Treaty (hereafter the Scientists' Coalition). As explained below, the Scientists' Coalition is a unique example of how scientists across different disciplines and regions of the world have come together with the common goal to disseminate science to negotiators of the UN plastics treaty, in order to provide the best possible scientific foundation for the negotiations. Within a relatively short period of time, the Scientists' Coalition has obtained a significant status among negotiators and other stakeholders. Since its formation in early 2023, the Scientists' Coalition has been mentioned in more than 50 news articles published by outlets such as The Guardian [23] as well as scientific journals such as Nature [19], and it has provided expert contributions to several webinars hosted by entities such as United Nation Environmental Programme (UNEP) and an alliance of UN member state countries known as the High Ambition Coalition (HAC). The goal of the current article is to explain how the Scientists' Coalition operates, by providing an insight into the dissemination strategy across the different forms of

science-policy communication, thereby allowing these experiences to hopefully aid future science-policy processes and potentially inspire other scientists who wish to work together to provide the best possible science-policy communication.

The need to strengthen the science-policy interface for the prevention and mitigation of plastics pollution was raised more than a decade ago [38], and organizations such as UNEP have mandated scientific reports such as those produced by the Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP), which typically focused on the environmental implications of plastics pollution [16]. The most recent international plastics pollution policy development is the adoption of the United Nations Environmental Assembly (UNEA) Resolution 5/14 “End Plastic Pollution” (UNEA 5/14). Executive Director of UNEP, Inger Anderson, illustrated the level of importance of the Resolution, referring to it as “the most significant environmental multilateral deal since the Paris Agreement” [42].

The mandate for the global plastics treaty [43] was the culmination of negotiations through the previous four UNEAs, starting with the first in Nairobi 23–27 June 2014.

Initially, UNEP’s focus was on marine litter and microplastics as a threat to the marine environment. However, subsequent UNEA sessions (UNEA2 to UNEA5) expanded the scope to include plastic pollution in general, recognizing its presence in all ecosystems. One important outcome of this process was the establishment of a Government and Major Groups and Stakeholder nominated Scientific Advisory Committee on Marine Litter and Microplastics (SAC) to provide input and guidance into the scientific assessment requested by member states in Res. 4/6. SAC produced the scientific report “From Pollution to Solution: A Global Assessment of Marine Litter and Plastic Pollution,” which emphasized the need for urgent action and highlighted the contribution of global market failures. In the most recent resolution, Resolution 5/14, the scope is now “plastic pollution, including in the marine environment, *Recognizing* that plastic pollution includes microplastics and that plastic pollution can only be tackled through a ‘full-life-cycle approach’” (UNEA 5/14). The adoption of the Resolution has initiated an intense policy process to negotiate a global, legally binding plastics treaty before the end of 2024.

The Scientists’ Coalition is one of several entities providing scientific input to the negotiation process. Organizations such as GRID-Arendal (www.grida.no), the Science Advisory Committee [44], and the International Science Council (<https://www.council.science/>) and others all provide equally important input to the process.

Similarly, different stakeholders such as the Business Coalition for an Effective Plastic Treaty (www.businessforplasticstreaty.org/) and NGOs such as Break Free From Plastic (www.breakfreefromplastic.org/) all provide scientific inputs to the negotiations process. Finally, several member states have scientific experts in their delegations, providing valuable scientific insights to shape and support the positions of the negotiators.

The Scientists’ Coalition for an Effective Plastic Treaty

The Scientists’ Coalition originated from an initiative by the Environmental Investigation Agency (EIA) with support from the Centre for International Environmental Law (CIEL) ahead of UNEA 5.2 when they motivated a group of independent scientists to inform policymakers on the science, by publishing a “Scientists’ Declaration on the Need for Governance of Plastics Throughout their Lifecycles”. All members of the Scientists’ Coalition are signatories to this declaration and as of May 2024, the Scientists’ Coalition comprises more than 350 scientists affiliated with independent academic and research institutes from various disciplines and fields of study from over 60 countries. Whereas the Scientists’ Coalition has representation from across the globe, there is by far the highest representation in Western States (WS) (Mainly Western Europe and North America) and relatively few representing Eastern Europe (EE). Upon applying for membership of the coalition, each member provides keywords for their respective expertise. Members typically provide 3–5 keywords, with few registering + 10 areas of expertise. By May 2024 the coalition covered 45 different areas of scientific expertise, bridging Science, Technical Sciences, Social Science, and Humanities, illustrating the range of relevant scientific fields represented by members of the Scientists’ Coalition (Fig. 1).

Scientists applying for membership must first complete a comprehensive declaration of interest and confirm that they are currently actively publishing peer-reviewed research that is relevant for plastic pollution. These applications are carefully reviewed. A Steering Committee leads the coalition with representatives from all UN regions, including Indigenous peoples representation, and it is democratically elected by members by popular vote. Members are organized in working groups focused on priority topics reflecting the multifaceted complexity of the plastic pollution issues (see Fig. 2). The work is supported by a secretariat that regularly reviews members’ disclosure of interest declarations (See <https://ikhapp.org/scientist-about-us/> for a full overview of the organization of the Coalition). As the treaty is expected to be negotiated over five Intergovernmental Negotiating

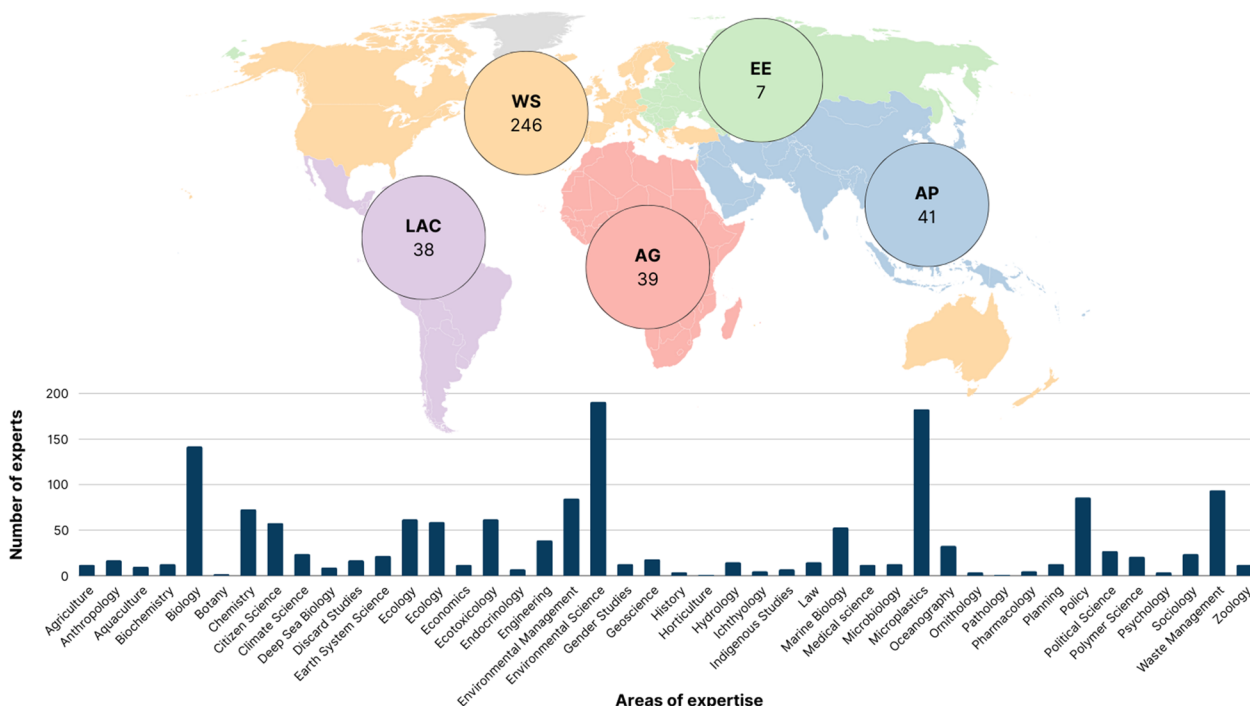


Fig. 1 (top) Distribution of the 371 Scientists' Coalition members (as of May 2024) across the globe and their areas of respective expertise. From left to right, the regions are: LAC: Latin American and Caribbean States, WS: Western States, AG: African group, EE: Eastern European States, and AP: Asia-Pacific States. (Bottom) display of expertise covered by the Scientists' Coalition members. The coalition covers 45 different areas of scientific expertise spanning Science, Technical science, Social science, and Humanities

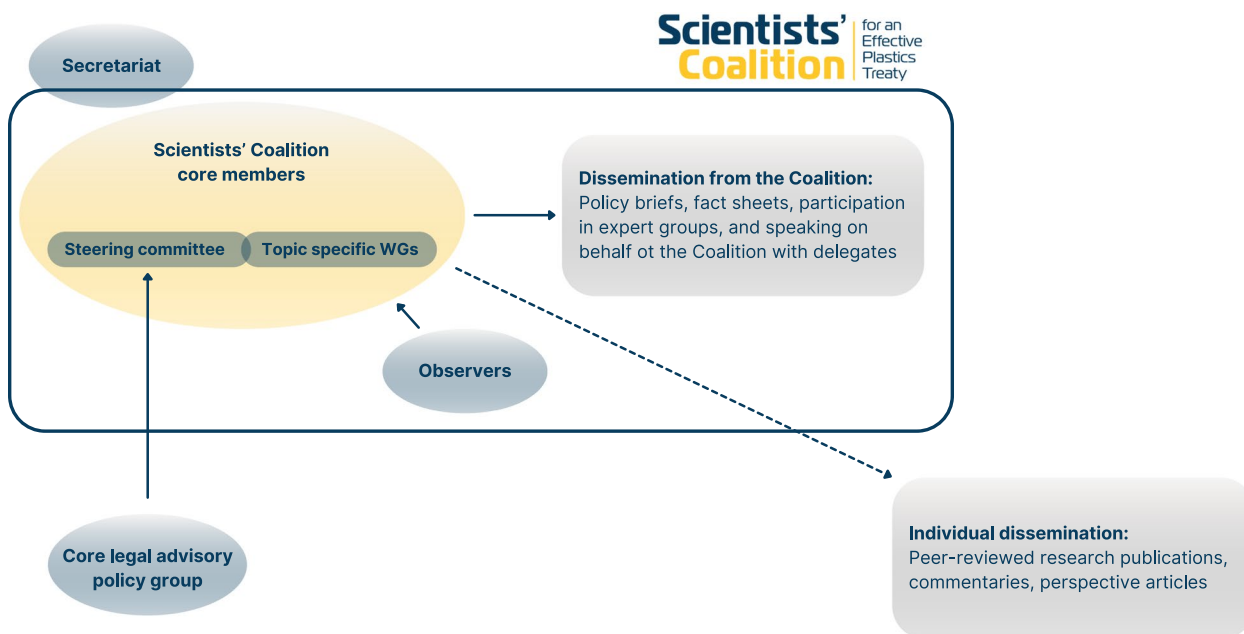


Fig. 2 The Scientists' Coalition is organized into core members and observers, where core members are working in academia or independent research institutes, and observers are scientists working in organizations that may have a potential policy interest. The steering committee and topic specific working groups (WGs) are populated with core members. Observers also participate in the WGs, but all dissemination from the coalition is written and published by core members only. Both core members and observers publish scientific articles with relevance to the treaty negotiations

Committee (INC) sessions, the Scientists' Coalition will remain actively involved in all treaty negotiations, at least until the treaty is ratified and potentially during the implementation phase. However, participation of scientific experts in the implementation phase is still not yet decided.

It is important to have a pragmatic and systematic strategy for dissemination to ensure policy decisions are based on robust independent science [13]. In The Scientists' Coalition, all disseminated material for disseminating is therefore produced in full transparency and by all members that sign up for participation.

This article presents how The Scientists' Coalition works to inform the Treaty negotiation process and reflects on why this strategy has been developed. Being a coalition with a scientifically diverse group that is governed by a democratic bottom-up philosophy, without any official mandate, makes The Scientists' Coalition a rather unique example of how science can inform policy. As such this article both provides insight into the scientific and strategic decisions made to maximize dissemination of the best available science to the negotiators and can further serve as an example for future policy processes, in the lead-up to the establishment of a formal science-policy interface. This ensures the decision-making processes are based on a sufficiently robust foundation.

The Scientists' Coalition operates via several forms of science outputs to achieve comprehensive and accessible dissemination and science-policy communication, and to support synergies across sectors. Outputs are structured into five categories under three overall groups.

Group one:

- (i) peer-reviewed publications,
- (ii) scientific letters and commentaries.

Group two:

- (iii) policy briefs and fact sheets.

Group three:

- (iv) social dissemination including infographics, statements, seminars, conferences, webinars, and workshops, and
- (v) direct engagement at Treaty negotiations.

Group one publications are compiled by members of the Scientists' Coalition with relevance for the Treaty but are not published in the name of the Scientists' Coalition. Group two outputs are developed by the Scientists' Coalition and published as such (Fig. 2). Outputs under group one undergoes classic peer-review ensuring the scientific quality is solid. Since outputs under group two are published by the Scientists' Coalition itself, there

is no external peer-review process to ensure scientific quality. The Scientists' Coalition has therefore adopted a rigorous internal peer-review process which is meant to ensure that the scientific quality of the outputs is of the same quality as traditional peer-reviewed publications, including that the outputs are based on the best available science and not just publications by its members. The procedure to ensure this is as follows: The outputs are produced in the relevant working groups, by authors consisting of core members. Upon finalization, they are first reviewed by the secretariat and the steering committee. Once this initial review is finalized, at least five members of the Scientists' Coalition who were not part of the writing group review the output, and finally the output is distributed broadly within the coalition for comments. All comments are then transparently addressed by the working group, prior to finalization. A last review by members of the steering committee completes the process. When approval is granted, outputs are published. Dissemination activities under group three aim to ensure that the scientific work conducted and summarized by the Scientists' Coalition has optimal conditions for reaching negotiators and relevant stakeholders. This includes infographics to highlight main messages in e.g. policy briefs and scientific publications and are peer-reviewed by the steering committee and relevant working groups. Similarly, any oral communication in webinars and workshops undergo rigorous assessment by relevant coalition members and the steering committee.

Peer-reviewed publications

Prior to 2018, there were relatively few articles published each year on the need for global plastic regulation, followed by a noticeable increase in recent years. The contribution of the Scientists' Coalition members to these articles is significant and falls into two categories: i) publications that provide solid background scientific knowledge based on descriptive studies, experiments, hypothesis testing, and/or other empirical evidence, and ii) publications related to the Treaty negotiations. The first category includes the following examples: Persson et al. [34] addressing the trespassing of the planetary boundary for novel entities including plastics and Völker et al. [52] assessing problematic chemicals for human health in plastic products. While these papers do not explicitly reference the Treaty negotiations, they provide important scientific findings on relevant topics that can be utilized in scientific communication through policy briefs and direct interactions with negotiators and other policymakers (see below).

The second category consists of research papers related to the negotiations, including the following examples: Oturai et al. [31] exploring the use of citizen science as

a means for the inclusion of citizens in the negotiation process, Trasande et al. [40] assessing disease burden and cost related to plastic chemicals and the need for the Treaty to account for these, and Aanesen et al. [1] focuses on key scientific insights to promote solution-oriented research to support the Treaty negotiations.

Peer-reviewed papers primarily target the scientific community and only secondarily focus on negotiators and other stakeholders (e.g. industry and civil society organizations). We acknowledge that while critically reviewing studies prior to publication is fundamental to scientific progress [3], the process has also been criticized for generating and maintaining a neo-colonial bias that favors research from the Global North [26]. In addition, the use of scientific jargon and barriers to access including high publication costs can perpetuate the siloing and impede the right to knowledge and access to information in scientific publications. Despite such critique, peer-reviewed science is still seen as the best foundation for ensuring that policy is informed and based on the best available science [25]. Therefore, while policymakers are not strictly speaking the intended target audience of the peer-reviewed papers authored by Scientists' Coalition members, the knowledge disseminated in these academic publications forms the cornerstone of the Treaty's informal science-policy interface.

Scientific letters, invited perspectives and communications

In addition to peer-reviewed publications, members of the Scientists' Coalition publish evidence-based reflections and papers about specific areas of scientific controversy and uncertainty identified in the negotiation process. Such publications are scientific 'letters' or 'correspondences', 'communications', and 'invited perspectives'. These may be written by individual members or on behalf of the position of the Scientists' Coalition with the approval of the coalition's steering committee. For example, 'Letters' in the journal *Science* consist of a few hundred words and highlight a specific area that deserves scientific awareness. While this form of scientific communication can be peer-reviewed, this task often falls to journal editors. These publications can maximize outreach and readership, including to negotiators, largely due to their brevity and writing style being intended for a broader audience. Examples of published scientific letters are Bergmann et al.'s [6] arguments that the Treaty must cap global production of plastics and Wysocki et al.'s [53] urge that ecosystems should take center stage in treaty negotiations. Equally, short disseminations named 'correspondence' serve a similar purpose in the journal *Nature* and examples include Thompson et al.'s [39] insistence that the Treaty negotiations must be

informed by science. A similar, but somewhat more comprehensive form of disseminations are 'communications' which are typically 1000–1500 words and intended to highlight certain areas of scientific concern and topicality. Examples include Bergmann et al.'s [7] caution about the risks and limitations of plastic removal technologies and Villarrubia-Gómez et al. [50] call for a global systems approach to the social and ecological challenges posed by plastics pollution. 'Invited perspectives' present a new viewpoint on generally accepted scientific perspectives, such as Fernandez & Trasande's [11] approach to chemicals and health as a key Treaty objective. These publications are more specifically situated within the discussions regarding the Treaty negotiations than the peer-reviewed papers described above. As such, they are intended to directly inform the decision-making process and focus on the science-policy interface relevant to Treaty negotiations rather than providing new scientific insights in themselves.

Policy briefs and fact sheets

A third form of communication used by The Scientists' Coalition are policy briefs and fact sheets. Unlike peer-reviewed publications and scientific letters and communications, policy briefs and fact sheets are published by the coalition in Zenodo. Policy briefs are an effective tool to communicate the relevant science to a non-specialized audience such as policymakers [4]. The policy briefs and fact sheets are directly targeted to Treaty negotiators, but they can also be used to inform other Treaty stakeholders such as industry and civil society organizations, journalists, and via social media (s. below) a broader public. They are designed to present a specific scientific topic in an easy-to-read format for non-experts in plain and understandable language.

Policy briefs from the Scientists' Coalition are generally two- to three-pagers produced by working groups and are internally reviewed by multiple members and approved by the Scientists' Coalition's steering committee prior to publication. Examples of policy brief topics are "*Waste Management*", "*Just Transition*" and "*Chemicals and Polymers of Concern*". Fact sheets are authored and reviewed similarly to the policy briefs but differ in that they summarize relevant scientific facts rather than providing policy relevant explanatory text. Some examples of fact sheets are "*Plastics 101*" and "*Plastic Alternatives and Substitutes*" (see the Scientists' Coalition website for a full list of policy briefs and fact sheets <https://ikhapp.org/materials/>).

Importantly, the Scientists' Coalition ensures that the policy briefs and fact sheets are publicly available, translated into several (ideally all) UN languages, and often include infographics to enhance accessibility to the key

messages. Policy briefs can have the most significant impact if they are disseminated during the policy formation process rather than after policy decisions have been made [4]. This is supported by [21], who found that policy briefs could help readers form an opinion but had no documented effect on changing readers' prior beliefs. To maximize the reach and impact, the Scientists' Coalition's fact sheets and policy briefs are also printed and distributed at face-to-face meetings with negotiators and other stakeholders during INCs to support capacity building. The credibility of the authors of policy briefs is an important factor that policymakers take into account when using policy briefs [4]. For this reason, the Scientists' Coalition has changed its policy from the first beginnings in 2023, and now only core members actively contribute to the drafting of policy briefs and fact sheets.

Dissemination through mass media, social media, and webinars

While the above modes of science communication are primarily written, dissemination through social media and webinars relies on a combination of oral, visual, and written engagements. Dissemination through the mass media is mainly done either by talking informally to journalists, about the best available science, or by participating in interviews that form the basis of articles. Working with journalists is important, given the public misconceptions surrounding plastic pollution [51]. Additionally, several members have authored publications in popular media summarizing scientific findings relevant to the Treaty negotiations [12, 30]. Media coverage has a high potential to influence both public opinion and policymakers, and the role of the media in the science-policy nexus is thus very important. Examples of media drawing on Scientists' Coalition members are Bruggers [8] citing the Scientists' Coalition on the need for a conflict-of-interest policy, and Rice [37] drawing upon Scientists' Coalition members regarding implications of focusing measures downstream in ocean clean-up activities.

The Scientists' Coalition aims to maximize its reach through a proactive and coordinated social media strategy. Such strategies can make a fundamental difference in engagement at the science-policy interface [17]. Historically, the main interest of the mass media has been focused on medicine and health, which implies that a broad outreach strategy can be vital for sufficient dissemination of a topic which is more focused around environmental pollution [24]. To this end, the Scientists' Coalition has a dedicated communications team, responsible for generating and uploading news and references to the Coalition's work on social media. The Scientists' Coalition participates in webinars and panels organized by relevant stakeholders such as UNEP (UNEP [46]),

member states (Nordic [27]), and civil society organizations. Finally, the treaty process is also channeled back to society through engagement via social and mass media in interviews, press conferences, and press releases.

Direct engagement at UN negotiations

The final form of science-policy dissemination used by the Scientists' Coalition is centered on the sessions of the Intergovernmental Negotiating Committee (INCs), where the text of the Treaty is negotiated. Interactions with delegates at the INCs fall into six categories: i) formal meetings, including national consultations and regional group meetings, before, and during the INCs sessions, ii) interventions during plenary and contact group discussions, iii) informal meetings with delegates and stakeholders such as industry, civil society organizations and the Indigenous People's Caucus participating in the INCs, iv) active participation in formal and informal side events during the INCs, e.g., as panelists in side-events from civil society organizations on a specific topic like fishing gear or informal side-events like the ask-a-scientist events during several INCs, v) submissions of verbal and written multistakeholder statements for publication on the UNEP INC website, and vi) contributions to events on the ground directly preceding the commencement of INCs.

Intergovernmental negotiations are typically lobbied by different advocacy coalitions [14], and the INC sessions are no exception. An analysis published by the Center for International Environmental Law (CIEL) on the representation of observers at the Nairobi, Kenya negotiations in November 2023 (INC-3), documented that 143 lobbyists from the fossil fuel and chemical industries participated in the negotiations, a 36% increase from the INC-2 in Paris early that year [10]. Many member states can only send small delegations consisting of 1–4 negotiators, who often lack sufficient understanding and/or knowledge of the relevant science required to make informed decisions in the Treaty negotiations. The Coalition plays an important role as a group of knowledge brokers, ensuring that negotiations are based on the best available science, free from conflicts of interest.

Reflections and conclusions

The science-policy interface has been described as a discursive struggle, in which advocacy coalitions with opposing policy agendas draw upon science in their arguments [20]. In such a context, the Scientists' Coalition can play a central role as an honest knowledge broker, informing the policy process of the best available science. This requires that stakeholders (primarily negotiators) continue to trust the Scientists' Coalition to be independent and without Conflicts of Interest (CoI). For this

reason, all Scientists' Coalition members are required sign a Declaration of Conflict of Interest (<https://ikhapp.org/scientist-membership/>). Similarly, organizations such as the UN and OECD have advocated for strong CoI policies in policy development, due to historical cases of industries with vested interests working strategically to reduce the specific impacts of regulations [5, 28, 33, 48]. On the other hand, it is also obvious that important scientific contributions are made by industry-funded research projects. This implies that a case-by-case judgment of individual researchers' work would be needed to assess whether vested interests impact scientific outcomes. The Scientists' Coalition does not wish to be this judgmental regarding colleagues' work. It is in this light that the strict CoI policies should be seen. They are a precautionary measure to ensure that negotiators can trust that the scientific disseminations from the Scientists' Coalition are free of vested interests. In this way, The Scientists' Coalition plays an important role, together with all the other stakeholders which draw upon science in their inputs to the negotiation process.

Scientists' Coalition members have seen a significant increase in attendance at the INCs. In the first session of the Treaty, only 5 core members traveled to Punta del Este, Uruguay, with around another dozen participating remotely. This steadily increased with more than 40 core members attending in person at the negotiations in Ottawa, Canada, and a few dozen additional members providing support remotely. The Scientists' Coalition differs from formal science-policy interfaces and science-policy panels in that it is independent of UN member states, which typically appoint members to official advisory mechanisms. As such, the coalition has a broader and larger membership than the aforementioned mechanisms (Fig. 1), but at the same time, it operates in an informal manner with no official mandate. Whether this is a strength, or a weakness is a matter of debate. While this setup provides complete freedom for the Scientists' Coalition to synthesize and communicate the scientific information that is deemed most important by its members, the actual impact relies solely on negotiators' willingness to account for it. The decisions on areas for intersessional work between INC-4 and INC-5 provide an illustrative case in this context. Negotiators' agreement on a mandate for working groups on central topics between the rounds of negotiations (intersessional work) was one of the main goals for INC-3 [45], but a mandate was not agreed upon at INC-3. This created high pressure to reach an agreement on intersessional work during INC-4. The Scientists' Coalition provided scientific input concerning central topics for intersessional work during INC-4, including on areas such as products and

chemicals of concern in plastic and reduction of primary polymer production (PPP) (see Response to Zero Draft for details at <https://ikhapp.org/material/response-to-the-revised-zero-draft/>). From the perspective of the Scientists' Coalition, the most important topic for intersessional work would be identifying a pathway towards the reduction of PPP, followed by the development of criteria for identifying chemicals and polymers of concern. The INC-4 ended with the adoption of a a mandate for intersessional work on products and chemicals of concern but not on the reduction of PPP [46]. Would the scientific advice of the Scientists' Coalition have had a greater impact if it came from an official body, such as a Science Policy Panel (SPP)? Perhaps, but it is important to recognize that the topic of reducing PPP is controversial among certain member states [15].

Whether the Scientists' Coalition will continue to exist after the conclusion of the treaty negotiations has not yet been decided. The negotiators' appreciation of the Scientists' Coalition's contributions is reflected in the high number of requests from Member State delegates to meet with Scientists' Coalition members at INCs and in conversations at the negotiations. But also, and more convincingly, by the fact that both UN Member States and other stakeholders continue to invite Scientists' Coalition members to review technical and scientific reports, to share expert input in webinars, and to offer reflections on key scientific issues relevant to the policy process. It is therefore likely that the Scientists' Coalition will continue in one form or another to provide scientific input to the policymaking process, dependent on future funding for the secretariat and whether a dedicated Science Policy Interface (SPI) within the new legal instrument will be adopted. If the latter is the case, it will be the ambition of the Scientists' Coalition to work together with such an SPI to ensure that future plastic pollution policies are guided by the best available science – in a pragmatic, transparent and independent way.

Abbreviations

CIEL	Centre for International Environmental Law
EIA	Environmental Investigation Agency
GESAMP	Group of Experts on the Scientific Aspects of Marine Environmental Protection
HAC	High ambition coalition
INC	Intergovernmental Negotiating Committee
The Scientists' Coalition	Scientists' Coalition for an Effective Plastics Treaty
UN	United Nations
UNEA	United Nations Environmental Assembly
UNEP	United Nation Environmental Programme
WG	Working group

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References

- Aanesen M, Ahi JC, Abate TG, de Khan FR, Vries FP, Kite-Powell H, Beaumont NJ. Insights from international environmental legislation and protocols for the global plastic treaty. *Sci Rep*. 2024;14:2750. <https://doi.org/10.1038/s41598-024-53099-9>.
- Agnew S, Kopke K, Dozier A, Power OP, Fitzgerald E, Mateos-Cárdenas A, Regali F. Science communication of marine plastic pollution. JPI Oceans-funded RESPONSE project; 2023. <https://doi.org/10.13140/RG.2.2.15212.33928>.
- Alberts B, Hanson B, Kelner KL. Reviewing peer review. *Science*. 2008;321:15–15. <https://doi.org/10.1126/science.1162115>.
- Arnautu D, Dagenais C. Use and effectiveness of policy briefs as a knowledge transfer tool: a scoping review. *Humanit Soc Sci Commun*. 2021;8:211. <https://doi.org/10.1057/s41599-021-00885-9>.
- Bhatta DN and Adhikari R. Conflict of interest and tobacco control: why does it matter? *Tob Prev Cessat*. 2022. <https://doi.org/10.18332/tpc/146893>.
- Bergmann M, Almroth BC, Brander SM, Dey T, Green DS, Gundogdu S, Krieger A, Wagner M, Walker TR. Global plastic treaty must cap production. *Science*. 2022;376:469–70. <https://doi.org/10.1126/science.abq0082>.
- Bergmann M, Arp HPH, Almroth BC, Cowger W, Eriksen M, Dey T, Gündoğdu S, Helm RR, Krieger A, Syberg K, Tekman MB, Thompson RC, Villarrubia-Gómez P, Warrier AK, Farrelly T. Moving from symptom management to upstream plastics prevention: the fallacy of plastic cleanup technology. *One Earth*. 2023;6(11):1439–42. <https://doi.org/10.1016/j.oneear.2023.10.022>.
- Bruggers J. Fossil fuel lobbyists flock to plastics treaty talks as scientists, environmentalists seek conflict of interest policies. *Inside climate News*; 2023. <https://insideclimatenews.org/news/19112023/nairobi-plastics-treaty-talks-fossil-fuel-lobbyist-influence-conflicts-of-interest/>.
- Chapman A, Wyndham J. A human right to science. *Science*. 2013;340(6138):1291. <https://www.science.org/doi/abs/10.1126/science.1233319>.
- CIEL. Fossil fuel and chemical industries registered more lobbyists at plastics treaty talks than 70 countries combined. 2023. <https://www.ciel.org/news/fossil-fuel-and-chemical-industries-at-inc-3/>.
- Fernandez M, Trasande L. The global plastics treaty: an endocrinologist's assessment. *J Endocr Soc*. 2024;8:1. <https://doi.org/10.1210/endo/bvad141>.
- Farrelly T. We need a legally binding treaty to make plastic pollution history. *The Conversation*; 2019. <https://theconversation.com/we-need-a-legally-binding-treaty-to-make-plastic-pollution-history-113351>.
- Fisher JRB, Wood SA, Bradford MA, Kelsey TR. Improving scientific impact: how to practice science that influences environmental policy and management. *Conserv Sci Pract*. 2020. <https://doi.org/10.1111/csp2.210>.
- Gabehart KM, Nam A, Weible CM. Lessons from the Advocacy Coalition Framework for climate change policy and politics. *Clim Action*. 2022;1:13. <https://doi.org/10.1007/s44168-022-00014-5>.
- García. A global plastics treaty to "change humanity's relationship with the planet". 2023. <https://www.maastrichtuniversity.nl/blog/2023/11/global-plastics-treaty-%E2%80%9Cchange-humanity%E2%80%99s-relationship-planet>.
- GESAMP. Sources, fate and effects of microplastics in the marine environment: a global assessment. In: Kershaw PJ, editor. IMO/FAO/UNESCO-IOC/UNIDO/WMO/IAEA/UN/UNEP/UNDP Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection. Rep. Stud. GESAMP No. 90, 2015. p. 96.
- Hetherington ED, Phillips AA. A scientist's guide for engaging in policy in the United States *Front Mar Sci Sec Marine Affairs Policy*. 2020;7. <https://doi.org/10.3389/fmars.2020.00409>.
- Ishmael-Perkins N, Raman S, Metcalfe J, Strudwicke I, Gascoigne T, Leach J. The contextualization deficit: reframing trust in science for multilateral policy. *The Centre for Science Futures, Paris*; 2023. <https://doi.org/10.24948/2023.10>.
- Jones N. Progress on plastic pollution treaty too slow, scientists say. *Nature NEWS*; 2023. <https://doi.org/10.1038/d41586-023-03579-1>.
- Kukkonen A, Ylä-Anttila T. The science-policy interface as a discourse network: Finland's climate change policy 2002–2015. *Polit Govern*. 2020;8(2):200–14. <https://doi.org/10.17645/pag.v8i2.2603>.
- Masset E, Gaarder M, Beynon P, Chapoy C. What is the impact of a policy brief? Results of an experiment in research dissemination. *J Dev Effect*. 2013;5(1):50–63. <https://doi.org/10.1080/19439342.2012.759257>.
- McDonagh M. The right to information in international human rights law. *Hum Rights Law Rev*. 2013;13(1):25–55.
- McVeigh. Developing country voices will be excluded at UN plastic talks, say NGOs. *The Guardian*; 2023. https://www.theguardian.com/environment/2023/may/18/scientists-say-they-have-been-locked-out-of-the-room-at-unep-talks-on-plastic-waste?CMP=share_btn_url.
- Mea M, Newton A, Uyarra MC, Alonso C, Borja A. From science to policy and society: enhancing the effectiveness of communication. *Front. Mar. Sci*, 14 Sec. Marine Ecosyst Ecol. 2016;3. <https://doi.org/10.3389/fmars.2016.00168>.
- Moghissi AA, Swetnam MS. The role of peer review in policy decisions. *Technol Innov*. 2010;12(3):203–211. <https://doi.org/10.3727/194982410X12895770314032>.
- Nakamura G, Soares BE, Pillar VD, Alexandre J, Diniz-Filho F, Duarte L. Three pathways to better recognize the expertise of Global South researchers. *NPJ Biodivers*. 2023;2:17. <https://doi.org/10.1038/s44185-023-00021-7>.
- Nordic Council. Nordic stakeholder webinar on a global plastics treaty. 2023. <https://www.norden.org/en/event/nordic-stakeholder-webinar-global-plastics-treaty>.
- OECD. Managing conflict of interest in the public service. OECD guidelines and country experiences. 2023. <https://web.archive.oecd.org/2012-06-14/90678-48994419.pdf>.
- OECD. Plastic pollution is growing relentlessly as waste management and recycling fall short, says OECD. 2022. <https://www.oecd.org/environment/plastic-pollution-is-growing-relentlessly-as-waste-management-and-recycling-fall-short.htm>.
- O'Hare P, Fernandez L. Waste pickers risk their lives to stop plastic pollution – now they could help shape global recycling policies. *The Conversation*; 2022. <https://theconversation.com/waste-pickers-risk-their-lives-to-stop-plastic-pollution-now-they-could-help-shape-global-recycling-policies-195311>.
- Oturai NG, Syberg K, Fraisl D, Hooge A, Ramos TM, Schade S, Hansen SF. UN plastic treaty must mind the people: Citizen science can assist citizen involvement in plastic policymaking. *One Earth*. 2023;6(6):715–24. <https://doi.org/10.1016/j.oneear.2023.05.017>.

32. Parkhurst J. The Politics of Evidence From evidence-based policy to the good governance of evidence. 2017. Routledge. ISBN 9781138570382.
33. Pedroza-Tobias A, Crosbie E, Mialon M, Carriedo A, Schmidt LA. Food and beverage industry interference in science and policy: efforts to block soda tax implementation in Mexico and prevent international diffusion. *BMJ Glob Health*. 2021;6:8. <http://gh.bmj.com/content/6/8/e005662.abstr.act>.
34. Persson L, Almroth BC, Collins CD, Cornell S, de Wit CA, Diamond ML, Fantke P, Hassellöv M, MacLeod M, Ryberg MW, Jørgensen PS, Villarrubia-Gómez P, Wang Z, Hauschild MZ. Outside the safe operating space of the planetary boundary for novel entities. *Environ Sci Technol*. 2022;56(3):1510–21. <https://doi.org/10.1021/acs.est.1c04158>.
35. Pohl P. From science to policy through transdisciplinary research. *Environ Sci Policy*. 2008;11(1):46–53. <https://doi.org/10.1016/j.envsci.2007.06.001>.
36. Reyes-Galindo. Post-truth and science. Looking beyond the Global North. In: *Global epistemologies and philosophies of science*. 1st ed. Routledge; 2021. ISBN97811003027140.
37. Rice D. Should we clean up the trash in our oceans? New study has a controversial answer. *USA Today*; 2023. <https://eu.usatoday.com/story/news/nation/2023/11/09/ocean-pollution-plastic-cleanup-study/71494767007/>.
38. Shaxson L. Structuring policy problems for plastics, the environment and human health: reflections from the UK. *Phil Trans R Soc*. 2009;B364:2141–51. <https://doi.org/10.1098/rstb.2008.0283>.
39. Thompson RC, Pahl S, Sembiring E. Plastics treaty — research must inform action. *Nature*. 2022;608:472. <https://doi.org/10.1038/d41586-022-02201-0>.
40. Trasande L, Krithivasan R, Park K, Obsekov V, Belliveau M. Chemicals used in plastic materials: an estimate of the attributable disease burden and costs in the United States. *J Endocr Soc*. 2024;8:2. <https://doi.org/10.1210/jeandso/bvad163>.
41. Turk. Protect the 'right to science' for people and the planet. *Nature* 2023;6(2023)23:9. <https://doi.org/10.1038/d41586-023-03332-8>.
42. UN. Nations sign up to end global scourge of plastic pollution. 2022. <https://www.un.org/en/delegate/nations-sign-end-global-scourge-plastic-pollution>.
43. UNEA 5/14. UNEA Resolution 5/14 entitled "End plastic pollution: towards an international legally binding instrument". United Nations Environment Assembly of the United Nations Environment Programme Fifth session Nairobi (hybrid), 22 and 23 February 2021 and 28 February–2 March 2022. 2022.
44. UNEP. Progress on the draft assessment on sources, pathways, and hazards of litter including plastic litter and microplastics pollution Note by the Secretariat. 2020. https://apps1.unep.org/resolutions/uploads/unep_aheg_4_inf_3.pdf.
45. UNEP. Report of the intergovernmental negotiating committee to develop an international legally binding instrument on plastic pollution, including in the marine environment, on the work of its third session. 2023. <https://wedocs.unep.org/bitstream/handle/20.500.11822/44760/INC3ReportE.pdf>.
46. UNEP FI. Onboarding finance to beat plastic pollution. Webinar 28 February 2024. 2024. <https://www.unepfi.org/events/onboarding-finance-to-beat-plastic-pollution/>.
47. UN General Assembly. Right to science in the context of toxic substances Report of the Special Rapporteur on the implications for human rights of the environmentally sound management and disposal of hazardous substances and wastes, Marcos Orellana. 2021. <https://undocs.org/Home/Mobile?FinalSymbol=A%2FHRC%2F48%2F61&Language=E&DeviceType=Desktop&LangRequested=False>.
48. UN General Assembly. Corporate influence in the political and regulatory sphere: ensuring business practice in line with the guiding principles on business and human rights. Note by the Secretary-General. 2022. <https://undocs.org/Home/Mobile?FinalSymbol=A%2F77%2F201&Language=E&DeviceType=Desktop&LangRequested=False>.
49. Van den Hove S. A rationale for science–policy interfaces. *Futures*. 2007;39(7):807–26. <https://doi.org/10.1016/j.futures.2006.12.004>.
50. Villarrubia-Gómez P, Carney Almroth B, Cornell SE. Re-framing plastics pollution to include social, ecological and policy perspectives. *Nat Rev Earth Environ*. 2022;3:724–5. <https://doi.org/10.1038/s43017-022-00359-9>.
51. Vince J. A creeping crisis when an urgent crisis arises: the reprioritization of plastic pollution issues during COVID-19. *Politics Policy*. 2022. <https://doi.org/10.1111/polp.12512>.
52. Völker J, Ashcroft F, Vedøy Å, Zimmermann L, Wagner M. Adipogenic activity of chemicals used in plastic consumer products. *Environ Sci Technol*. 2022;56(4):2487–96. <https://doi.org/10.1021/acs.est.1c06316>.
53. Wysocki ITW, Wang M, Morales-Caselles C, Woodall LC, Syberg K, Almroth BC, Fernandez M, Monclus L, Wilson SP, Warren M, Knoblauch D, Helm RR. Plastics treaty text must center ecosystems. *Science*. 2023;382:525–6. <https://doi.org/10.1126/science.adl3202>.

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