Strengthening the Science-Policy Interface in Order to Operationalize Sustainable Development

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Introduction

The COVID-19 pandemic and overlapping global issues, including geopolitical conflicts, economic crises and climate change, have made the achievement of the 2030 Agenda for Sustainable Development and its Sustainable Development Goals (SDGs) more challenging. Realizing the objectives set out in the SDGs will require broad engagement and commitment from Governments, the private sector, funding bodies, scientists and engineers, and civil society. In some countries, including the United States of America,[2] recognition of the SDGs remains low, despite the high degree of interest in the types of activities included in the SDGs.

As the midpoint of the 15-year timeline for achieving the SDGs approaches, it is becoming increasingly clear that action must be taken to strengthen the science-policy interface and create research agendas to inform the post-2030-Agenda processes. In November 2022, an expert committee of the National Academies of Sciences, Engineering, and Medicine (NASEM) in the United States released a short consensus report, *Operationalizing Sustainable Development to Benefit People and the Planet*, that identifies key research priorities and possible actionable steps to operationalize sustainable development.[3] The present contribution offers constructive, forward-looking assessments based on the lessons learned from some of the positive case studies in the NASEM report, focusing on the productive intersection of nature, society, science, and technology.

As the SDGs are interrelated and can often be mutually reinforcing, common priorities across the eight themes highlighted in the report include the need for multi-stakeholder, multisectoral collaboration and the importance of participatory processes in decision-making. One takeaway from the case studies presented below is that it is important to build trust among different stakeholders to enhance science-policy interfaces for an integrated implementation of the SDGs that builds on their synergies and minimizes possible negative interactions.

The scientific community can play an important role in building trust among government, industry, and local community stakeholders by listening to and acknowledging their needs and by exploring ways to make science systems more inclusive, equitable and socially relevant. The science-policy interface is strengthened by all stakeholders collectively participating in decision-making, setting priorities, and managing trade-offs, which could help strengthen public trust in science and support inclusive knowledge production and capability-building. This collective listening and decision-making process takes time and effort but is essential. Scientists working together with other stakeholders can support the adoption of evidence-based policies and actions that can bolster and even accelerate the implementation of the SDGs.

Education and capacity-building

Education is critical to achieving the SDGs, and educational institutions at all levels are powerfully positioned to stimulate the operationalization of sustainable development across society. Achievement of SDG 4 (quality education) requires making complex subjects understandable, building mindsets for long-term engagement, transforming abstract SDGs into locally relevant issues, taking actions for change, and engaging children at a young age.

One promising initiative at the K-12 level is the work of the Smithsonian Science Education Center (SSEC),[4] which promotes active inquiry-based science, technology, engineering and math (STEM) teaching and learning; advances K-12 STEM education for sustainable development; and ensures diversity, equity, accessibility and inclusion in K-12 STEM education.[5] In 2016, SSEC intentionally aligned its work with the SDGs, creating the Smithsonian Science for Global Goals project in collaboration with the InterAcademy Partnership, an umbrella group of more than 140 science and medicine academies, to help young people discover, understand and act. Locally relevant, locally driven but globally important experiential learning experiences combine STEM education, social and emotional learning, and civic engagement in a process similar to the multi-stakeholder process described above.

At the tertiary level, Carnegie Mellon University (CMU) serves as an example of how colleges and universities can operationalize sustainability. In 2019 CMU launched the campus-wide, multidisciplinary Sustainability Initiative, through which the first United States-based voluntary university review (VUR) was developed to assess how education, research and practice in a post-secondary educational setting align with the SDGs.[6] CMU students have been involved in creating a voluntary local review (VLR) for the City of Pittsburgh and capstone projects to develop case studies in several cities in the United States and Canada that are tracking the impact of pandemic relief and recovery funds on issues relating to social justice needs (including SDGs 2, 3, 10 and 16). To operationalize sustainable

development, universities could develop partnerships with local and national governments, business communities, and civil society organizations to develop VURs and VLRs for their local communities to evaluate needs and take actionable steps to advance progress toward the SDGs.

Localization of the SDGs

While the SDGs embrace global aspirations, they must be rooted in local buy-in and implementation. Local communities have an important role to play in achieving the SDGs; however, jurisdictional boundaries, regulatory limitations and financing considerations can create obstacles. Electoral cycles can be tricky as government champions may come and go, but embedding sustainability into government, citizens groups, and informal networks provides the longevity needed.

As an on-the-ground example of localization, Hawai'i Green Growth (HGG) uses and contributes knowledge through a number of networks that provide examples of what works and what could be approached in a better way.[7] Launched in 2011, HGG brings together more than 150 diverse stakeholders committed to economic, social, and environmental priorities. Success rests on four key pillars: leadership commitment, public-private partnerships, measurement of progress, and concrete, on-the-ground action. The common language of the SDGs can be used to produce data that are transparent and useful. An online open data dashboard shows citizens the progress being made and where work is falling short. Measuring what matters encourages multi-stakeholder-driven development of local metrics and indicators and an understanding of how diverse metrics are related to each other and to the SDGs. Progress towards SDG 17 (partnerships) is essential but must move at the pace of trust.[8] People often want to take quick action, but process matters; it takes time to convene and connect diverse partners, identify shared priorities, measure what matters, and coordinate partnerships to drive action. In 2020, Hawai'i became the first state in the United States to conduct a voluntary state review.

To localize the SDGs, there is a need to explore ways to make science systems more inclusive and equitable—to involve a wider range of voices, institutions, types of knowledge, and approaches to learning that are designed to capture local needs and thus strengthen the local science-policy interface. Local officials could use the SDG framework to align local policies and initiatives. Urban and community leaders could tap into existing knowledge networks to advance sustainability, exploring the resources and activities of entities such as C40, the Brookings Institution (SDG Leadership Cities initiative), the Global Island Partnership, UCLG Learning, Vikalp Sangam, the Global Tapestry of Alternatives, and the African Network

of Cities.[9] As more states and cities in the United States conduct VLRs, the federal Government could leverage and synthesize this knowledge and work to conduct a voluntary national review (VNR).

Urbanization

Although SDG 11 (sustainable cities and communities) most directly targets urban areas, cities will not realize the goal of becoming "inclusive, safe, resilient and sustainable" without progress on related SDGs. Many opportunities exist for synergies among SDGs related to urbanization. For example, restoring wetlands and urban forests can bolster food security, provide flood and drought relief, buffer urban heat island effects, and reduce air pollution, as well as providing city dwellers mental and physical relief from stress. Transitioning to low-carbon (including bike-friendly or bus-based) transport systems can not only reduce carbon emissions, but also decrease obesity levels, improve local economies, and reduce air pollution. Decreasing carbon emissions by x per cent or increasing tree cover by y per cent may be possible, but doing so without exacerbating inequity or worsening poverty and vulnerability is more challenging and difficult. To generate sustainable prosperity and improve the quality of life for urban residents, a new development paradigm is required.

An initiative being carried out in Porto Alegre, Brazil, illustrates how this synergistic approach can help engage citizens at the local level and over the long term to make sustainability fun and aspirational. Founded in 2001, Global Urban Development has been involved in a World Bank-funded strategy for the state of Rio Grande do Sul in southern Brazil. The Sustainable Innovation Zone was created within Porto Alegre, a city of 1.5 million, with the aim of making the city the most solar-powered, energy-efficient, bike-friendly, circular-economy, and digitally connected community in Latin America by 2030.[10] Community members have joined together to plan and take part in activities involving community gardens, composting centres, electric car and bike sharing, solar posts and rooftops, and much more. A bottom-up approach, with neither State nor city officials in charge, involves civil society, academia, business, and government actors. Elements for change include taking actions and producing results to show what sustainable improvements will look like, participatory inclusiveness, and independent non-partisanship to survive electoral changes in political leadership. This experience demonstrates that strategies must be participatory and co-developed at all stages, with recognition given to the importance of collaboration and knowledge-sharing in achieving sustainable urbanization. If tied too closely to the agenda of a mayor or other leader at the helm, strategies could fall apart with changes in leadership.

Science, technology and innovation for the SDGs

Science, technology and innovation (STI) are major pillars for accelerating progress towards the SDGs. STI partnerships across sectors and disciplines offer hope for resurgent multilateralism and innovative approaches to advance the SDGs.[11] Several challenges to applying STI have surfaced and in some cases have been exacerbated by the COVID-19 pandemic and geopolitical and social unrest. One such challenge is the digital divide, in which access to digital technologies is uneven and inequitable across and within countries. As the interconnected world relies more heavily on such technologies, countries and people without digital access may fall further behind.[12] Full realization of the benefits of digital technology and mitigation of its detriments require appropriate governance, infrastructure, resources, and capabilities, as well as the capacity of individuals, communities, and companies to absorb and apply them.

The United Nations Interagency Task Team on Science, Technology and Innovation for the SDGs (IATT), coordinated by the United Nations Department of Economic and Social Affairs and United Nations Conference on Trade and Development,[13] is leading the Global Pilot Programme on STI for SDGs Roadmaps, which offers a promising approach to planning for how STI can accelerate a country's efforts towards achieving the SDGs. IATT began this pilot project with Ethiopia, Ghana, India, Kenya and Serbia and continued to scale with the addition of Ukraine. The Roadmaps process involves six steps: (1) define objectives and scope; (2) assess the current situation; (3) develop a vision, goals, and targets; (4) assess alternative pathways; (5) develop a detailed STI for SDGs roadmap; and (6) execute, monitor, evaluate, and update the plan.[14] Key inputs include stakeholder consultations, technical and managerial expertise, and data and the evidence base. Lessons from the Roadmaps pilot underline the importance of (a) ensuring active participation across government, scientists and engineers, industries, and non-governmental and local community stakeholder groups to develop a coherent vision, goals, and targets;[15] (b) using this enhanced science-policy interface and up-to-date data and expertise to assess STI options; and (c) earmarking budgets

to implement the initiative. Among the pilot countries, Ghana is committed to strengthening institutional coordination and institutionalizing mechanisms for monitoring and evaluating STI for SDG strategies,[16] while Ethiopia and Ukraine are involved in conflicts that have disrupted their plans for sustainable development, illustrating that wars and local conflicts may be the greatest threat to achieving the SDGs.[17] Although countries are dealing with different challenges that may affect the prioritization or implementation timeline of STI for SDG strategies, the Roadmap offers a clear pathway for moving forward when the time is right.

Conclusion

As the midpoint of the implementation of the 2030 Agenda approaches, there is an urgent need to accelerate actions for sustainable development. Accelerating progress on operationalizing sustainable development involving all levels of government and all sectors of society can be a major stepping stone towards realizing the optimistic future envisioned in the 17 SDGs. Experience has shown the folly of relying on technology-only solutions or simply copying something that has worked in one place but will generally not work in another.[18] The positive case studies shared in this contribution demonstrate that it is important to build trust among different stakeholders to enhance science-policy interfaces for the integrated implementation of the SDGs. The scientific community can play an important role through actively collaborating in multi-stakeholder processes in decision-making, setting priorities, and managing trade-offs to help enhance public trust in science and support inclusive knowledge production. To operationalize sustainable development, there is a need to explore ways to make science systems more inclusive and equitable–to involve a wider range of voices, institutions, types of knowledge, and approaches to encourage learning, capacity-building, and producing knowledge that are attuned to local needs. It is essential to identify governance models and arrangements that could strengthen science-policy interfaces and accelerate local transformations for sustainable development.

Endnotes

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2 Kait Pendrak, Oneika Pryce and Krista Rasmussen, "What do Americans really think about the SDGs?", United Nations Foundation blog post, 8 September 2022, available at https://unfoundation.org/blog/post/what-do-americans-really-think-about-the-sdgs.

3 The report builds on discussions among scientists, policymakers, business leaders and youth leaders during the 2021 Nobel Prize Summit: Our Planet, Our Future; see National Academies of Sciences, Engineering, and Medicine, *2021 Nobel Prize Summit: Our Planet, Our Future: Proceedings of a Summit* (Washington, D.C., The National Academies Press, 2021), available at https://doi.org/10.17226/26310. The expert committee was assigned to convene two public workshops in spring 2022 to gather information on positive case studies across eight interrelated themes, which served as the primary source of evidence for its work; see National Academies of Sciences, Engineering, and Medicine, *Operationalizing Sustainable Development to Benefit People and the Planet* (Washington, D.C., The National Academies Press, 2022), available at https://doi.org/10.17226/26654.

4 See the Smithsonian Science Education Center website (https://ssec.si.edu/).

5 Carol O'Donnell, Smithsonian Science Education Center, presentation at the NASEM Committee on Operationalizing Sustainable Development's first information gathering workshop, 18 April 2022.

6 Sarah Mendelson, Carnegie Mellon University, remarks at the NASEM Committee on Operationalizing Sustainable Development's first information gathering workshop, 18 April 2022.

7 Celeste Connors, Hawai'i Green Growth—United Nations Local 2030 Hub, presentation at the NASEM Committee on Operationalizing Sustainable Development's first information gathering workshop, 21 April 2022.

8 Ibid.

9 Information on the knowledge-sharing activities of these entities can be accessed on their respective websites: https://www.c40.org; https://www.brookings.edu/multi-chapter-report/city-playbook-for-advancing-the-sdgs; https://www.glispa.org; https://learning.uclg.org; https://vikalpsangam.org; https://globaltapestryofalternatives.org; and https://aston-network.org. The Brooking's Institution link provides access to its *City Playbook for Advancing the SDGs: A Collection of How-To Briefs on Advancing the Sustainable Development Goals Locally.*

10 Mark A. Weiss, Global Urban Development, "Sustainable innovation and inclusive prosperity: Porto Alegre Sustainable Innovation Zone (ZISPOA)", presented at the NASEM Committee on Operationalizing Sustainable Development's first information gathering workshop, 21 April 2022.

11 Truman Center, "Broadening diplomatic engagement across America: report of the Truman Center City and State Diplomacy Task Force, June 2022", available at https://www.trumancenter.org/issues/subnational-diplomacy.

12 Klaus Tilmes, remarks at the NASEM Committee on Operationalizing Sustainable Development's second information gathering workshop, 4 May 2022.

13 See United Nations, Department of Economic and Social Affairs, "Partnership in Action on Science, Technology and Innovation for SDGs Roadmaps", blog post, 31 May 2022, available at https://sdgs.un.org/blog/partnership-action-science-technology-and-innovation-sdgs-roadmaps-24893.

14 United Nations, Sustainable Development Goals, "Goal 10: reduce inequality within and among countries", available at https://www.un.org/sustainabledevelopment/inequality.

15 United Nations, Department of Economic and Social Affairs, 2023 Global Sustainable Development Report, draft version, available at https://sdgs.un.org/gsdr/gsdr2023.

16 Cynthia Asare Bediako, "Sharing Ghana's experience with STI4SDGs Roadmap development", report presented at the sixth annual Multi-Stakeholder Forum on Science, Technology and Innovation for the Sustainable Development Goals, 4-5 May 2021.

17 Sam Viney, "Q&A: Russia-Ukraine war 'hindering SDGs progress'", SciDev.Net, 15 December 2022, available at https://www.scidev.net/global/opinions/russia-ukraine-war-conflict-hindering-sdgs-progress.

18 David Peter Stroh, *Systems Thinking for Social Change: A Practical Guide to Solving Complex Problems, Avoiding Unintended Consequences, and Achieving Lasting Results* (White River Junction, Vermont, Chelsea Green Publishing, 2015).