

Section Four: The Five Legacy Papers

UNEP, science and the environment – a necessary partnership to save the planet

Authors:

Raymond Saner
Lichia Yiu

You are reading one of the five Legacy Papers, which is an integral element of the 2022 Commemorative Report called “**The People’s Environment Narrative**” celebrating 50 years of work between civil society and UNEP to safeguard the environment. The themes of the five Legacy Papers are: Environmental rights and justice; the Conventions and the MEAs; Environmental multilateralism; Education and the environment; Science and the environment.

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https://drive.google.com/file/d/14Py7VIPUI_B2j79ZBpJPAZVy5PCs6w2q/view



Patricia Espinosa, Executive Secretary UNFCCC © IISD / ENB / Kiara Worth

UNEP, science and the environment – a necessary partnership to save the planet

by Professor Raymond Saner & Lichia Yiu

Abstract

This chapter provides an assessment of the current relation, interaction and importance of Science for the UN Environment Programme, UNEP, as a key enabler of its mandate to catalyze environmental policies, strategies and actions for the benefit of world citizens and the planet. UNEP's mission (2013) ¹states

The United Nations Environment Programme (UNEP) is the leading environmental authority in the United Nations system. UNEP uses its expertise to strengthen environmental standards and practices while helping implement environmental obligations at the country, regional and global levels. UNEP's mission is to provide leadership and encourage partnership in caring for the environment by inspiring, informing, and enabling nations and peoples to improve their quality of life without compromising that of future generations.

The mission statement lists six strategic areas of concentration namely 1. Climate Change, 2. Post-Conflict and Disaster Management, 3. Ecosystem Management, 4. Environmental Governance 5. Harmful Substances and 6. Resource Efficiency/Sustainable consumption and production. The strategic areas 3, 4 and 6 make reference to sustainable development and 6 states explicitly "sustainable consumption and production" which fits with the SDG 12 of the 2030 Agenda. UNEP's is the leading environment organization in the UN system.

¹ <https://www.un.org/youthenvoy/2013/08/unep-united-nations-environment-programme/>

Scope of this chapter

This review is based on semi-structured qualitative interviews with renowned international experts about their views on UNEP's role and contributions to the international multilateral environmental system and on the emerging challenges and needs of knowledge production through science. Highlights will be given to exemplify the impact of proposed policy choices, the monitoring mechanisms created to track scientific knowledge - how it got translated and popularized - since UNEP's inception in 1972. Observations made by these experts on UNEP's challenges and shortfalls will also be reported.

The authors conclude with recommendations on how UNEP could strengthen its science-policy-society interface and strengthen its role as key international advocate and custodian of sustained environmental development through effective science-policy-society dialogue and mutual learning.

Objective of this Chapter

This book chapter is part of the legacy book which was conceived to commemorate UNEP's 50-year anniversary. The idea of the book came about as a follow up to the conference on Stockholm +50 of 2022 which was organized to recall the 50 years since the UN Conference on the Human Environment and its outcome documents. The book concept was developed by the Stockholm+50 Consortium consisting of the Stakeholder Forum for a Sustainable Future (NL) and the forum for Environment and Development (N). Input to the project was also provided by various Major Groups accredited to UNEP including NGOs and stakeholders from the 6 UNEP regions.

UNEP has since its inception worked on many different aspects of the environment and issues strongly related to the environment. The five Legacy Themes, which are presented in this

section of the People's Environment Narrative, could be understood as five dominant themes for UNEP as they have followed UNEP since its inception. This chapter has the following approach to one of these 'Legacy Themes'. Science has always been an integral element of UNEP's work and science was used as one of the convincing arguments to carry out the 1972 UN Conference on the Human Environment. When the conference opened in 1972, 80 countries had provided their first environmental assessments. This was also a first in international contexts. Since then, such assessments have developed in quality and depth, providing the world with detailed, in-depth analysis and assessment of the environment on a national, regional and global level.

UNEP has its own scientific staff and chief scientists and in addition contracts well known researchers and scientists to provide reports on key issues, often in connection with UNEP's work programme and UNEA's five-year work plans – the Medium-Term Strategies.

UNEP's environmental assessment and environmental research have often identified emerging issues, which subsequently have found their ways into resolutions or work-programmes. Today these findings are also published in UNEP's many flagship reports, of which the Global Environment Outlook, GEO, is a key one.

This chapter of the Legacy Themes attempts to map important aspects of UNEP's work on science and research. A more in-depth narration of UNEP's historical engagement of science and research is given in Jan-Gustav's chapter of this report named the People's Environment Narrative, the PEN. The authors of this chapter focus rather on some of the themes and areas of research that relate to society and policy making as conveyed by the experts who shared their views on UNEP's engagement over the years with science, research and policy uptake. Comments will also be shared on some of the

contextual conditions that UNEP finds or found itself in which might have hindered UNEP's fulfilment of its mandate.

The overall objective of this chapter pertains to the question as to what has been researched and what has not been researched – and if not-why? and finally - are scientific methodologies appropriate for the purpose of strengthening UNEP's mandate to safeguard the environmental sustainability? How does science underpin UNEP's work programme and create novel work items?

Journey from 1972 to Today

Over the 50 years of UNEP's existence, the member countries' stance on UNEP's vision and mission has been at times hesitant with wavering commitments to what might be labeled direct environment/nature problems and since 1992, environmentally related sustainable development goals and activities. Member countries seem also reluctant to agree that bold or transformative actions are needed to stop environmental degradation and loss of biodiversity. Equally reluctant, these member states shy away from radical reconfiguration of economic and social-ecological relations to ensure the survival of nature and the human species who is facing life-threatening environmental deterioration. Averting the trend of existing life-style - that has cumulatively resulted in exceeding planetary boundaries of carrying capacity - has been deemed, albeit silently, as politically unpalatable.

Summarizing some of the main points since UNEP's foundation, a few important historical milestones are identifiable. Following up on the United Nations Conference on the Human

Environment, held in Stockholm in 1972, the United Nations Environment Programme (UNEP) was established as the leading UN body in the field of environment. Two considerable steps were taken: one was to locate the newly founded UNEP in Nairobi, a very first in locating an international body in a developing country; the second was to construe that the UNEP is a crosscutting body that oversees the environmental component in all other UN bodies. It is its mandate and public expectation to ensure policy coherence and coordination from an environmental perspective in different sectoral domains and across UN family.

In the post-Stockholm years, increasing concern over continuing environmental degradation led the United Nations General Assembly (UNGA) to convene the World Commission on Environment and Development in 1983. The report of the Commission (the Brundtland Report) was a catalyst for the 1992 UN Conference on Environment and Development (UNCED), also known as the Earth Summit in Rio. Among other outcomes, the Summit adopted Agenda 21, a comprehensive, yet non-binding plan of action for addressing both environment and development goals in the 21st century and the Rio Declaration.² It was also an action agenda for all other multilateral organizations and individual governments around the world that can be implemented at local, national, and global levels.³

The Agenda 21 consisted of a large number of very comprehensive articles (see Figure 1) agreed by the UN member states that covered a broad range of actions intended to ensure sustainable environmental development. Broadly six environmental dimensions were mentioned with water, land, and waste to top the list. It is interesting to note that climate

² EU Commission, (2020) «Environment Issues, International Issues»; https://ec.europa.eu/environment/international_issues/relations_un_en.htm

³ https://en.wikipedia.org/wiki/Agenda_21

change has yet to emerge as a primary concern and threat to mankind at this stage.

(See Figure 1)

However, despite the Rio Declaration and Agenda 21 and major global efforts, the overall environmental conditions at country, region and global levels did not improve sufficiently since then and environmental degradation continues today.

What followed were subsequent international environment agreements and major outcome documents such as the Programme for the Further Implementation of Agenda 21 (1997), Outcomes of the World Summit on Sustainable Development (2002), The Future We Want (2012), The United Nations Conference on Sustainable Development, The 2030 Agenda (2015), the Paris Agreement (2015) and the Addis Ababa Action Agenda on Financing for Development (2015) and several agreements pertaining to the environment as listed below. These international agreements shared a common objective which was to develop global consensus in tackling the worsening environmental crisis that affect the health and wellbeing of the world population and other societal conditions necessary to maintain peace and prosperity. A detailed inventory of international environmental treaties or instruments are presented in Table 2.

These international agreements consisted of articles focusing on improvement of environmental conditions for instance concerning water, waste, biodiversity, land, forests, pollution, ocean acidification etc. but included also other important dimensions of sustainability namely social and economic sustainability. Together, they can serve as a comprehensive

set of pathways and roadmaps to move the world away from pending catastrophic future events should right actions be taken in a timely manner and at extraordinary scale. Scientific knowledge embedded in these international agreements also pointed out the “window” for such transformation to achieve intended outcomes are narrowing.

With the concerted effort since 2000 in achieving MDG 7 “Ensure Environmental Sustainability”, all of these international agreements on the environment and sustainable development created from 1992 to 2015 helped improved the planetary conditions of environmental sustainability and ensured that principles of sustainable development, including the environment were indeed integrated into most nations’ policies and programmes.⁴ Some of these gains in the areas of “reversing the depletion of environmental resources”, a target of MDG 7, have unfortunately seen a regression in recent years due to the prolonged COVID-19 pandemic worldwide.

In view of the focus of this chapter being on the UNEP and its contribution to the science and policy interface on environmental issues, emphasis will be put on whether UNEP was able to draw on scientific knowledge and its convening power to influence the international policy discourse, and whether policy making institutions like governments and influential non-state actor organizations have been adequately informed about the potential impact of environmental risks but also of the potential positive externalities resulting from constructive and sensible environmental policy making.

At the time of the multilateral agreement on “Further Implementation” negotiated in 1997, UN member countries put a strong emphasis

⁴ <https://www.mdgmonitor.org/mdg-7-ensure-environmental-sustainability/>

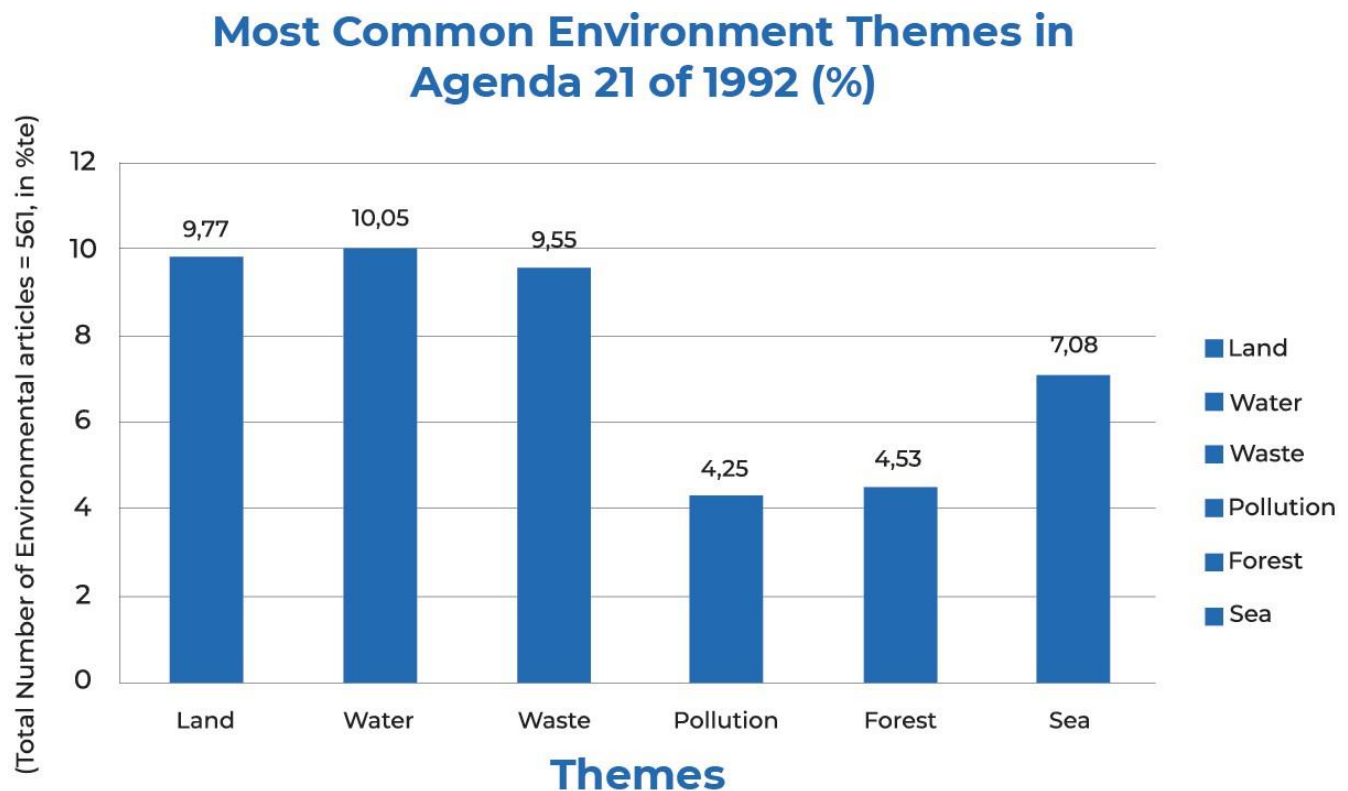
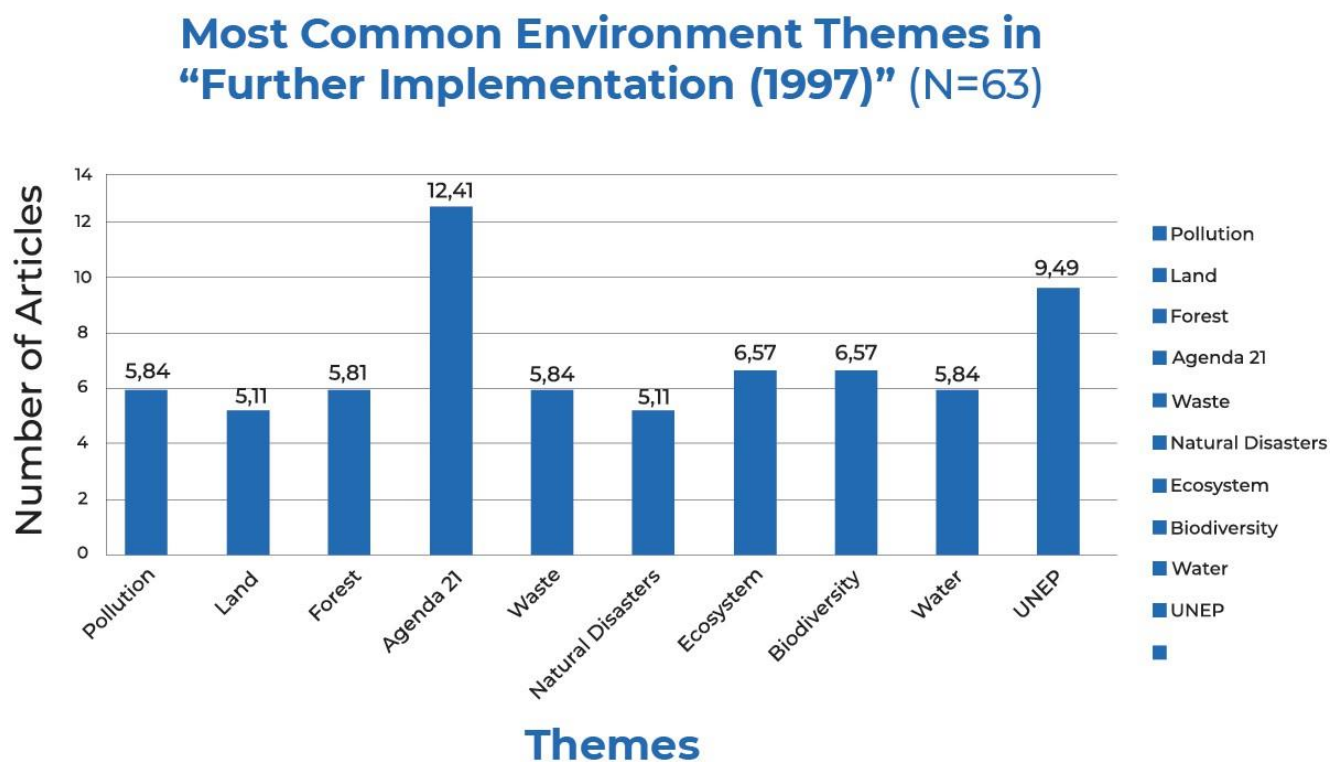


Figure 1 : Most common environmental topics covered in the Agenda 21. (Source: Authors' own elaboration)



(Figure 2: author's contribution)

on environmental issues⁵. Out of a total of 137 articles of the agreement, 63 pertained to environmental issues and UNEP was mentioned in 13 of the 63 articles focusing on environmental sustainability as shown in figure 2 on page 7.

As shown by the high score relating to UNEP, the international community of the 185 UN member countries in 1997⁶ recognized the prominent role of UNEP in implementing the Agenda 21 and in undertaking future actions to alert the world about what it was facing in regard to environmental problems and risks thanks to UNEP's authoritative voice based on scientific knowledge and evidence. As demonstrated by the high reference made to UNEP in the 1997 Agreement, UNEP is expected to initiate actions in favor of environmental sustainability and give policy advice to deal with countries' specific plights.

Over the following 18 years starting from the 1997 agreement "Further Implementation" to the 2030 Agenda signed in 2015, environmental issues re-appeared in the subsequent four agreements but to a much lower degree as indicated by the relatively low number of articles which addressed environmental issues (see figure 3 below). Nevertheless, of the eight Millennium Development Goals (MDGs), MDG 7 was dedicated to the environmental sustainability and to guaranteed access and use of natural resources, such as biodiversity, water and sanitation. By 2015, different target areas of the MDG 7 morphed into five SDGs with dedicated targets.

The relative decline in environment-related articles included in the four post Agenda 21 agreements, except the "Further Implementation"

agreement, is surprising especially amidst the facts that increasing evidence of environmental degradations and creeping rise of global temperature have been reported and discussed widely in the media. It was observed that these six international agreements tend to build on each other, not always in the most straightforward manner, but they constitute a complementary set of agreements documenting the existing knowledge and practices on sustainability development (Saner et al.2019)⁷. Deeper insights into meta-level governance could be obtained by leveraging the established consensus and knowledge through these international agreements by pursuing policy coherence across the whole global system.

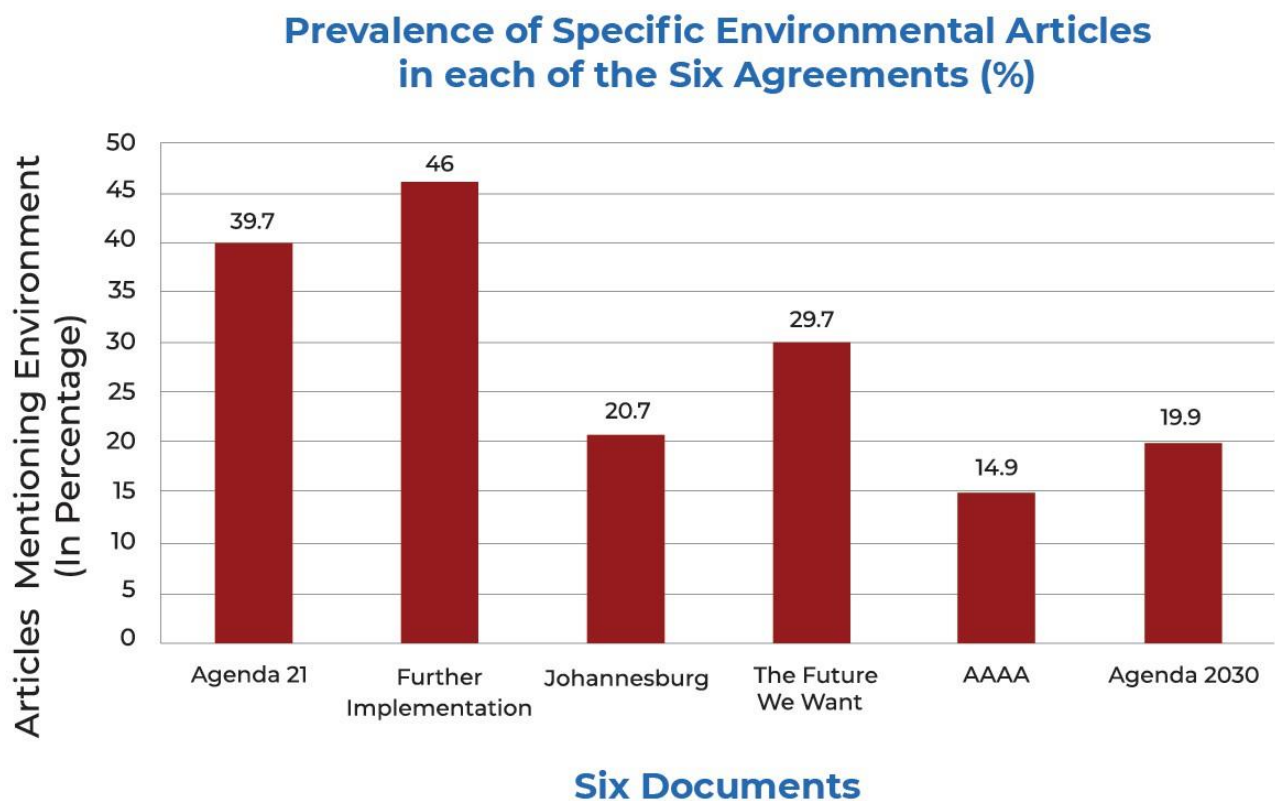
The environmental issues that were part of in these treaties included other environmental topics and not only climate change. This decrease could perhaps be attributed to the fact that the drafters/negotiators of multilateral agreements rotate mid-course and collective commitment to address environmental issues declined or were diluted due to preoccupations with other issues than environmental risks.

It is important to take note of this declining trend. The 2030 Agenda repositioned the importance of the environmental sustainability and allocated five SDGs out of seventeen goals to address different aspects of the ecosystems that affect human and natural survival and point to collective conduct that affect environmental survival. Most importantly, environment has been recognized as being one of the three dimensions of sustainable development which interact with the social-economic dimensions of the global ecosystem giving a boost to the necessity of interdisciplinary and

⁵ P.32, section B on Sectors and issues:https://www.diplomacydialogue.org/images/files/20190209-11625_2019_655_OnlinePDF.pdf

⁶ The current number of UN member states is 193

⁷ http://www.diplomacydialogue.org/images/files/20190209-11625_2019_655_OnlinePDF.pdf



(Figure 3: author's contribution)

transdisciplinary science. Yet, it seems that the sense of urgency felt after the Earth Summit in Rio in 1992 has gradually dissipated from the international community and the public consciousness. Except, of course, on the places on the earth and with the people living there who were gradually experiencing the negative consequences of disasters to nature and the environment.

The decrease could also be related to the disappearance of institutional history and knowledge. The same can be said about international agreements focusing on sustainable development and particularly on environmental sustainability as illustrated by figure 1 to 3. In other words, concern about environmental issues and readiness to commit to corrective poli-

cies and actions seem to have been lost over time and this most likely is also a challenge for UNEP.⁸

Current State of the Environment and Knowledge Gap

In the Preamble of the 2030 Agenda, it clearly states;

“This Agenda is a **plan of action for people, planet and prosperity**. It also seeks to strengthen universal peace in larger freedom. We recognize that eradicating poverty in all its forms and dimensions, including extreme poverty, is the greatest global challenge and an indispensable requirement for sustainable development. All countries and all stakehold-

⁸ Saner, R; Yiu, L; Kingombe, Ch; (2019) “The 2030 Agenda compared with six related international agreements: valuable resources for SDG implementation”; Sustainability Science, Springer, Tokyo.

ers, acting in collaborative partnership, will implement this plan. We are resolved to free the human race from the tyranny of poverty and want and to **heal and secure our planet**. We are determined to take the bold and transformative steps which are urgently needed to **shift the world onto a sustainable and resilient path**. As we embark on this collective journey, we pledge that no one will be left behind. The 17 Sustainable Development Goals and 169 targets which we are announcing today demonstrate the scale and ambition of this new universal Agenda. They seek to build on the Millennium Development Goals and complete what these did not achieve. They seek to realize the human rights of all and to achieve gender equality and the empowerment of all women and girls. They are **integrated and indivisible and balance the three dimensions of sustainable development**: the economic, social and environmental." (A/RES/70/1 - Transforming our world: the 2030 Agenda for Sustainable Development)⁹ (Bold added).

Today, we are entering into the eighth year of implementation since these bold and inspiring words were announced. How far have we come in shifting onto a sustainable and resilient path?

According to the latest Global Sustainable Development Review (GSDR 2019)¹⁰ written by independent scientists, the Goals 12, 13, 14, 15 which are crucial for environmental sustainability are facing a negative long-term trend (p.10). The GSDR authors state that scientific analysis have been made of the environment and nature but there is no evidence that the negative trend has been stopped or, better, re-

versed. Specific mention is made in the GSDR of the following targets: 12.2, 14.1, 14.4., 15.5., 15.7 and Goal 12 in general in regard to Global GHG emissions relative to the Paris targets (see Figure 4). There continues to exist the "knowing to acting" gap signifying low uptake of scientific evidence and policy re-direction.

(See Figure 4)¹¹

There are plenty of studies in the fields of natural science that focus on the targets and goals mentioned above and labelled as being in "long-term negative trend". What appears to be missing is complementary and ideally transdisciplinary social and economic science studies that focus on human behavior and the phenomenon of human resistance to change. Equally missing are additions pertaining to economic cost and benefit analysis of specific policy solutions in many of the developing countries. The affordability argument is genuine and needs to be taken on board through innovation, partnerships and burden sharing. The now emerging discussions concerning natural based solutions and indigenous knowledge might offer alternative and affordable solutions in a timelier manner.

The GSDR 2019 calls for the greater collaboration between non-traditional partners for building on sustainability science and states the following:

"In recent decades, scientists have begun to address the web of challenges facing humanity, with interdisciplinary research focused on coupled human- environment systems or socio-ecological systems. That has given birth

⁹ <https://sdgs.un.org/2030agenda>

¹⁰ GSDR is a quadrennial report and a key instrument of the HLPF to strengthen the science-policy interface and drafted by an independent group of scientists (IGS) supported by a task team of six UN entities (DESA, UNCTAD, UNDP, UNEP, UNESCO and the World Bank) - <https://sdgs.un.org/gsdrgsd2019>

¹¹ https://sdgs.un.org/sites/default/files/2020-07/24797GSDR_report_2019.pdf

Table 1-1
Projected distance from reaching selected targets by 2030 (at current trends)

GOAL	WITHIN 5%	5–10%	>10%	NEGATIVE LONG-TERM TREND
 Goal 1		1.1. Eradicating extreme poverty	1.3. Social protection for all	
 Goal 2		2.1. Ending hunger (undernourishment)	2.2. Ending malnutrition (stunting) 2.5. Maintaining genetic diversity 2.a. Investment in agriculture*	2.2. Ending malnutrition (overweight)
 Goal 3	3.2. Under-5 mortality 3.2. Neonatal mortality		3.1. Maternal mortality 3.4. Premature deaths from non-communicable diseases	
 Goal 4	4.1 Enrolment in primary education	4.6 Literacy among youth and adults	4.2. Early childhood development 4.1 Enrolment in secondary education 4.3 Enrolment in tertiary education	
 Goal 5			5.5. Women political participation	
 Goal 6		6.2. Access to safe sanitation (open defecation practices)	6.1. Access to safely managed drinking water 6.2. Access to safely managed sanitation services	
 Goal 7		7.1. Access to electricity	7.2. Share of renewable energy* 7.3. Energy intensity	
 Goal 8			8.7. Use of child labour	
 Goal 9		9.5. Enhancing scientific research (R&D expenditure)	9.5. Enhancing scientific research (number of researchers)	
 Goal 10			10.c. Remittance costs	Inequality in income*
 Goal 11			11.1. Urban population living in slums*	
 Goal 12				12.2. Absolute material footprint, and DMC*
 Goal 13				Global GHG emissions relative to Paris targets*
 Goal 14				14.1. Continued deterioration of coastal waters* 14.4. Overfishing*
 Goal 15				15.5. Biodiversity loss* 15.7. Wildlife poaching and trafficking*
 Goal 16			16.9 Universal birth registration **	

Negative long-term trends of SDGs for which UNEP is the custodian

Note: Selected indicators only. SDG 17 is not included as it consists of a wide range of indicators that cannot easily be captured using the methodology for assessing distance from reaching targets. Estimates of the distance from the target by 2030 are based on forecasted value of the corresponding indicator in 2030, relative to target. Forecasts based on best-fit trends of individual indicators, given the available data range.

* Quantitative target for 2030 is not specified in the SDG indicator framework; targets are estimated.

** Assessment is based on indicators outside the SDG indicator framework; inequality in income is based on data from household surveys.

(Source: adapted from Global Sustainable Development Report, 2019, P. 10, Table 1-1)

to a new, more engaged academic discipline – sustainability science – that draws on all scientific disciplines, including social sciences and humanities in a problem-solving approach, and seeks to shed light on complex, often contentious and value-laden nature-society interactions, while generating **usable scientific knowledge** for sustainable development.

The four levers of change – governance, economy and finance, individual and collective action, and science and technology – should be coherently deployed and combined to bring about transformational change. All actors should strive for coordinated efforts and prioritize policy coherence and consistency across sectors.

Universities, policymakers and research funders must scale up support to **mission-oriented research**, guided by the 2030 Agenda, in sustainability science and other disciplines, with simultaneous strengthening of the *science-policy-society interface*¹² (GSDR, 2019, p. XXXiii)

a long while, this newly “renovated” mission agenda will need substantive injection of resources and networks to make UNEP effective and successful.

Solidarity is one of the key value propositions of the 2030 agenda and is not a traditional topic for scientific inquiry. UNEP has started to partner with other UN bodies and international actors such as the Major Stakeholder Groups of the HLPF to address the solidarity issue concerning the climate and environmental injustice inflicted on billions of people especially the younger generation, for example “Global Youth for Environment”. These projects could be the stepping-stones for the UNEP in finding new pathways to leverage its scientific knowledge and networks for making the grand coalition work and bring close alignment among science, policy and society together for a sustainable future.

Searching for Collective Narrative regarding UNEP’s Footprints and Contributions in Science and Policy Interface

Research Method Applied

UNEP needs to be the driving force of this «grand coalition» to fathom a new science and research agenda to stimulate greater science uptake into policy and ground level actions. With the stakeholder engagement and solidarity being at different system levels, there will emerge greater opportunities of moving the world onto the right path for a sustainable future.

Such an interpretation of the current environmental challenges goes beyond the initial mandate of UNEP and stretches its institutional ecosystem, process and resources. A related question could also be raised, does its structure remain fit for purpose? While operating creatively with limited resources for

Our research adopted a qualitative interview method and gathered detailed data from the participants in order to delineate the relationship between the UNEP and its constituencies and its contribution to the science-policy-society interface. A set of qualitative interviews were conducted with a select group of experts in a conversation and discussion style over Zoom during a period of three months in 2022. The advantage of using qualitative interviews is the relative absence of research bias due to direct interaction with participants. It also provides flexibility to address emerging subjects during the interview in a non-linear manner. It is also acknowledged that qualita-

¹² https://sdgs.un.org/sites/default/files/2020-07/24797GSDR_report_2019.pdf

Profession	Number	Nationality	Number
Natural Scientists	6	French	1
Lawyer-Diplomat	1	Indian	2
Economist	1	Swiss	2
Social Scientists	2	South African	2
Total	10	USA	1
Affiliation	Number	Swedish	1
Academics	7	Italian	1
NGOs	2	Total	10
Civil Servant	1		
Total	10		

Table 1: Background of interviewees

tive interviews also carry the risk of observer bias. Secondary data obtained through literature search was also used to cross check the findings and conclusions.

References were made to existing literature such as the Global Sustainable Development Review (GSDR) 2019, the Stockholm +50: Unlocking a Better Future Report (2022), GEO 6; Making Peace with nature and Unleashing Science (ISC). Fifteen experts were contacted and ten agreed to be interviewed for this oral "history" analysis. The 10 experts represent diverse stakeholder groups, professional background and nationalities as captured in Table 1.

Table 1: Background of interviewees

Terms and Definition

Science

The role of science in tackling climate change, biodiversity loss and pollution, and preventing other environmental challenges from emerging has been widely accepted in the policy community. Yet what is science? How does it differ from common sense or causal observations?

We structured our review and qualitative interviews with our expert informants along the short definition of science suggested by the University of Berkeley¹³ which states "Science is both a body of knowledge and a process. In school, science may sometimes seem like a collection of isolated and static facts listed in a textbook, but that's only a small part of the story. Just as importantly, science is also a process of discovery that allows us to link isolated facts into coherent and comprehensive understandings of the natural world".

At the same time, we also drew on suggestions provided by the expert-interviewees to bring to the fore the important task of science communication and diplomacy with policy makers and the public at large. Such communication needs to be conducted in the spirit of discovery and sharing of new information as well as with the understanding that knowledge should also generate actions for the preservation of the environment. Hence for the survival of the planet and its manifold species including the human society science-based actions are urgently needed.

¹³ <https://undsci.berkeley.edu/understanding-science-101/what-is-science/>

Therefore, scientific discovery needs to be translated into policy directives and actionable programmes to promote ecological and societal transformations. In between is the task of science diplomacy and public education that keep the dialogue going and the motivation to change sustained at different system levels.

Science Diplomacy

Science Diplomacy should be considered as “a means to reduce the many imbalances and as a vehicle to lift humanity up towards sustainable growth and development. It involves the use of scientific collaborations among nations to address common problems and to build constructive international partnerships” (Saner, 2015)¹⁴.

The Royal Society noted that, “science diplomacy” refers to three main types of activities¹⁵:

- informing foreign policy objectives with scientific advice (science in diplomacy)
- facilitating international science cooperation (diplomacy for science);
- using science cooperation to improve international relations between countries (science for diplomacy)

Applying this categorisation, one can see the «science diplomacy» roles enacted by UNEP in the following manner. 1) Science in diplomacy of informing policy makers with scientific advice concerning sustained environmental development of challenges; and 2) Diplomacy for Science of facilitating international science cooperation regarding research, information exchange and possibly technology transfer. Less evident seems to be the work in the domain of «science for diplomacy» that uses science coop-

eration to improve multilateralism and address the development needs of the Global South.

Main Findings

The key messages communicated by the 10 interviews are grouped into main themes. Each theme is given a title and in parenthesis are the number and professional backgrounds of the interviewees. The messages are indications and the group themes do not represent a statistically developed data nor is the selection of interviewees based on representative samples of interviewees. The findings should be taken as initial indications based on opinions expressed by the interviewees who were selected based on their many years of experience and accumulated know-how of environmental issues, of UNEP's role in the field of science and of its science-policy making contribution.

1. UNEP-Science Strategy

Questions were raised concerning UNEP's science strategy. Mentioning was made of an initial strategy during the early stages of UNEP's life which was more aiming towards a horizontal reach involving other international organisations (IO) whose mandates also interact with environmental topics. The group had the impression that UNEP has given up on the horizontal strategy and instead opted for a more vertical strategy consisting of pursuing its research objectives, organising research programmes and projects within its domain without close consultation with other IOs before deciding on project themes of its research. The experts also mentioned that they see an absence in UNEP's “oversight” coordination function in ensuring scientific and policy coherence

¹⁴ Science Diplomacy to support global implementation of the Sustainable Development Goals (SDGs). Brief for GSDR 2015. <https://sustainabledevelopment.un.org/content/documents/6654135-Saner-Science%20diplomacy%20suggested%20revisions%203%20final.pdf>

¹⁵ https://royalsociety.org/~media/Royal_Society_Content/policy/publications/2010/4294969468.pdf



UNEP in the Global Goals World Cup in Nairobi, 2017 © UNEP

when it comes to research on the sustainability of our planet.

Bob Watson was mentioned as a good example of the whole of the system approach when putting together a flag stone report titled “Making Peace with Nature”¹⁶. UNEP at its start-up stage initiated more contacts with other IOs trying to create a community of researchers based on mutual respect and two-way communications. UNEP was seen as being more engaged then in a pro-active manner in regard to coordinating policy research on key environmental issues. Some in the group consider the coordination efforts by the UNEP Geneva office could be improved and also include non-state actors be this private sector or civil society research centres to create an enriching environmental research community.

In regard to UNEP relevant research indicators, several experts consider that the Gross Domestic Product, GDP, measure should be less dominant and be more balanced by natural science indicators pertaining to environmental research. Many of the group thought that UNEP needs to have a more explicit governance system in regard to environmental science, for instance when and under what conditions should private sector and civil society think tanks be included in scientific research projects. Suggestions have gone even further by for instance suggesting inclusion of citizen science as means to collect ground level data on real-life problems and to achieve scale of transformation. Example of such a “crowd sourcing” approach can be seen as the UN Study on “The World that We Want” (2012)¹⁷ and the recent UNEP Inquiry into research designs that address questions pertaining to fac-

¹⁶ <https://www.unep.org/resources/making-peace-nature>

¹⁷ <https://www.un.org/en/exhibits/page/theworldwewant>

tors that could enable the creation of a comprehensive sustainable financial system (2021)¹⁸.

Several of the group members stated that the SDGs are not sufficiently included in UNEP's research undertakings and that the relation to the 2030 Agenda could be improved especially in scoping out the diverse impacts of environmental degradation, extreme weather conditions, loss of biodiversity, pollution etc. Citizen science focusing on generating and collecting data by ordinary citizens should be brought in to generate more granular data so that scientific analysis can better address the problems confronting different human communities. Critical schooling and support, it was said, could help mainstream the participation of citizenry as content producers and co-designers of locally sensitive solutions. It is also one more channel of delivering the solemn commitment made in the 2015 Declaration on "Transforming our world: the 2030 Agenda for Sustainable Development" (UN Resolution, A/RES/70/1)¹⁹ of "Partnerships".

Observations were also made that very few natural science NGOs of the UNEA Major Groups are present in New York during the annual HLPF of the 2030 Agenda Fora and concerns were raised that NGOs active in the UNEP consultative process are no longer able to engage in other important and relevant policies outside of UNEP and hence carry the risk of restricting themselves to a form of UNEP silo mentality which reduces UNEP's ability to catalyse actionable and useable environmental policy discussions in other international organisations of the United Nations.

Several experts also see tensions between the UNEP Headquarters in Nairobi and its own offices in Geneva and Paris as well as between

UNEP proper and the many secretariats which have been created to be in charge of environmental conventions and with other IOs that are seen to autonomously work on environmental issues. Worries were expressed on how the fragmentation of actors can be managed and the ensuing competition for budgets and for convening power be contained. These comments add an organisational challenge on how to maintain collaboration and coherence in the field of environmental and sustainable science.

2. What kind of Science is relevant for UNEP's mandate?

Experts of natural science as well as others of social science and economic science background agreed that UNEP's focus is too strongly based on nature and environmental science. Much more should be done to integrate the social science traditions. Particularly mentioned were the lack of integration of economic and social science in the Global Environmental Outlook (GEO) project and reporting. Mention was also made that the GEO focused too much on environmental risks and not enough on potential collaboration across sectors and disciplines to generate actionable solutions that would lead to real actions. Human behaviour is a key factor of environmental risk but UNEP studies often do not include psychology, sociology, economics, political and administrative science nor education and anthropology.

Linked to the above, a major concern expressed by the experts was that UNEP's research is not sufficiently inter-disciplinary, multi-disciplinary or transdisciplinary and hence no meaningful integration of the different knowledge fields is possible. It was also said that while a purely sectoral approach of environmental problems can generate important findings, if

¹⁸ <https://www.unep.org/news-and-stories/press-release/inquiry-design-sustainable-financial-system>

¹⁹ <https://documents-dds-ny.un.org/doc/UNDOC/GEN/N15/291/89/PDF/N1529189.pdf?OpenElement>



Science Policy Business Forum UNEA 3, Closing Session. Nairobi, Kenya. 2017 © UNEP / Natalia Mroz

these findings are not translated into societal realities, research projects can remain without transformative impact.

Another concern was raised about the perceived lack of applied research. While basic science, particularly in the field of environmental and natural sciences, is crucial for the future of this planet, UNEP should also engage in more applied science which could provide more opportunities to show local communities how science can contribute to solving and handling environmental crises in locality and provide practical solutions for long-term sustainable futures.

For scientists to be able to make important contributions to the wellbeing of society and safeguarding sustainable environmental or ecological futures, a re-assessment of the scientific sector is urgently needed. UNEP counts

on mostly unpaid contributions by environmental scientists which limits its access to scientists, especially the younger generation of scientists who depend on financial income from research work.

To be dependent on extra-budgetary funds and external scientists who are financed by their respective research institutions is not a sustainable solution to guarantee adequate investment in a transdisciplinary approach such as sustainability science. The latter is an emerging scientific field that depends on continued investment in tools, capacities, community of practices, and platforms for knowledge exchange. Without investment in such research infrastructure, sustainability science will remain a niche player, playing a catch-up game with the ever-evolving planetary ecological challenges. The voluntary contributions to the research work of UNEP will also become more

difficult to find because of the change of financial situations of and working conditions in many universities.

Young researchers are less and less sure of obtaining tenure for their post and hence are engaged in sometimes fierce competition for ad-hoc research budgets. In addition, the proliferation of publication outlets and the abundant flow of information via digital means (internet, webinars, e-books etc.) increases fragmentation of scientific focus. The result of both tendencies is that young researchers are not interested to focus on mid-term to longer term research topics nor are they available for UNEP to provide research services on a gratuitous basis. Both trends will reduce UNEP's ability to draw on scientific resources for its research projects and the overall quality of research of the global science community.

The solution proposed by some of the experts is to reconsider how the funding of scientific work by external researchers could be re-organised. For instance, through core funding which would reduce UNEP's pressure of securing high quality research contributions. An increase of core funding would also strengthen UNEP's influence when it negotiates research consortia with other IOs or with think tanks of the private sector of civil society.

In addition, experts stated that UNEP does not seem to have interest or time to explore

the potential cooperation with universities except with the highest ranked universities of the world and best known researchers who are, however, often not available nor interested to provide gratuitous contributions for UNEP. In order to broaden options for scientific collaboration with the scientific communities, UNEP should re-think its incentives to attract good quality scientific contributions, especially by the younger qualified scientists.

3. Impact of UNEP on policy making of governments and other important stakeholders

Ms. Inger Andersen, executive director of UNEP mentioned that it took thirteen years from the first scientific results on the ozone layer to establish the Montreal Protocol in 1987 which subsequently quickly led to the phase out of CFCs²⁰ in developed industrialized countries. However, she also reminded us that we need a nimbler and more inclusive science-policy interface – one that will stimulate to accelerate effective policies and follow-up action.²¹

How to speed up the science-policy making process is not only the task of scientists and intergovernmental organisations, IGOs, like UNEP. One of the experts pointed out that politicians should ask scientists more often what solutions could be possible to solve environmental and sustainability problems rather than wait for the scientists to volunteer their know-how. Governments need to be advised on how

²⁰ CFC CFCs, or chlorofluorocarbon, are any of several organic compounds composed of carbon, fluorine and chlorine. CFCs are also called Freons, a trademark of the E.I. du Pont de Nemours & Company in Wilmington, Delaware, USA. CFCs were originally developed as refrigerants during the 1930s. Some of these compounds, especially trichlorofluoromethane (CFC-11) and dichlorodifluoromethane (CFC-12), found use as aerosol-spray propellants, solvents, and foam-blowing agents. Their commercial and industrial value notwithstanding, CFCs were eventually discovered to pose a serious environmental threat and was proved to damage the Ozone-layer in the atmosphere, protecting the earth from dangerous levels if not different radiation. In 1990, 93 nations agreed, as part of the Montreal Protocol (established 1987), to end production of ozone-depleting chemicals by the end of the 20th century. From Britannica.com <https://www.britannica.com/science/chlorofluorocarbon>

²¹ Inger Anderes (2022) „A new Science-Policy Interface for UNEP at 50" / <https://www.unep.org/news-and-stories/speech/new-science-policy-interface-unep-50>



Science Policy Business Forum UNEA 3, Closing Session. Nairobi, Kenya. 2017 © UNEP / Natalia Mroz

to create meaningful dialogues and cooperation with the science community.

Mention was also made that in light of the inter-disciplinary nature of environmental and sustainable crises, key organisations that are part of the UNEP network need to broaden their own scope of scientific work. The example that was given was IPCC which remains very much natural science based which is of course valid in regard to the analysis of the climate problems as environmental risks but leaves out the human behavioural factor of environmental sustainability in regard to both the causes of environmental risks and the factors that could contribute to reduced Green House Gasses, GHGs, and to a sustainable future.

The science-policy cooperation should also be broadened for instance in regard to sustain-

able finance and investments needed to improve sustainable physical and social infrastructure. Traditional considerations of Return of Investment, ROI,²² for public investment remains mostly oriented towards financial gains at the expense of including estimations of negative externalities. For instance, should investments in physical environment infrastructure lead to social inequalities which in turn might generate long term environmental costs? The example given was advising governments about policy trade-offs and synergies of the 17 SDGs and particularly how to avoid policies which could lead to more income inequality.

Other experts pointed out that UNEP needs to add in its policy advice more attention to the legal and institutional frameworks which might limit the ability of governments to implement scientific advice if their laws and regulatory

²² A calculation of the monetary value of an investment versus its cost.

frameworks do not allow for quick implementation of scientific policy advice, for instance if new policies might need parliamentary approval or voting by a country's citizens.

Some experts suggested that UNEP explains better the findings and impact of scientific research to government officials and to other important political stakeholders. UNEP could publish research outcomes for non-scientific audiences, for instance government officials and opinion leaders, in shorter intervals and not only every 7 years when the much appreciated GEO is produced and made available. One suggestion was made that publications similar to the Earthwatch system Earth Watch which was stopped in 2005²³ could be re-introduced.

Policy dialogue between the environmental science community (natural and social sciences) and governments should start early with effective education through modern teaching methods including digital platforms that could also give access to the public at large that is interested in increasing their understanding of the inter-connectedness between the environment and human behaviour. Some experts suggested a democratisation of knowledge and explanation of what and how science can partner with society in making the world a less risky place in regard to nature based risks and crises.

UNEP has made major contributions to the field of environmental science and to the United Nation system at large. All experts expressed appreciation of what UNEP has been able to achieve and to live up to its mission which is to provide leadership in caring for the environment by inspiring, informing and enabling nations and their peoples to improve their quality of life without compromising that of future generations.

Over the last 50 years, UNEP has played a major role in initiating and facilitating new conventions and institutions which have a bearing on important aspects of environmental sustainability. Table 2 below provides a chronology of UNEP's contribution in the field of treaty making, negotiating conventions and laying the foundations for new institutions.

UNEP has acted as an incubator of new legal and administrative solutions to combat a multitude of environmental crises. These new conventions and institutions are the outcome of scientific research and corresponding policy making by member countries. The question was raised by experts related to the overall science strategy and role of UNEP. Should it remain an incubator or a host for basic and applied research of environmental science and policy-making within its own headquarters thereby accumulating know-how in house or should it continue to support other IOs and IGOs and their environmental initiatives?

4. UNEP: Incubator of environmental conventions & institutions

Arguments in favour of continued decentralisation is due to the fact that UNEP was seen to be

²³ Established in 1972 at the UN Conference on the Human Environment as an assessment of the state of the global environment. Earthwatch coordination was later a service UNEP provided to the entire United Nations system in accordance with UN General Assembly resolutions, and later with Agenda 21 and decisions of the former Administrative Committee on Coordination (ACC). It also served as co-task manager with UN DESA for chapter 40 of Agenda 21: "Information for decision-making". The United Nations System-wide Earthwatch mechanism continued work from 1996 and was a broad UN initiative to coordinate, harmonize and catalyse environmental observation activities among all UN agencies for integrated assessment purposes. It ceased operations in 2005. <https://unepgrid.ch/en/activity/201>

too close to several international organisations, being located in Nairobi, in the Global South, governmental and others, that were highly influential (in regard to know-how and financial means). The example given by an expert was the location of the UNEP office in Geneva close to the global nexus of the chemical industry with health related issues. Other experts highlighted the importance of UNEP's headquarter

which gives greater access to governments and stakeholders in regions where environmental resources are located. What was stated as missing is a review and re-assessment of what UNEP's role could or should be - incubator or producer of scientific knowledge related to environmental sustainability.

Table 2: Non-exhaustive International Environmental Instruments Initiated or Incubated by the UNEP 1972-2022 (in chronological order)

International Environmental Instruments (by chronological order)	Date	Key Actor(s)	Secretariat/ HQs Location
Declaration of the United Nations Conference on the Human Environment (16 June 1972)	1972	CSOs	
The Ramsar Convention on Wetlands	1972	Civil Society and UNEP	Gland, Switzerland
CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora)	1973	UNEP IUCN	Initially in Bonn, Germany (1975) now Geneva, Switzerland
PACD (Plan of Action to Combat Desertification)	1977	UNEP/ The Secretariat for the Consultative Group for Desertification Control (1978)	Nairobi, Kenya
World Charter for Nature	1982	UNEP, UN General Assembly	IUCN Portal
the Association of Southeast Asian Nations Agreement on the Conservation of Nature and Natural Resources	1985	ASEAN	Kuala Lumpur, Indonesia
CMS (Convention on Migratory Species)	signed in 1979, in force since 1983	UNEP	Bonn, Germany



International Environmental Instruments (by chronological order)	Date	Key Actor(s)	Secretariat/ HQs Location
Protection of the Ozone Layer: Montreal Protocol on Substances that Deplete the Ozone Layer, a protocol to the Vienna Convention for the Protection of the Ozone Layer agreed to in 1985-87	1987	Work started in 1975 by UNEP. - WHO on Melanoma. - Agricultural experts on crops and the immune system of all species	Headquarters in Montreal, Canada
IPCC (Intergovernmental Panel on Climate Change)	1988	UNEP, WMO	Headquarters in Geneva, Switzerland
The Basel Convention	1989	UNEP, FAO, NGOs	Joint Secretariat with Rotterdam and Stockholm Conventions since 2013 in Geneva, Switzerland
UNFCCC (UN Framework Convention on Climate Change)	1992	UNEP	Headquarters in Bonn, Germany
UNCBD, The Convention on Biological Diversity (Agenda 21)	1992	UNEP	Headquarters in Montreal, Canada
The Aichi biodiversity Targets (2011-2020)	2012		
UNCCD (Convention to Combat Desertification) (Binding)	1994	UNEP & UNECE	Bonn, Germany with a subsidiary office in New York, USA
Aarhus Convention (Binding) The UNECE Convention on Access to Information, Public Participation in Decision-making and Access to Justice	1998	UNECE	Geneva, Switzerland
The Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade	1998	UNEP	Joint Secretariat with Basel and Stockholm Conventions since 2013 in Geneva, Switzerland
AEWA (Africa-Eurasian Migratory Waterbird Agreement) under the framework of CMS	1999	UNEP	Nairobi, Kenya
The Earth Charter	2000	CSOs with global consultation & UNESCO	Based in San Jose, Costa Rica

International Environmental Instruments (by chronological order)	Date	Key Actor(s)	Secretariat/ HQs Location
The Stockholm Convention on Persistent Organic Pollutants	2001	UNEP/ IUCN/ NGOs	Joint Secretariat with Rotterdam and Basel Conventions since 2013 in Geneva, Switzerland
Biosafety Protocol CBC	2000	UN	Montreal, Canada
The Rio+20 Outcome Document, the Future we Want in 2012	2012		Negotiated in Rio, Brazil, follow-up by the UN-HLPF by UNDESA, New York, USA
Green Economy - Green Finance Initiative - Responsible Banking Initiative	2012	UNEP	Nairobi. Kenya
IPBES (The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services)	2012	UNEP, UN Family, NGOs	Panama City at the start, now Bonn, Germany
the Minamata Convention on Mercury	2013	UNEP Office	Geneva, Switzerland
Regional Agreement on Access to Information, Public Participation and Justice in Environmental Matters in Latin America and the Caribbean	2015	UNECE & ECLAC (secretariat ESCAZU)	Santiago de Chile
Expanded Aarhus Convention to include UN-LAC countries and Japan	2021	UNEA-UNEP	Geneva, Switzerland
UNEA 5 outcome resolution on plastics	2022	UNEP	Nairobi, Kenya With the first negotiations to develop a convention to ban plastics in Montevideo, Uruguay

The results of the non-exhaustive list of table 2 starting in 1972 indicate the following: The location of secretariats of environmental treaties and institutions is spread as follows: Geneva (9), Nairobi (4), Bonn (4), and Montreal (3) KL (1) and other locations (4).

Discussion of findings

Science is one of the three core functions of UNEP. In this context, UNEP is to carry out the following activities:

1. To provide scientific information and background for decision making.
2. To provide political guidance for political decisions
3. To catalyse actions among some key IOs, such as UNDP and other members of the Environment Management Group²⁴

UNEP's record in these regards, according to the information communicated by the participants of the semi-structured interviews is mixed.

Through its GEOs, UNEP has curated the cutting edge of scientific knowledge and provided state of the art analysis to the policy community for policy making and political decisions. However, when it comes to catalysing actions among some of the key global organisations and to ensure environmental policy coherence, UNEP was not able to maintain its coordination function and address the social-economic and ecological linkages throughout the UN system.

Major progress has been made in the past 50 years of UNEP's life span. These successes unfortunately remain mostly in the domain of norm-setting and international agreements, less in the actual arresting of deteriorating environmental conditions at global and local levels.

Three scenarios could be proposed concerning the role and function of UNEP and its contribution to the policy deliberation on environmental sustainability over the years.

Scenario 1: UNEP has been successful in its natural science-based advocacy and awareness raising leading to broadening of systemic understanding of the planetary crisis and possible solutions. The remaining work is therefore more for the social sciences/human science and economics to ensure the change of minds and hearts of the people and daily behavior and practices. The paramount question regarding this transition within this scenario is how to implement the environmental policies in a transversal manner and to achieve behavioral change at scale. Therefore, the task of UNEP at the next phase of environmental including sustainable development issues needs to focus ever more on interdisciplinary and transdisciplinary approach and pursue problem solving at socio-ecosystem interface.

Attempts to bridge the silos and shed lights on the academic disciplinary blind spots could be a major challenge and call for ongoing dialogue and reforms on the side of science. Similarly, inter-ministerial coordination and policy coherence regarding national development plans and international development governance needs to be high on the UNEP agenda who could serve as intermediary between these communities of interest (governments, business, civil society, academics). Therefore, the central role of UNEP should be to act as the intermediary that fosters dialogue and

²⁴ Established in 2001 and chaired by the Executive Director of UNEP and supported by a secretariat provided by UNEP in Geneva, Switzerland, the UN Environment Management Group (EMG) is a system-wide coordination body on environment and human settlements. The EMG membership consists of 51 specialized agencies, programmes and organs of the UN including the secretariats of the Multilateral Environmental Agreements. The EMG identifies issues on the international environmental agenda that warrant cooperation, and finds ways of engaging its collective capacity in coherent management responses to those issues, Civil society can be invited to its meetings (from the EMG website), <https://unemg.org/>



ROLAC Project "Support to Protected Areas in Mesoamerica" © UNEP / PNUMA

collaboration within a community (science or policy) and among communities (science-policy). The convening power of UNEP with its unique mandate is a key factor of effectiveness in influencing the dominant narratives in favor of radical changes.

Scenario 2. UNEP has been to some extent successful in trying to incrementally stop the environmental and climate deterioration. What remains to be resolved and recorded in these treaties to this effect are the more wicked and entrenched long-term challenges that require greater knowledge and deeper insight from environmental and social sciences including long-term commitment from the science-policy community. The role of UNEP should therefore be centered on closing the knowledge and data gap while continuing its role of curating, interpreting and translating scientific knowledge and finding ways to implement this by

the policy making and action oriented resolutions on environmental problems. It is also the role and function of the UNEP to identify incentives and pressures to sustain the needed political will in tackling these wicked systemic problems that continue to cause the deterioration of the planetary health. Science diplomacy needs to become a major tool for influence at the UNEP.

Scenario 3. Environmental issues are seen as part of the total ecological system and cannot be resolved in isolation. Other linking issues concerning the green economy, consumer and producer behavior and specific stakeholders are gaining momentum in formulating mitigation strategies. Demands for policy synergy and policy clear trade-offs between the economic, social and environmental objectives are needed to solve these complex problems. UNEP in this new operational context has start-

ed to shift towards an integration of interdisciplinary issues by looking at the synergy of environmental science with social and human science as well as economic science. The rise of sustainability science and its ensuing values and principles will play a higher hand in determining the quality and direction of future scientific inquiry and help the policy makers to address more pressing environmental disasters and greater vulnerability. The role of UNEP in this regard would be to work with the frontier science and technology in forestalling and preventing emerging sustainability challenges. This could include collecting and generating data to assess untested technologies such as geo-engineering.

Regardless of which scenario is closer to the reality, one thing is clear: For the world to be more effective in managing its environmental and sustainability crisis, efficient and effective knowledge management undergird impactful policies and actions. In this context, international organizations and specialized agencies need to be the custodians of both explicit and tacit knowledge. Perhaps one way of approaching this complex issue during the next decades is to intensify and upgrade the position of the Environment Management Group as the coordinator of environmental and sustainability policies within the UN itself. To do so, allowing relevant civil society organisations to participate more often, could be an innovative and pro-active step in this direction.

Enabling science and society to co-design environmental spaces and processes

Thinking outside the box, one can also imagine that besides curating or initiating new scientific research, UNEP might also want to initiate and spearhead more pilot applied research projects. By working with other societal actors closely, translation of science discoveries to local contexts could happen more often and with less interruptions. Such working relations or interfaces could be achieved through

more co-designing of solutions and partnership for actions.

Local residents and institutions could and should also be content producers and not just recipients of information by scientific organisations suggesting how to solve and manage environmental crises. Through active participation of local communities, climate science and related policies and regulations would generate more meaning and relevance for society.

UNEP cannot be expected to intervene at the local level. Yet, it could facilitate and help the creation of sustained local spaces for dialogue and co-design processes through promoting partnerships between science institutions with schools and other concerned organisations making an effort similar to that of UNESCO in promoting sustainability through educational efforts.

One of the key scaffolding structures for this effort is to adapt existing climate science information and data portals to fit the understanding and interests of the non-scientist community that plays a key role in knowledge transmission and knowledge adoption.

Creation of the co-design spaces and partnerships with citizens through effective scientific intermediaries would support a greater scale of transformation than is currently the case. Advising policy makers about how to mitigate and prevent the negative impact of destructive environmental practices is only one side of the coin. The missing link or the other side, for a successful implementation of pro-environmental policies, is understanding and support by society without which it is unlikely that policy adoption will succeed.

The social tipping point is insufficiently discussed in UNEP's environment including other deliberations, such as with bio-diversity loss, chemical pollution and climate change. A few well-placed centres or labs that would allow for



Mr. Green Kenya plastic recycling plant © UNEP / Ahmed Nayim Yussuf

experimental ways to excel in transdisciplinary “testing” of sustainable development solutions fitting diverse regional contexts could be part of a phase III development of UNEP. Such action-oriented research could also support the political interest for stop-gap actions and for moving onto sustainable pathways. Both are in short supply at the moment especially in resource constrained countries.

Future Outlook: Technologies and New Possibilities for Knowledge Production

As the leading global environmental authority, UNEP is the custodian for 25 SDG indicators – across SDG Goals 6, 8, 12, 14, 15 and 17. These indicators cover topics related to resource management and protection of water, marine and terrestrial ecosystems, circularity, and environmentally sound management of chemicals and waste. Nevertheless, it is worth to remember

that environment underpins the attainment of all other SDG Goals. For example, pollution greatly affects human health, be that water or air pollution. Yet, data to reflect the nexus effect of the intersections are often missing.

UNEP works with Member States on SDG methodologies and with national statistical authorities to collect, review and report SDG data to the SDG Global database. UNEP promotes the use of data for analysis, and preparation of the annual progress reports. In this process, UNEP has incorporated modern digital technologies, such as smart sensors, mobile phones, internet of things and computing capabilities in order to create more timely, nuanced and targeted analysis and knowledge base. Emerging tools that have been explored and experimented on, include citizen science, big data and data analytics, as well as traditional of indigenous knowledge. These new data

sources will complement the traditional means of data collection and offer novel opportunities for future environmental monitoring and assessments. Needless to say, these tools and new approaches will also strengthen the capacities of UNEP in monitoring large scale data sources, mitigating its funding restrictions, educating in much greater number the public about environmental issues and policies and using local knowledge to generate more sustainable local solutions.

In addition, UNEP facilitates avenues for cooperation between the UN, governments, bilateral and multilateral agencies, businesses, and civil society organizations in order to initiate joint commitments and promote Multilateral Environmental Agreements.²⁵ Greater access to data and related analytics and modelling can better promote such collaboration where power imbalance exists and interests diverge. The brokering role of UNEP to bring about a whole-of-society approach to environmental and sustainability issues could be much enhanced by the future deployment of data science and other knowledge technology.

Fighting misinformation and fake news

For the scientists, especially the young ones, few opportunities exist to obtain funding for longer term and systemic research which would provide possibilities to engage in research on future risks. At the same time, the proliferation of scientific publications of varying stringency and quality generate a fragmentation of the environmental and sustainability fields of science making it more difficult to separate important from less important journal articles.

Secondly, the proliferation of falsehood through the internet and social media has cre-

ated an anti-science backlash. Citizens are in need of good basic science education in order to be able to separate fake news from serious science publications. A large portion of contemporary society is not equipped with sufficient critical thinking and becomes easily prey to sensationalism or different forms of fallacies. With the support of the Supreme Court, India is now implementing a policy to embed sustainability curriculum into all levels of schooling.

Thirdly, the sheer volume of information makes it impossible for individual citizens to fact check and validate the information that they receive from serious but also from sensationalist media products. Time constraints also make it more difficult to have enough time to undertake fact checking of today's media outlet.

Technology and hopefully artificial intelligence with the oversight provided by scientific groups could help build fact checking portals to support "real" and "truthful" evidence of published materials. UNEP could help by providing fact checking sites and observation centers.

Visualization, interactive database and modelling – democratizing scientific tools

The availability of other digital tools also makes it possible to democratize data science. Visualization is a powerful communication tool to convey complex information. It is more persuasive than words.

Besides using visualizations, interactive data bases could allow interested parties to apply his/her own preferences in order to make chronological and terrestrial comparisons of environmental news. Citizens need to be given access to such powerful analytic tools and opportunities to follow debates on the environment and on sustainability where discussions

²⁵ UNEP (2019) "UNEP and the SDGs", Nairobi, <https://www.unep.org/unep-and-sdgs>



UNEP@50 - World Environmental situation room © UNEP / Cyrill Villemiaín

are held about how costs need to be shared and who will benefit most and what will contribute to the much needed and urgent transformations of the environment.

Science-Policy Interface: searching for the right strategy

UNEP has grappled with the challenge of finding the best approach to ensure an effective Science-Policy Interface. In 2017, UNEP published a study titled “Strengthening the Science-Policy Interface- A Gap Analysis” which was initiated by the then UNEP Executive Secretary Erik Solheim²⁶. The executive summary highlighted several key areas needing improvements and the first mentioned was improving coordination of different actors around the globe observing that scientific ev-

idence is not often understood or used by policy makers and that science and policy were at a crossroad. The solution proposed was to making science-policy interface more dynamic while engaging the right actors in achieving the SDGs...

Mrs Inger Andersen who succeeded Mr. Solheim was also concerned about the science-policy interface and exclaimed with the closing words of her presse release titled „A new science-policy interface for UNEP at 50” on 3 March 2022²⁷ that

(In a nutshell), we must rapidly develop specific and relevant solutions through the engagement of diverse stakeholders – and get those solutions out there quickly through real-time digital tools. If we do this, science

²⁶ <https://www.unep.org/resources/report/strengthening-science-policy-interface-gap-analysis>

²⁷ <https://www.unep.org/news-and-stories/speech/new-science-policy-interface-unep-50>

will become more accessible, more trusted, more democratic, and therefore more useful. The whole of society will be involved in producing and acting on science. Decision makers will have a wider range of solutions, quickly produced, upon which to act. We will brighten the light of science so that it serves as a beacon for all to follow, in policy and action, as we walk the path towards ending the triple planetary crisis.

the whole interaction between financial markets on supply of commodities and other macro-economic impacts on the real economy.

By becoming more specific, the larger scope of science and economics might become very narrow generating on one hand more application oriented solutions while at the same time running the risk of losing sight on the larger realities covered by science and economics.

Taking a further step towards developing specific and relevant solutions quickly through real-time digital tools, two divisions of UNEP were renamed on 4th February 2023. The former Science Division is now named Early Warning and Assessment Division and the former Economics Division is now named the Industry and Economy Division²⁸.

Conclusion

To conclude, the authors quote the reminder from Ms. Inger Andersen, executive director of UNEP that “we need a nimbler and more inclusive science-policy interface – one that will accelerate effective policies and follow-up action”.²⁹

The renaming can have positive but also some more risky implications. Focusing on Early Warning and Assessments can cut the time of bringing to the attention of policy makers and the public at large that dangerous developments are in the making needing immediate attention (e.g. typhoons, tsunamis). At the same time, one can wonder whether the longer term but equally crucial environmental developments are no longer being followed by UNEP (e.g. warming of glaciers and oceans or emergence of plant diseases). In addition, shorter term and longer-term environment threatening development affect each other and need to be continuously watched.

Regarding the renaming of the former economics division to Industry and Economic Division puts emphasis on the industry seemingly leaving out the rural-agricultural part of the economy and also seemingly excluding

It is our view that this nimble and more inclusive science-policy interface, needs to place society in the centre of the current discussions and must fight to stop environmental deterioration in order to achieve a healthy planet for healthy people. It is our collective belief that together we can make it possible that wellbeing for all could be realised in the not too distant future. Science diplomacy creates space for dialogue and exchanges of views that eventually will lead to the discovery and support of shared interests and shared commitments to healthy environment and sustainable futures. This needs to be a 360-degree engagement. Through the combined forces of innovation, science and deployment of new technology, and accumulated social capital, UNEP in its next phase of development will continue to make its unique contributions to society and sustainable environmental futures.

²⁸ Memo dated 4 February 2023 by Radhika Ochalik, Secretary of Governing Bodies, Director, Governance Affairs Office, UNEP

²⁹ Inger Andersen (2022) „A new Science-Policy Interface for UNEP at 50” - <https://www.unep.org/news-and-stories/speech/new-science-policy-interface-unep-50>

You have just read a Legacy Paper, one of five, which is an integral element of the report: **The People's Environment Narrative** celebrating 50 years of work between civil society and UNEP to safeguard the environment. The report is created, published and owned by Stakeholder Forum for a Sustainable Future, SF, and can be downloaded in its entirety for free at:

www.stakeholderforum.org
www.unep.org

Section Four: the five Legacy Papers

UNEP, science and the environment – a necessary partnership to save the planet

Authors: Raymond Saner & Lichia Yiu

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Illustrations by María Andrea Miranda Serna

Stakeholder Forum for a Sustainable Future

Company no. 05243470 / Registered in England and Wales and Utrecht, the Netherlands

Registered Office: 2 The Links, Herne Bay, Kent, CT6 7GQ, UK

www.stakeholderforum.org
info@stakeholderforum.org

twitter @stakeholders
linkedin @stakeholderforum

