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International environmental policy and governance issues

Progress in the implementation of resolution 5/9 on sustainable and resilient infrastructure

Report of the Executive Director

I. Introduction

1. The present report provides an update on progress made in the implementation of resolution 5/9 of the United Nations Environment Assembly of the United Nations Environment Programme (UNEP) on sustainable and resilient infrastructure. In paragraph 3 of the resolution, the Environment Assembly requested the Executive Director of UNEP to support Member States and members of specialized agencies in their work to integrate sustainability and resilience into infrastructure planning and delivery by promoting the implementation of existing tools, developing further knowledge, and providing technical assistance and capacity development; supporting the sharing of experiences, and peer-to-peer learning; facilitating private-sector engagement in planning, developing, and mobilizing finance for sustainable and resilient infrastructure; connecting science and policy for sustainable infrastructure; and supporting the implementation of the International Good Practice Principles for Sustainable Infrastructure (SI Principles), including by translating them for application to specific subsystems and stakeholder groups.

2. In the resolution, the Environment Assembly also requested the Executive Director to continue to collect and share best practices, tools and experiences for improving the sustainability of infrastructure systems and to submit a report containing that information to the Environment Assembly at its sixth session. The annex to the present report contains a non-exhaustive list of resources containing good practices, tools, and lessons learned from country experiences.

II. Progress in the implementation of resolution 5/9

3. Trillions of dollars of investment in infrastructure are needed over the coming decades to meet global development needs. Since the typical lifespan of infrastructure assets is measured in decades, the choices made about how this money is invested will have long-lasting impacts on sustainability. If infrastructure investment follows business-as-usual approaches, it will continue to be a driver of the three environmental planetary crises of climate change, biodiversity loss and pollution.

4. To implement the resolution, UNEP built on the implementation of the preceding resolutions, in particular Environment Assembly resolution 4/5 on sustainable infrastructure, and the existing

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networks and partnerships, including the Sustainable Infrastructure Partnership, the 10-Year Framework of Programmes on Sustainable Consumption and Production Patterns (10YFP), and the Partnership for Action on Green Economy (PAGE). Implementation of the resolution contributes to the achievement of outcomes 1A, 1B, 2A, 2B and 3B of the UNEP medium-term strategy for 2025.

5. The present report describes the efforts made by UNEP to implement the resolution using the SI Principles as an overarching framework. This has involved supporting Member States' efforts to integrate sustainability and resilience across all phases of the infrastructure life cycle, including planning, design, procurement, financing, construction, and operations and maintenance, with a focus on the enabling policies for each of these phases. This has entailed working via different projects and initiatives to engage a wide range of relevant actors. For reporting, activities have been grouped according to the three components of the implementation plan: (a) knowledge generation and exchange; (b) strengthening countries' technical and institutional capacity; and (c) mobilizing public and private financing for sustainable and resilient infrastructure projects.

A. Knowledge generation and South-South and triangular exchange

6. Knowledge generation and exchange activities have focused on collection and dissemination of good practices and lessons learned and research into the positive and negative impacts of infrastructure development. Together, these activities have helped to fill knowledge gaps related to the implementation of the SI Principles, generate new data that can inform decision-making, and facilitate peer-to-peer learning among a broad range of actors, covering many different dimensions of sustainable and resilient infrastructure across different phases of the life cycle.

7. A second edition of the *International Good Practice Principles for Sustainable Infrastructure*¹ was published in March 2022 after the principles were updated and endorsed by the Senior Officials Meeting of the United Nations Environment Management Group (EMG) in October 2021. The UNEP-GIZ² Sustainable Infrastructure Tool Navigator³ site was also updated to include new tools and a new case study module featuring an initial six cases from Cabo Verde, Canada, Ghana, Indonesia, Mexico and Ukraine. UNEP produced video versions of the three already-published case studies from Chile, the Islamic Republic of Iran and Zimbabwe. Six additional case studies will be published in advance of UNEA-6. In September 2023, the Global Alliance for Buildings and Construction (GlobalABC) launched the materials hub,⁴ a new resource centre designed to help governments and policymakers around the world develop the policies that are urgently needed to decarbonize and address the resource-use impacts of buildings and construction.

8. Under a project funded by the Global Environment Facility (GEF), the UNEP World Conservation Monitoring Centre (UNEP-WCMC) prepared a global database of planned road and rail investments, mapping their risks to nature versus potential economic and social benefits. This work entailed the development of a new methodology for estimating impacts from linear infrastructure development. The methodology and results were published in a report and an online data viewer.⁵

9. The *Global Resources Outlook 2024*⁶ by the International Resource Panel (IRP) looks at the built environment as well as the infrastructure needs of other provisioning services such as energy, mobility and food. The report demonstrates that in 2020, 55 per cent of all global material demand (about 59 billion metric tons) was related to housing and mobility, including the construction of infrastructure. Of these materials, non-metallic minerals – including sand, gravel and clay – for construction and industrial purposes are the largest component of material use, growing fivefold since 1970. This increase has been related to the massive build-up of infrastructure in many parts of the world. Scenario modelling finds that the stock of materials in the built environment at global level will continue to grow until 2060 due to rising demand for infrastructure services. Assuring the sustainability of the new building stock, retrofitting the existing building stock, using buildings more intensively, and decarbonizing material production are among some of the recommendations highlighted by IRP to decrease the resource intensity of the built environment.

10. IRP, with the support of GIZ, also released three national-level technical guidelines based on the global report *Resource Efficiency and Climate Change: Material Efficiency Strategies for a*

¹ https://www.unep.org/resources/publication/international-good-practice-principles-sustainable-infrastructure.

² Deutsche Gesellschaft für Internationale Zusammenarbeit.

³ https://sustainable-infrastructure-tools.org/.

⁴ https://globalabc.org/sustainable-materials-hub/home.

⁵ https://www.giiviewer.org/.

⁶ This report will be presented to the Environment Assembly at its sixth session.

*Low-Carbon Future.*⁷ These include assessments of the potential greenhouse gas emissions reductions from material efficiency strategies applied in residential buildings in G7 countries, as well as China and India. The national technical guidelines identify country-specific material efficiency strategies with greenhouse gas emissions reduction potential that can accelerate the net-zero agenda in the residential building construction sector in Argentina, Indonesia and Mexico. These include: the use of low-carbon materials, using less material by design, material decarbonization and substitution, decarbonization of manufacturing processes, and reducing waste and increasing reuse and recycling.

11. In the framework of GlobalABC, UNEP and the Yale Center for Ecosystems + Architecture (Yale CEA) published a report in September 2023 on decarbonizing and reducing waste generated by buildings and construction. The report, *Building Materials and the Climate: Constructing a New Future*, advocated for the use of a whole-life-cycle approach through the joint implementation of three overarching strategies to decarbonize building materials: avoid unnecessary extraction and production, shift to regenerative materials, and improve decarbonization of conventional materials.⁸

12. UNEP developed a pilot version of a framework for measuring progress on sustainable and resilient infrastructure at the national level, based on the methodology of the Green Economy Progress Measurement Framework developed under PAGE in consultation with a group of international experts. The pilot measurement framework requires further iterative development, and UNEP is exploring potential channels for engaging key partners and experts, including the Economic Commission for Europe and the members of the Green Growth Knowledge Partnership.

Working in partnership with the Environmental Change Institute at the University of Oxford 13. and the United Nations Office for Project Services (UNOPS), UNEP conducted an analysis of the potential contribution of nature-based infrastructure solutions (NbI) to the Sustainable Development Goals, the Paris Agreement on climate change and the Kunming-Montreal Global Biodiversity Framework. The results, published in the report Nature-Based Infrastructure: How Natural Infrastructure Solutions Can Address Sustainable Development Challenges and the Triple Planetary $Crisis^{9}$ in November 2023, found that nature-based infrastructure solutions can influence up to 79 per cent of Sustainable Development Goals targets across all 17 goals. When such solutions are used together with built infrastructure, the combination can have a much greater impact on progress towards the Sustainable Development Goals, influencing approximately 25-50 per cent more targets, than when either is used on its own, largely because of the multiple additional environmental, social and economic benefits derived from nature-based infrastructure solutions. Nature-based infrastructure also has the potential to affect 70 per cent of Global Biodiversity Framework targets and contribute to both mitigation and adaptation objectives under the Paris Agreement. It is the only type of infrastructure intervention that can contribute to simultaneous positive progress on the Sustainable Development Goals and the targets of the Paris Agreement and the Global Biodiversity Framework.

14. UNEP is also developing two new tools that will support the implementation of the SI Principles. The first is a collaboration with UNOPS to create a tool for assessing policy alignment with the SI Principles that builds on the existing UNOPS Capacity Assessment Tool for Infrastructure (CAT-I); the second is a methodology for integrating nature into infrastructure planning processes being developed in collaboration with the University of Oxford.

15. In addition to the above-mentioned knowledge generation activities, UNEP has organized and participated in knowledge dissemination and exchange and made concerted efforts to share best practices, tools and experiences through a range of media, including partners' publications, blog posts and podcasts. Events co-hosted by UNEP included a joint event with the Institution of Civil Engineers that brought together government officials and civil society to share how they have used existing tools to integrate sustainability concerns into infrastructure planning; a seminar on transport infrastructure and biodiversity with the French Ministry of Ecological Transition; and a seminar on the infrastructure sustainability learning (ISLe) model.

B. Country engagement, technical assistance and capacity-building

16. With financial support from Switzerland, UNEP supported the Economic Commission for Europe and its member States in the planning and preparations for the 2022 Environment for Europe Ministerial Conference, where sustainable infrastructure was one of the two themes. UNEP contributed to the development of background documents and framing for the event, provided guidance on voluntary commitments that countries could make to contribute to the implementation of

⁷ https://www.resourcepanel.org/reports/resource-efficiency-and-climate-change.

⁸ https://www.unep.org/resources/report/building-materials-and-climate-constructing-new-future.

⁹ https://doi.org/10.59117/20.500.11822/44022.

the SI Principles, and hosted a side event at the conference on financing nature-based infrastructure. In total, member States made 40 commitments regarding actions to support sustainable and resilient infrastructure.¹⁰

17. In one output of the Environment Management Group consultative process on sustainable infrastructure, begun as part of the implementation of Environment Assembly resolution 4/5, UNEP, the United Nations University Institute for Integrated Management of Material Fluxes and of Resources, and the Ministry of Public Works of Chile conducted an enabling environment assessment that identified critical barriers to sustainable infrastructure in Chile and prioritized means of addressing them. UNEP also signed a memorandum of understanding with the Ministry of Public Works of Chile to provide continued support on sustainable infrastructure. Building on links with PAGE, UNEP also completed enabling environment assessments in Rwanda and Thailand, and has further assessments planned in Costa Rica, El Salvador and South Africa.

18. UNEP, the Global Centre on Adaptation, the University of Oxford and UNOPS jointly supported the Government of Ghana in the development of a national infrastructure resilience road map for the water, energy and transport sectors.¹¹ The road map is the result of a climate risk assessment for built and natural assets in the three sectors and includes 35 concrete interventions by which the Government can increase infrastructure resilience. The methodology and outputs of the road map are informing the development of Ghana's national adaptation plan, which is being led by UNEP with funding from the Green Climate Fund. UNEP is also working with GIZ, the International Institute for Sustainable Development, UNOPS and the Ministry of Environment, Science, Technology and Innovation of Ghana to support the implementation of one prioritized action from the road map by providing technical assistance and capacity-building to integrate nature into national infrastructure planning processes.

19. UNEP is working with the Ministry of Works and Housing of Ghana to develop a national road map for buildings and construction under the project "Transforming the Built Environment through Sustainable Materials", which is funded by the Federal Ministry for Economic Cooperation and Development of Germany and is also being implemented in Bangladesh, India and Senegal. The national road map will outline key steps towards decarbonization of the buildings and construction sector.

20. With financial support from the Government of China and the Global Environment Facility, and working with Sustainable Infrastructure Partnership partners and the Governments of Mexico, Rwanda and Singapore, UNEP conducted three week-long regional capacity-building workshops on sustainable and resilient infrastructure for policymakers in South-East Asia, Latin America and East Africa between November 2021 and September 2022. In 2022, UNEP also held two workshops on gender-responsive infrastructure, in Côte D'Ivoire and Zambia, which helped inform the development of policy briefs on gender and infrastructure in each country.

21. Building on previous work in Rwanda and its status as a new PAGE partner country, UNEP delivered an intensive, week-long training-of-trainers on sustainable and resilient infrastructure for Rwandan policymakers in April 2023. Discussion of potential follow-up activities is ongoing, with a strong focus on transport infrastructure and biodiversity and links to the PAGE workplan, which is still being developed by the PAGE partners.

22. In partnership with Duke University, Conservation International and the International Coalition for Sustainable Infrastructure, UNEP launched the Infrastructure Sustainability Learning (ISLe) Initiative, which aims to build capacity by facilitating peer-to-peer learning and knowledge exchange through a network of virtual communities of practice for sustainable infrastructure practitioners working on common topics or in common geographies, supported by a centre of excellence. A year-long pilot training programme on the implementation of the SI Principles was completed, with the participation of more than 700 policymakers and practitioners worldwide, including the private sector. Planning and fundraising for phase 2 of the ISLe Initiative are under way, with a goal of launching three new peer-to-peer networks by the end of 2023.

23. In November 2022, the Governments of France and Morocco and GlobalABC announced the Buildings Breakthrough initiative, which aims to make near-zero emission and resilient buildings standard by 2030. Twenty-five countries had already joined the Buildings Breakthrough initiative ahead of its official launch at the twenty-eighth Conference of the Parties to the United Nations Framework Convention on Climate Change in November 2023. The launch will be followed by a

¹⁰ https://www.greenpolicyplatform.org/initiatives/batumi-initiative-green-economy-big-

e/knowledge?f%5B0%5D=initiative knowledge theme%3A52529.

¹¹ https://content.unops.org/publications/Ghana-roadmap-web.pdf.

Buildings and Climate Global Forum in March 2024 to reinforce intergovernmental collaboration on buildings and climate across the construction sector value chain.

UNEP, as the secretariat of the 10-Year Framework of Programmes on Sustainable 24. Consumption and Production (10YFP) and its One Planet network, is mobilizing key partners and stakeholders in the development of a flagship initiative dedicated to raising climate ambitions in the buildings and construction sector through circularity, leveraging the power of public procurement. In the context of the new Global Strategy for Sustainable Consumption and Production (2023-2030), which identifies sustainable public procurement as a key enabler for change in high-impact sectors and value chains, the flagship initiative will: (a) develop and promote global norms, standards and practices for circularity in the construction sector, using a whole life cycle approach, in partnership with governments and the private sector; and (b) establish a strategic commitment framework and a multi-stakeholder knowledge-sharing and capacity-building partnership to help national and local governments use their planning, managing and purchasing power to accelerate the uptake of such norms, standards and practices. The flagship initiative is in its early stages and brings together GlobalABC, through its circular economy for construction materials sub-working group, led by Finland and the Royal Melbourne Institute of Technology(former leads of the One Planet network's Sustainable Buildings and Construction Programme), and the One Planet Network Sustainable Public Procurement programme, with the support of UNOPS and UN-Habitat.

C. Public and private finance for sustainable infrastructure

25. While private-sector investment and technical expertise are increasingly needed to help close the infrastructure gap, the public sector still accounts for most infrastructure investment. To help align public budgets with sustainable infrastructure investment, UNEP, working with the Smith School of Enterprise and the Environment at the University of Oxford, has developed sustainable public budgeting tools that can be applied to planned infrastructure spending to identify opportunities, barriers and gaps, and develop recommendations for increasing investment in sustainable, resilient and inclusive infrastructure. This toolkit will be piloted in El Salvador and can then be applied in additional countries.

26. As part of the pilot work in El Salvador, UNEP will also identify pathways and mechanisms for mobilizing financing for sustainable infrastructure projects by cooperating with multilateral and regional development banks, such as the Asian Infrastructure Investment Bank, and provide technical assistance and capacity-building to help private financial institutions and investors finance nature-based infrastructure solutions and align portfolios with sustainable infrastructure objectives. This approach can then be applied in other countries. Beyond the work in El Salvador, UNEP is also engaging with regional development banks on mobilizing finance, including exploring partnerships with the Asian Infrastructure Investment Bank and the European Investment Bank. In the case of the latter, UNEP is exploring ways it can help to integrate sustainability and resilience into projects delivered as part of the European Union's Global Gateway Initiative.

27. GlobalABC, in collaboration with UNEP Finance Initiative, conducted regional training for commercial banks from Eastern Europe, the Asia-Pacific region and Africa on investment in green buildings as a means of shifting their investment portfolios towards a greater proportion of assets with lower embodied and operational carbon. Additional training is planned for Latin America in 2024.

III. Lessons learned

28. If planned well, infrastructure investments can respond to multiple crises, including climate change mitigation and adaptation, resource overuse, biodiversity loss, and pollution. However, most new infrastructure development continues along the "business-as-usual" pathway that fails to deliver sustainable infrastructure on the scale required to respond to global challenges; and much of the forward planning still fails to anticipate the likely impacts of an increasingly volatile climate.

29. Integrated approaches that consider all aspects of sustainability throughout the infrastructure life cycle in a way that accounts for interlinkages between different infrastructure systems can contribute to more sustainable and resilient outcomes. When infrastructure is viewed as a "system of systems", trade-offs and synergies from different projects and sectors can be balanced to achieve more efficient and sustainable service delivery that better contributes to national sustainable development objectives.

30. Infrastructure planning needs to be modelled on forward-looking trends, and not only on historical and "backward-looking" data. Future infrastructure planning needs to consider the possible and emerging scenarios put forward by the Intergovernmental Panel on Climate Change, so that

100-year flood maps of tomorrow and other relevant modelling tools consider the most up-to-date scenario analysis. Practitioners will also need to integrate nature-based solutions into planning and design processes, necessitating a rethink of current and existing school and university curricula in the area of sustainable infrastructure.

31. To reduce the resource and carbon intensity of infrastructure development and operation, planners and designers should consider all available options for meeting service needs, starting with alternatives to building new "grey" infrastructure. These could include increasing the longevity of existing infrastructure systems, investing in natural and nature-based infrastructure, "dematerialized" solutions enabled by digital technology, and managing demand for certain services.

32. Many ongoing challenges to sustainable and resilient infrastructure need to be addressed. They include lack of coordination across sectors and disciplines among the major actors at the international and national levels; a lack of capacity to navigate the wealth of information and tools available, to understand when, why and how to use them, and then to create the institutions, policies and governing frameworks (i.e., the enabling environment) needed to apply them effectively; the perception that sustainable infrastructure is more expensive than less sustainable "business-as-usual" options; a lack of financing mechanisms for sustainable infrastructure, especially nature-based infrastructure; and a lack of capacity to develop pipelines of bankable sustainable and resilient projects.

33. To address these challenges, more financial and technical support is needed, including capacity-building and technical assistance related to integrating nature and ecosystem services into infrastructure planning processes and investment decisions, inter-ministerial and inter-disciplinary coordination, building the business case for sustainable and resilient infrastructure solutions that factor in the long-term economic, social and environmental benefits that can offset upfront costs, and the development of innovative financing mechanisms that incorporate these costs and benefits and allocate risk accordingly.

34. UNEP has seen growing interest and commitments from countries that wish to use the SI Principles to inform national infrastructure policies and master plans as a means of aligning them with the Sustainable Development Goals and the Paris Agreement and have requested UNEP support in doing so. Providing the requested support will require additional financial resources to be mobilized.

IV. Recommendations and suggested actions

35. Addressing sustainable infrastructure challenges requires a wide range of stakeholders and partners to be engaged, including policymakers, planners, designers, builders, operators, and financers and investors. Governments, however, have an important role to play in creating an enabling environment for investments in sustainable and resilient infrastructure. For this reason, the Assembly may wish to emphasize the need to strengthen national policy and regulatory measures to mainstream sustainability and nature into infrastructure financing decisions as a means of aligning public and private finance with national plans and strategies to implement the Kunming-Montreal Global Biodiversity Framework and 1.5°C pathways.

Annex

List of resources

The following is a non-exhaustive list of available resources that highlight good practices, lessons learned, available tools and other resources related to sustainable infrastructure.

- The Sustainable Infrastructure Tool Navigator is a database of more than 100 tools for integrating sustainability across the infrastructure life cycle, accompanied by case studies of their use.
- The International Good Practice Principles for Sustainable Infrastructure reflect international good practice collected through consultations with more than 30 partner organizations and more than 70 Member States.
- The Green Growth Knowledge Platform hosts a database of sustainable infrastructure case studies that highlight best practices and lessons learned.
- The Global Alliance for Buildings and Construction (GlobalABC) Sustainable Building Materials Hub contains resources for decarbonizing the construction sector.