This submission is on behalf of Geology for Global Development, a science-for-sustainable development NGO mobilising and equipping Earth and environmental scientists to help deliver the SDGs. We have supported detailed analysis of the role of Earth science in the 2030 Agenda [1], and here offer four reflections relevant to Session 2 of the 2021 UN Forum on Science, Technology, and Innovation for the SDGs - *Effective paths towards the SDGs: STI for ending poverty and hunger, enhancing human well-being, and building resilience*.

First, understanding the natural environment should be at the centre of education for sustainable development. Tackling poverty and increasing well-being requires access to basic services, including clean water and sanitation, and natural resources (SDG 1.4), and increased resilience to environmental shocks and stresses (SDG 1.5). Improved public understanding of the dynamics of environmental systems and planetary boundaries can help to encourage appropriate and decisive actions, at all levels, to deliver these objectives and secure a resilient and sustainable future [2]. This requires commitments to support and strengthen those institutions tasked with environmental data collection, management, integration, analysis, and access (e.g., national geological surveys, hazard monitoring agencies, ministries of water), to ensure they are effective, accountable, and transparent (SDG 16.6), with public access to information (SDG 16.10).

Second, understanding the Earth science contributions required to deliver the SDGs in national contexts is needed to identify and bridge any training gaps. Global commitments to ending poverty (SDG 1) and hunger (SDG 2), enhancing human well-being (SDG 3) and building resilience (SDGs 1, 9, 11) will require Earth scientists with specialised training in (for example), hydrogeology, geochemistry, soil science, engineering geology, waste management, and energy geoscience. A lack of appropriate Earth science expertise will hinder the implementation of the SDGs. We need to systematically understand the required contributions from Earth science (and other STEM) professionals to national SDG implementation programmes. This will inform analysis of training gaps and the interventions required to strengthen the STEM workforce (also supporting the creation of decent, resilient STEM jobs; SDG 8) to help end poverty and hunger, improve wellbeing, and build resilience.

Third, valuing and protecting geodiversity is key to improving health and wellbeing. Efforts to protect, conserve, and restore the natural environment are key to achieving the targets of SDG 3. There is growing evidence that access to and contact with nature and the natural environment can enhance physical and mental wellbeing (SDG 3.4). Ecosystems and their biodiversity, topography and landforms are shaped (in part) by the underlying geology and geological processes on the land surface and subsurface. These complex interrelationships must be understood to achieve SDG 3, requiring increased collaborations between Earth scientists, ecologists, and health professionals. UNESCO Global Geoparks provide one opportunity to protect geodiversity, and explore, develop, and celebrate the links between geodiversity and public health (as well as poverty alleviation, education, and sustainable tourism). We endorse the call to create an International Geodiversity Day [3] to raise awareness of the essential role of Earth science knowledge.

Finally, characterising geodiversity (and understanding the subsurface) can strengthen resilience in diverse contexts. Understanding Earth resources, systems, and dynamics is foundational to building resilience of the world's poorest communities (SDG 1.5) and agricultural systems (SDG 2.4), as well as infrastructure (SDG 9.1), and cities (SDG 11.5). For example, characterising groundwater resources is key to ensuring sustainable withdrawals (SDG 6.4) and therefore building community and agricultural resilience. Integrated urban planning (SDG 11.3) is needed to increase resilience to disasters for the urban poor (SDG 1.5, 11. B). This is informed by research on different geological materials and their geotechnical characteristics, the dynamics of ground and surface water, and geophysical processes contributing to risk. Understanding the complex relationships between geodiversity and social, built, and other natural environments can help build resilience, and indicates that Earth scientists are invaluable contributors to sustainability discourse, planning, and policy.

We are grateful for the opportunity to input into this important dialogue.

[1] Gill JC, Smith M (Eds.), 2021, Geosciences and the Sustainable Development Goals. Springer. doi.org/10.1007/978-3-030-38815-7

[2] Gill JC, White E, Hartigan, J (2018) Enhancing Earth Science Education to Support Sustainable Development, Invited Submission to 2nd International Commission on Education for Sustainable Development Practice Report.

[3] https://www.geodiversityday.org/