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Adoption of the agenda and organization of work

Priorities for advancing sustainable solutions for a resilient planet

Report of the Executive Director: Part 1

This report forms Part 1 of the Executive Director's report, suggesting possible areas for UNEA-7 resolutions for the consideration of Member States. A second part will focus on the Assembly more generally, reflecting on lessons learned after a decade of existence, and how to ensure that it continues to enhance its role as a critical platform for environmental governance. The second part builds on a series of informal lunches which took place in late 2024 in Nairobi between the Executive Director and Permanent Representatives – UNEP wishes to reiterate its deep appreciation for these rich exchanges.

I. Introduction

1. The present report focuses on emerging and urgent environmental issues that may prove relevant as Member States consider critical resolutions for possible adoption by the Environment Assembly of the United Nations Environment Programme (UNEP) at its seventh session. While resolutions remain the prerogative of Member States, it is hoped that proposals in the report may help inform their identification, scope and content. In the report on effective, inclusive and sustainable multilateral actions to tackle climate change, biodiversity loss and pollution (UNEP/EA.6/2), submitted for consideration by the Assembly at its sixth session, the Executive Director similarly identified areas of potential usefulness to Member States as they considered resolution priorities. Accordingly, in support of the UNEP mandate of keeping the global environment under review, and through the filter of an assessment of whether a topic is new, urgent or un-/underexplored, this report reviews the following priorities: addressing the global hydrological cycle (section II); tackling nutrient pollution (section III); critical energy and digital transition minerals (section IV); protecting the Earth's shield by protecting the stratosphere (section V); and deploying and scaling environmentally sustainable artificial intelligence (section VI).

* UNEP/EA.7/1.

2. **A healthy environment is the foundation for stable and prosperous societies and economies, yet planet Earth is under escalating pressure, as is recalled in the draft medium-term strategy for the period 2026–2029 being submitted to the Assembly for its approval.** Addressing the three planetary environmental crises – climate change; desertification, land degradation and drought, and biodiversity loss; and pollution and waste – is critical for peace, prosperity and development. From the United Nations Conference on the Human Environment in Stockholm in 1972, to the Earth Summit in Rio de Janeiro, Brazil, in 1992, to the Rio+20 Conference in 2012 and the adoption of the Sustainable Development Goals in 2015, the global community has repeatedly affirmed that environmental sustainability is the foundation of societal and economic resilience. Only 16 per cent of the Goals, however, are on track to be met by 2030, and nearly all of the environmental Goals are critically off track.[1]

3. **Since the sixth session, the global landscape has evolved significantly and become more turbulent.** In September 2024, the international community convened at the Summit of the Future in New York – a once-in-a-generation opportunity to reimagine the multilateral governance system for a world that is increasingly industrialized, digitalized and interconnected. At the historic summit, world leaders adopted the Pact for the Future, alongside its key annexes, the Global Digital Compact and the Declaration on Future Generations. In this context, but also amidst unprecedented global geopolitical upheaval marked by escalating conflicts, economic instability and growing inequality, the Environment Assembly remains a critical platform, holding the potential to deepen global cooperation and guiding efforts to create the conditions necessary for sustainable human development on a thriving, living planet.

4. **The seventh session takes place at a critical time**. The session can reinforce the collective determination of Member States to ensure that the environment remains vibrant, balanced and able to support humanity's march towards more peaceful, prosperous and thriving economies and societies. With just five years remaining for the world to achieve the Sustainable Development Goals, the seventh session offers Member States the opportunity to discuss a future vision for the environmental dimension of the sustainable development agenda in the post-2030 setting, reflecting on the kind of world envisioned for future generations and shaping the path to 2050 and beyond. In full continuity with the aspirations and expectations framed at Rio+20 and its outcome document "The Future We Want", the Assembly offers a unique, powerful space in which to address environmental challenges, share opportunities and frame concrete solutions.

II. Priority: Addressing the global hydrological cycle

5. **Water is increasingly under pressure.** Water resources of fundamental importance to life are under increasing pressure due to deforestation,[2] urbanisation, land degradation, pollution, climate change, nature loss and poor resource management. Climate, land and nature stress and pollution are disrupting the global hydrological cycle, as evidenced by the increased frequency, intensity and scale of water-related challenges,[3] from floods to droughts, fires and famines. These stressors undermine the health of the environment, disrupting the ecological balance on which our lives and livelihoods depend. Strengthening climate mitigation and adaptation, land restoration, biodiversity conservation and enabling ecological resilience at scale are vital to ensuring that people have the sustainable and equitable access to water they need to build their resilience.

6. **Prioritizing the full hydrological cycle.** The global hydrological cycle is the path that all water – green and blue – follows as it moves around Earth's atmosphere, land and ocean as liquid water, solid ice and gaseous water vapour. Current water management approaches often prioritize "blue water" (surface water and aquifers) while neglecting "green water" (water held in soils and vegetation), which plays a critical role in recharging and sustaining cryosphere, surface and groundwater ecosystems,[4] yet remains largely absent from national policies and international governance frameworks. Addressing this knowledge gap is crucial to enhancing economic and ecological resilience against increasing water stress.

[1] J. D. Sachs and others, *The SDGs and the UN Summit of the Future. Sustainable Development Report 2024* (Dublin, Dublin University Press, 2024).

[2] C. Smith and others, "Tropical deforestation causes large reductions in observed precipitation", *Nature*, 615 (2023), pp. 270–275. Available at www.nature.com/articles/s41586-022-05690-1.

[3] United Nations Office for Disaster Risk Reduction, *Global Assessment Report on Disaster Risk Reduction 2022: Our World at Risk – Transforming Governance for a Resilient Future* (Geneva, 2022). Available at https://www.undrr.org/gar/gar2022-our-world-risk-gar.

[4] M. Mazzucato and others, *The Economics of Water: Valuing the Hydrological Cycle as a Global Common Good* (2024). Available at https://economicsofwater.watercommission.org/report/economics-of-water.pdf.

7. **The role of UNEP in mainstreaming freshwater in the climate, land degradation and biodiversity agendas.** The recently launched United Nations System-wide Strategy for Water and Sanitation[5] provides an opportunity to enhance global coordination in the provision of support to Member States. The Environment Assembly has previously adopted several resolutions on water-related issues, including resolution 1/9 on the Global Environment Monitoring System/Water Programme (GEMS/Water), 3/10 on addressing water pollution to protect and restore water-related ecosystems, 4/6 on marine plastic litter and microplastics, 5/2 on sustainable nitrogen management, 5/4 on sustainable lake management and 6/13 on effective and inclusive solutions for strengthening water policies to achieve sustainable development in the context of climate change, biodiversity loss and pollution. A more comprehensive approach, however, would explicitly address the interconnections between ecosystem health, water extremes and the challenges of food security, land degradation and climate resilience.

8. **Member States may wish, subject to the availability of resources, to:**

(a) Invite UNEP and partners to support countries to recognize the value of water for humanity and for the environment and account for water in all its forms – both blue and green – and support countries in integrating these concepts into the climate, land degradation, biodiversity and pollution agendas, as well as national policies, regional economic plans and international governance frameworks, in order to advance access to water and build resilience;

(b) Invite UNEP to strengthen the World Environment Situation Room by working with partners to improve the assessment of the quantity and quality of water resources, including groundwater, to close data gaps and facilitate science-based decision-making;

(c) Emphasize the importance of data collection, governance and interoperability, as highlighted by the global environmental data strategy, in analysing and supporting enhanced management of the global hydrological cycle, and enable the development of cross-cutting scenarios such as mapping the effects of drought on food security, human health and other domains;

(d) Leverage partnerships to foster locally driven scalable solutions for water quality management, integrating science policy and community engagement to address pollution, enhance ecosystem health and promote sustainable water use across regions.

III. Priority: Tackling nutrient pollution

9. **There is robust scientific consensus on the detrimental impacts of nutrient pollution.** Excess nutrients from fossil fuel burning, fertilizers, and wastewater from humans, livestock, aquaculture and industry lead to air and water pollution and soil degradation, and result in biodiversity loss, ozone depletion and additional global warming.[6,7] Integrated global assessments of nitrogen and phosphorous in the environment and global consensus on the implications of their uses, presence and impacts are lacking, but a wealth of literature demonstrates the impacts of nitrogen and phosphorous use, noting significant variation within and between countries.[8,9] A number of global frameworks and agreements highlight the urgency of this issue, including Sustainable Development Goal targets 6.2, 6.3 and 14.1, Kunming-Montreal Global Biodiversity Framework target 7, which aims to halve the amount of excess nutrients lost to the environment by 2030,[10] the regional seas conventions and action plans, the United Nations Framework Convention on Climate Change and the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities.

10. **The Environment Assembly can promote a coherent, system-wide approach, complementing and reinforcing existing commitments…** Sustainable nutrient and wastewater management provides important co-benefits such as food systems and soil health through pollution

[5] *United Nations System-wide Strategy for Water and Sanitation* (United Nations publication, 2024). Available at https://www.unwater.org/publications/united-nations-system-wide-strategy-water-and-sanitation.

[6] United Nations Environment Programme, *Frontiers 2018/19: Emerging Issues of Environmental Concern*, (Nairobi, 2019). Available at https://www.unep.org/resources/frontiers-201819-emerging-issues-environmental-concern.

[7] W. J. Brownlie and others (eds.), *Our Phosphorus Future: Towards global phosphorous sustainability.* UK Centre for Ecology and Hydrology (2022). Available at https://nora.nerc.ac.uk/id/eprint/533099/1/N533099CR.pdf.

[8] M. A. Jwaideh and others, "Global impacts of nitrogen and phosphorus fertiliser use for major crops on aquatic biodiversity", *International Journal of Life Cycle Assessment* 27 (2022), 1058–1080.

[9] C. Lu and H. Tian, "Global nitrogen and phosphorus fertilizer use for agriculture production in the past half century: shifted hot spots and nutrient imbalance", *Earth System Science Data* (March 2017).

[10] CBD/COP/DEC/15/4.

reduction, use of appropriate levels of fertilizer, and deployment of integrated nutrient management to restore soil health and productivity.[11] Sustainable nutrient and wastewater management also enhances nutrient recovery and recycling,[12] while enhanced nutrient management through abatement of nitrous oxide (N_2O) and ammonia (NH_3), both potent greenhouse gases, has positive impacts in relation to air quality and climate change, with resulting benefits to human health. Improved nitrogen management and nitrous oxide mitigation have the potential to reduce the equivalent of 235 billion tonnes of carbon dioxide emissions by 2100.[13] Sustainable nutrient and waste management also offers opportunities[14] for green energy to be produced from wastewater, potentially meeting the energy needs of half a billion people worldwide,[15] and, in water scarce settings, water recycling and wastewater reclamation could contribute to addressing water scarcity and land degradation and desertification.

11. **…because current governance strategies and approaches are fragmented and do not adequately address the global issue of nutrient pollution.** The issue of nutrient pollution is central to many policy domains: health, food systems, water, waste management, energy, urban planning, economics, biodiversity and the environment. To manage nutrients sustainably while promoting soil, water and ocean health and sustainable food systems, a holistic, circular, multi-sector and transdisciplinary systems-wide approach from source to sea is needed. Building the capacity of national monitoring systems will support the tracking of efforts to tackle nutrient pollution. In past discussions, the Environment Assembly has singled out nutrient pollution as a major threat to the environment and adopted resolutions that led to the establishment of the UNEP Working Group on Nitrogen (fourth session) and increased emphasis on science-policy interfaces for pollution control (fifth session).

12. **Member States may wish, subject to the availability of resources, to:**

(a) Establish a technical process under the auspices of the Environment Assembly, requesting UNEP to convene an ad hoc open-ended working group to provide future guidance on work on sustainable nutrient management, benefiting from the work of the UNEP Working Group on Nitrogen, and consider placing a greater focus on phosphorus, in particular. With the ambition of completing its work before the eighth session of the Environment Assembly, the working group could also consider aspects pertaining to supply, technology and opportunities;

(b) Request UNEP to establish a platform for collaborative action, knowledge exchange and best practice on nutrient pollution, acknowledging both the challenges and needs of developing and developed countries with a view to offering context-tailored solutions for sustainable nutrient and wastewater management, including monitoring systems.

IV. Priority: Critical energy and digital transition minerals

13. **The digital and energy transitions are reshaping the world.** The transition to renewable energy and digital technologies is fundamentally reshaping economies and societies, with a growing reliance on specific minerals, such as copper, lithium, cobalt, gold and rare earth elements.[16] The value chains of these minerals hold the potential to contribute significantly to the achievement of the Sustainable Development Goals. However, action is needed to ensure balance between promoting prosperity and ensuring sustainability, given the economic and political pressure to develop critical minerals. The environmental degradation and other detrimental effects associated with the supply

[11] Food and Agriculture Organization of the United Nations and United Nations Environment Programme, *Global Assessment of Soil Pollution: Report* (2021). Available at https://www.unep.org/resources/report/global-assessment-soil-pollution.

[12] United Nations Environment Programme, *Synthesis Report on the Environmental and Health Impacts of Pesticides and Fertilizers and Ways to Minimize Them* (Geneva, 2021). Available at https://www.unep.org/resources/report/environmental-and-health-impacts-pesticides-and-fertilizers-and-ways-minimizing.

[13] Food and Agriculture Organization of the United Nations and United Nations Environment Programme, *Global Nitrous Oxide Assessment* (Nairobi, 2024). Available at https://wedocs.unep.org/handle/20.500.11822/46562.

[14] Biogas, energy bricks and heat.

[15] United Nations Environment Programme, “Facts about wastewater and nutrient management”. Available at https://www.unep.org/facts-about-wastewater-and-nutrient-management.

[16] International Energy Agency, “The Role of Critical Minerals in Clean Energy Transitions. International Energy Agency” (2021). Available at https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions.

chain of grid and energy storage and digital technologies need to be mitigated in places where transition minerals are mined or processed.[17]

14. **The Secretary-General launched the Panel on Critical Energy Transition Minerals.**[18] In its report, released in 2024, the Panel highlighted that opportunities exist for governments to strengthen and consolidate the interdependencies between energy and digital transitions, environmental stewardship and sustainable development.[19] The Environment Assembly has progressively addressed mineral resources governance (at the fourth session), improving the environmental aspects of mineral development (fifth session), and mandated international cooperation on minerals and metals (sixth session).

15. **Member States may wish, subject to the availability of resources, to:**

(a) Task UNEP with working on environmental aspects of minerals that are critical for the industries of the future, in coordination with Member States; thereby, based on individual country requests, supporting the delivery of relevant elements of multilateral environmental agreements;

(b) Invite UNEP to support mineral-producing countries in accessing environmentally sound technology and finance and developing capacities to increase resource extraction efficiency in order to prevent environmental contamination, remediate legacy areas and reduce pressure on biodiversity and land;

(c) Invite UNEP to support Member States to identify appropriate policy and market signals required by the recycling and manufacturing sectors, enabling them to take advantage of circular economy approaches to manage demand;

(d) Task UNEP with supporting the building of transparency and traceability opportunities to ensure stable and resilient supply chains and markets. Such actions would help strengthen the social compact with diverse stakeholders and build trust, which are critical to increase resilience in the sector.

V. Priority: Protecting the Earth's shield by protecting the stratosphere

16. **The stratosphere, home of the protective ozone layer, is critical for shielding humans and life on Earth from harmful ultraviolet radiation.** Ozone depletion leads to increased ultraviolet B radiation exposure, linked to skin cancer, cataracts, reduced crop yields, changing water regimes and disruption to phytoplankton and ocean health.[20] Thanks to the Montreal Protocol on Substances that Deplete the Ozone Layer, the world has made great strides in reversing damage to the ozone layer by

[17] If the increased demand for just five of the energy transition minerals (copper, nickel, lithium, cobalt and graphite) were sourced from new mines, the world would need 145–245 additional mines by 2030. Source: Energy Transitions Commission, *Materials and Resource Requirements for the Energy Transition* (July 2023). Available at https://www.energy-transitions.org/wp-content/uploads/2023/08/ETC-Materials-Report_highres-1.pdf.

[18] The Secretary-General's Panel on Critical Energy Transition Minerals defines critical energy transition minerals as "the minerals necessary to construct, produce, distribute and store renewable energy". Lists of critical minerals vary, but most include some combination of aluminium, boron, cadmium, chromium, cobalt, copper, gallium, germanium, gold, graphite, indium, lead, lithium, manganese, molybdenum, nickel, platinum group minerals, rare earth elements, silicon, silver, tellurium, tin, titanium, vanadium, zinc and zirconium. See the list in United Nations Environment Programme, *Critical Transitions: Circularity, Equity, and Responsibility in the Quest for Energy Transition Minerals* (Nairobi, 2024).

[19] The Panel on Critical Energy Transition Minerals of the Secretary-General recommended in its report (available at https://www.un.org/sites/un2.un.org/files/report_sg_panel_on_critical_energy_transition_minerals_11_sept_2024.pdf) the following seven voluntary guiding principles as applicable to the entire value chain and life cycle of critical energy transition minerals: human rights; environmental safeguards; justice and equity in value chains; benefit sharing, value addition and economic diversification; responsible and fair investments, finance and trade; transparency, accountability and anti-corruption; and cooperation for global action, peace and security. The guiding principles are supported by five actionable recommendations: accelerating greater benefit-sharing, value addition and economic diversification; traceability for accountability; a global mining legacy fund; empowering artisanal and small-scale miners towards responsibility; and material efficiency and circularity targets to balance consumption and reduce environmental impacts.

[20] United Nations Environment Programme, *Environmental Effects of Stratospheric Ozone Depletion, UV Radiation, and Interactions with Climate Change: 2022 Assessment Report* (2023). Available at https://ozone.unep.org/system/files/documents/EEAP-2022-Assessment-Report-May2023.pdf.

phasing out the chemicals that deplete it. Nevertheless, the following emerging issues are again potentially jeopardizing both the ozone layer and, as a result, human and environmental health:

(a) Climate-altering technologies and measures, sometimes referred to as geoengineering, include methods such as stratospheric aerosol injection, which aims to reflect solar radiation and cool the planet.[21] The nature and scale of the risks of these speculative technologies, which are being proposed for field testing, are highly unknown and could include altering the chemistry of the stratospheric ozone layer;[22]

(b) Large wildfires have also been shown to inject aerosols into the stratosphere, potentially harming the ozone layer.[23] As environmental changes intensify, the frequency, scale and severity of wildfires are on the rise;

(c) Another emerging issue is the rapid expansion of space activity. Emissions from the launch and re-entry of spacecraft and debris are potentially impacting the stratosphere and the troposphere, releasing gases and metals.[24]

17. **The cumulative effect of these activities on the upper atmosphere is still unknown.** History has shown that ignoring the science behind these potential cumulative chemical changes can have serious consequences. Current frameworks for stratospheric protection are fragmented and do not fully address cumulative risks. Five existing space treaties offer partial guidance and the Montreal Protocol recently expanded its assessment of ozone depletion to include space activities and solar radiation modification.

18. **Member States may wish, subject to the availability of resources, to:**

(a) Draw on the report of the Secretary-General, entitled "Our Common Agenda", and the Pact for the Future to establish more coherent, multi-stakeholder processes for periodic scientific review of these evolving issues;[25]

(b) Request UNEP, the World Meteorological Organization and other relevant partners to host periodic evidence-based scientific reviews and convene dialogues on the cumulative impact of new technologies and activities in the stratosphere to enable a more anticipatory and strategic stance for sustainable development while protecting the shield that protects our home.

VI. Priority: Deploying and scaling environmentally sustainable artificial intelligence

19. **Artificial intelligence holds considerable promise for addressing environmental challenges but also entails significant environmental costs.** UNEP tools, such as EnvironmentGPT, which is in testing mode and will be launched at the seventh session, and the International Methane Emissions Observatory's Methane Alert Response System, illustrate the power of artificial intelligence to accelerate emissions tracking, enhance environmental monitoring and improve policy responsiveness.[26] Artificial intelligence could be further integrated to support more holistic analytics, helping to connect diverse data sets and uncover relationships previously undetectable across environmental and economic systems. It is not, however, without trade-offs. Energy- and water-intensive training and inference processes contribute to climate impacts, while the production of artificial intelligence hardware depends on rare earth minerals often extracted from ecologically sensitive regions in the global South. These operations can contribute to biodiversity loss, water insecurity and rising levels of e-waste, disproportionately affecting the communities that are least

[21] United Nations Environment Programme, *One Atmosphere: An Independent Expert Review on Solar Radiation Modification Research and Deployment* (Nairobi, 2023). Available at https://www.unep.org/resources/report/Solar-Radiation-Modification-research-deployment.

[22] Ibid.

[23] M. Stocker and others, "Observing the climate impact of large wildfires on stratospheric temperature", *Scientific Reports* 11, 22994 (2021). Available at https://www.nature.com/articles/s41598-021-02335-7.

[24] United Nations Environment Programme, *Environmental Effects of Stratospheric Ozone Depletion, UV Radiation, and Interactions with Climate Change: 2022 Assessment Report* (2023). Available at https://ozone.unep.org/system/files/documents/EEAP-2022-Assessment-Report-May2023.pdf.

[25] United Nations, *Our Common Agenda – Report of the Secretary General* (New York, 2021). Available at www.un.org/en/content/common-agenda-report/assets/pdf/Common_Agenda_Report_English.pdf.

[26] See https://www.unep.org/topics/digital-transformations/digital-accelerator-lab/ai-solutions-environment.

responsible for the environmental crisis. Without thoughtful governance, artificial intelligence use could reinforce patterns of digital and environmental injustice.

20. **To mitigate these risks and maximize the potential of artificial intelligence, UNEP calls for a balanced, evidence-informed approach aligned with the Global Digital Compact**.[27] A recent UNEP Issues Note on the matter sets out seven recommendations, including the urgent need for internationally accepted standards to assess and reduce the environmental footprint of artificial intelligence throughout its full value chain.[28] In parallel, the forthcoming global environmental data strategy aims to address persistent gaps in data quality, access, governance and interoperability, all of which are prerequisites for the responsible deployment of artificial intelligence.

21. **UNEP also emphasizes the critical role of capacity-building in ensuring that artificial intelligence technologies are equitably developed and deployed.** Building on early efforts such as the Digital4Sustainability Learning Path, UNEP encourages the design of targeted, modular training for Member States, particularly in regions facing structural digital divides. These efforts should be coupled with practical mechanisms for technical knowledge exchange, including a proposed online platform for cooperation on artificial intelligence, enabling Member States with expertise to share tools and insights with those who may benefit from them most.

22. **Member States may wish, subject to the availability of resources, to:**

(a) Convene an expert group to assess the environmental impacts of artificial intelligence across its life cycle and recommend appropriate measurement methodologies, reporting its findings to the Environment Assembly at its eighth session;

(b) Align global efforts by establishing a coalition or observatory for Member States and other stakeholders to share mitigation practices and tools;

(c) Acknowledge the importance of environmental data in driving responsible artificial intelligence and support implementation of the global environmental data strategy, including proposals for a global environmental data utility, expert-led clearing house and harmonized data standards;

(d) Mobilize resources and technical partnerships to support these initiatives, particularly in countries where the need is greatest.

23. By acting in the mentioned ways, UNEP and its partners can help ensure that the environmental benefits of artificial intelligence are shared broadly, while protecting vital ecosystems.

VII. Conclusions

24. The challenges described in the present report – whose effects reach from the outer reaches of the atmosphere to essential water bodies – highlight a need for globally coordinated, solutions-focused action. As the leading global forum on environmental governance, the Environment Assembly must build on existing momentum to realize its commitment to catalysing transformative change. By targeting water resource management, nutrient pollution, mineral governance, stratospheric protection and the environmental footprint of artificial intelligence, Member States can uphold and strengthen the Assembly's mission of protecting the planet and safeguarding the well-being of current and future generations.

[27] The Global Digital Compact is available at www.un.org/global-digital-compact/en.

[28] United Nations Environment Programme, "Artificial Intelligence (AI) end-to-end: The environmental impact of the full AI lifecycle needs to be comprehensively assessed", Issues Note (21 Sept. 2024). Available at https://wedocs.unep.org/handle/20.500.11822/46288;jsessionid=99C93C9FC24F1FBD5594EC602AE5571F.