1 Identification

1.1 Session ID: 180117

1.2 Session Title: Exploring the Nexus of Soil Health, Diversified Crops, and Agricultural Productivity for Achieving the Sustainable Development Goals

1.3 Session Date and Time: September 18, 17:00

1.4 Convenor name: Cathy McKinnell

2 Speakers and Panelists

Please list all speakers and panellists, including their names, titles, and organisational affiliations.

2.1 Speaker 1

2.1.1 Name: Dr. Rattan Lal

2.1.2 Organisation name: Distinguished University Professor of Soil Science at The Ohio State University and Co-Founder CA4SH

2.1.3 Type of organisation: Academic Institution

2.1.4 Title of the presentation: Sustainable Development Goals and Global Soil Resources

2.1.5 Summary of the presentation (max 200 words): Seventeen Sustainable Development Goals (SDGs) of the Agenda 2030 of the United Nations launched in 2015 are to be concluded in 2030 with the primary focus on "peace and prosperity for people and the planet." Direct impact of soil is evident on SDGs 1, 2, 3, 6, 13, and 15, with an indirect impact also observed on all the other SDGs. However, there is still a lack of specific mention to global soil resources and their sustainable management in the SDGs, which is partly due to poor understanding of the importance of soil to creating, strengthening and sustaining critical ecosystem services for humanity and nature. Yet, sustainable agriculture and innovative soil management must be integral to any part of the solution to restore and manage soil resources beyond food and fuel. This transformation in the mind-set of humanity would require change of the curricula from kindergarten to high school and beyond with clear focus on global soil resources and their sustainable management. A Soil Health Act must be enacted in all countries with specific provision of rewarding farmers and land managers for strengthening of ecosystem services (i.e., carbon sequestration, water conservation,) through protection, sustainable management, and restoration of global soil resources.

2.2 Speaker 2

2.2.1 Name: Dr. Sieg Snapp

2.2.2 Organisation name: International Maize and Wheat Improvement Center (CIMMYT)

2.2.3 Type of organisation: Research Center

2.2.4 Title of Presentation: Open, inclusive science to improve environmental and food security in a changing world

2.2.5 Summary of the presentation (max 200 words): Extreme weather events are challenging agrifood systems all over the globe, as seen across the global south. This rapidly changing environment requires complementary processes and open science to augment conventional science. If sustainable intensification is to be achieved, there is urgent need to invest in co-generation of knowledge to empower land managers and food producers to cope and adapt. Support for Findable, Accessible, Interoperable & Reusable (FAIR) Principles in data generation and management is one important step. Emerging examples of open science in action includes on-line maps of soils that are annotated with the source of information that link in indigenous knowledge. The government of Nepal is pioneering the use of on-line soils map to improve soil health and fertilizer targeting. This living document is being updated constantly and promoting informed policy making. Other examples include public-private partnerships with researchers for diversified legume systems in Malawi and regenerative agriculture. Harnessing advanced communication capacity is being explored in Zambia where a call in system provides a new voice for youth, women and elders to co-create and learn. Knowledge on soils principles, regenerative ag practices and amendments targeted by location is now becoming more broadly available in southern Africa.

2.3 Speaker 3

2.3.1 Name: Dr. Tebila Nakelse

2.3.2 Organisation name: Global Agricultural Productivity (GAP) Initiative

2.3.3 Type of organisation: Academic Institution

2.3.4 Title of the presentation: Addressing TFP Slowdown Through Pubic-Private Partnerships and Local Innovation

2.3.5 Summary of the presentation (max 200 words): The global slowdown of agriculture Total Factor Productivity (TFP) growth presents a significant obstacle to achieving the SDGs. This presentation will discuss how public-private partnerships (PPPs) can play a crucial role in reversing this trend by fostering innovation and facilitating the adoption of productivity-enhancing technologies. The Homegrown School Feeding Program will be highlighted as a successful PPP model that not only boosts local agricultural productivity but also addresses food security by providing nutritious meals sourced from local farms. Utilizing insights from the Global Agriculture Productivity (GAP) reports, the presentation will examine how strategic collaborations and innovative solutions can overcome the TFP slowdown, with a focus on enhancing crop diversity, soil health, and agricultural productivity. The talk will emphasize the importance of addressing these challenges to ensure progress towards SDG2 and sustainable food systems.

2.4 Speaker 4

2.4.1 Name: Dr. Candiss Williams

2.4.2 Organisation name: United States Department of Agriculture (USDA)

2.4.3 Type of organisation: Government

2.4.4 Title of the presentation: Using Citizen Science to Meet Soil Health Conservation Management Goals

2.4.5 Summary of the presentation (max 200 words): Soil health has become a focal point of global research and technological innovation. In the United States, substantial financial investments are being directed towards climate-smart agriculture and forestry practices on private lands, with a focus on increasing the adoption of soil health management systems and achieve scalable conservation outcomes. Despite these investments, barriers to widespread adoption of these systems persist. This has led to a growing importance of citizen science in promoting soil health and achieving conservation outcomes. Involving the public in outreach, data collection, monitoring, and analysis leverages community knowledge, ensuring equitable conservation strategies tailored to local or regional contexts. This knowledge also informs conservation practices, enhances agricultural productivity, and improves biodiversity. Citizen science enables adaptive management strategies, allowing land managers and conservation planners to adjust and respond quickly to environmental changes and challenges such as climate. By integrating citizen science into soil health conservation, we can achieve more comprehensive, data-driven outcomes that support long-term sustainability and resilience in ecosystems, ensuring healthier soils and more productive landscapes, and contribute to achieving UN SDGs 2, 12, and 15 among others.

2.5 Speaker 5

2.5.1 Name: Grace Magny-Fokam

2.5.2 Organisation name: Folia Technologies

2.5.3 Type of organisation: Private Sector

2.5.4 Title of the presentation: FoliaNet: Leveraging AI for Sustainable Agricultural Productivity and Policy Impact

2.5.5 Summary of the presentation (max 200 words): In the quest to achieve SDG 2: Zero Hunger, integrating emerging technologies with sustainable agricultural practices is crucial. Folia Technologies is making significant advancements in that area with FoliaNet, which serves as an early warning system for farmers by detecting diseases in crop plants, aiming to mitigate crop loss and enhance agricultural productivity. With nearly 125 million tons of crops lost annually to crop diseases, FoliaNet offers a data-driven solution that addresses food insecurity, particularly in rural areas. This presentation – delivered by youth speaker representative Grace Magny-Fokam – explores the broader role of AI in optimizing resource management and supporting decision-making in sustainable agriculture. Drawing from her experience influencing food systems policy as a UNFCCC youth ambassador and UNCCD Land Hero, Grace underscores the importance of integrating artificial intelligence (AI) to drive sustainable practices. Grace explores the intersection of technology, policy, and collaboration, advocating for a unified approach to address the pressing challenges of our time.

2.6 Moderator 6

2.6.1 Name: Leigh Ann Winowiecki

2.6.2 Organisation name: The Center for International Forestry Research and World Agroforestry (CIFOR-ICRAF)

2.6.3 Type of organisation: Research Center

2.6.4 Title of the presentation:

2.6.5 Summary of the presentation (max 200 words):

3 Content

3.1 Session Abstract (max. 500 words)

Achieving SDG 2 will require radical improvements in regenerative and sustainable agricultural production. The science to support such improvements needs to be fuelled by a wide diversity of knowledge sources ranging from cutting edge scientific research to Indigenous practices honed through generations. This session will highlight scientific advances, applications, and

lessons learned for inclusivity and collaboration across the three areas of research and development fundamental to improving regenerative and sustainable agriculture: soil health, adapted and diversified crops, and sustainable productivity growth.

Soil health: Healthy soil is the very foundation of our food systems and provides several vital ecosystem services, including nutritious food, productivity, flood regulation, habitat for biodiversity, nutrient cycling, and carbon sequestration. Over one-third of the Earth's surface is degraded, limiting the soil's ability to provide these critical services, including 65% of the agricultural soils across Africa. Reversing these trends will require scaling of healthy soil practices globally. This will be enabled through increased access to knowledge and information, implementation of advanced monitoring systems, increased financial investments in soil health and filling key knowledge gaps around the impact of land management on soil health. This will require sustained, collective and collaborative action.

Adapted and diversified crops: Overreliance on a few staple crops leads to systemic vulnerability, especially as extreme weather and land degradation increasingly cause crop failures and reduced yields. Traditional food crops in the developing world suffer from insufficient investment in research required to produce them in a competitive commercial market. Many of these crops are highly nutritious and adaptable to local conditions and erratic weather. They are often grown by women and contribute to household nutrition and economic security. Accelerating plant breeding efforts for diverse nutritious, climate-resilient food crops can lead to diversified diets, helping reduce micronutrient deficiencies, child stunting, and wasting. It can also lead to more diversified cropping systems supporting soil health and resilience. Driving innovation to support successful crop diversification relies on developing innovative research agendas.

Sustainable productivity growth: Agricultural productivity growth, which has been declining in recent decades, measures the efficiency with which inputs are used to produce agricultural output. Agricultural productivity growth is key to conserving resources, mitigating, and adapting to climate change, and ensuring the viability of agriculture. It is a powerful engine to increase food production without using more resources and is explicitly targeted in SDG 2.3 and 2.4. It has led to dramatic reductions in global poverty and food insecurity and continues to be a primary engine of growth and poverty alleviation in many parts of the world. The major driver of sustainable productivity growth is innovation, including technological and managerial innovations, innovative nature-based solutions, and new institutional arrangements and infrastructures. One exciting area of innovation driving sustainable productivity advances is precision agricultural. Precision applications, supported by science-based digital technologies and infrastructures, can lead to more efficient use of water, chemical inputs, and land, as well as climate-smart approaches to reduce GHG emissions while improving productivity.

3.2 Project Objectives

List the key objectives your session or project aimed to achieve. ***Max 50 words*** *each objective*

3.2.1 Objective 1 (Soil Health): Healthy soil is the very foundation of our food systems and provides several vital ecosystem services, including nutritious food, productivity, flood regulation, habitat for biodiversity, nutrient cycling, and carbon sequestration. However, over one-third of the Earth's surface is degraded. In order to reverse this trend, sustained, collective and collaborative action will be required.

3.2.2 Objective 2: To inform capacity building efforts that empower communities with options and information tailored for their own local conditions and preferences requires inclusive decision making and collaborative innovation building on cutting edge science and local knowledge.

Objective 3: Increase awareness and adoption of innovative technologies that enhance sustainable agricultural productivity. This includes technological and managerial innovations, innovative nature-based solutions, and new institutional arrangements and infrastructures. Precision agriculture technologies and climate-smart approaches are emerging areas.

3.3 Key Themes

Main themes and topics that were covered during the session. The same ones you selected when you submitted your original session proposal. Select from the following. Maximum three

- Food systems
- Environment and Climate
- Biodiversity

4 Planned Impacts of the science and innovation presented in you session

4.1 Contribution to the SDGs

The SDGs provide a comprehensive framework for addressing the world's most pressing challenges and promoting sustainable development globally. Select the Goal/s that your project contributes to (max 3 SDGs)

SDG 2. **Zero Hunger**: End hunger, achieve food security and improved nutrition, and promote sustainable agriculture.

SDG 12. **Responsible Consumption and Production**: Ensure sustainable consumption and production patterns.

SDG 15. **Life on Land**: Protect, restore, and promote sustainable use of terrestrial ecosystems, manage forests sustainably, combat desertification, and halt and reverse land degradation and halt biodiversity loss.

5 Contribution to the UN Summit of the Future

5.1 Main challenges (max 200 words)

Main challenges and difficulties experienced in implementing the science to contribute to the Sustainable Development Goals and provide recommendations to address the same whole.

There is a real need to raise awareness of the critical role of agricultural productivity, healthy soil and diverse crops to achieve food systems transformation. Too often the critical role of healthy soil is overlooked or taken for granted. Yet, healthy soil is critical for biodiversity, ecosystem restoration, the production of healthy food, and climate change adaptation and mitigation. There is a real need to bend the curve on food systems, to make them nature positive, while increasing productivity. This requires sustained collaboration across all stakeholders and the financial investments to truly scale these practices, globally.

As shared by our youth speaker representative - Grace Magny-Fokam: In addition, one of the main challenges faced as a youth-led research organization was gaining credibility and securing the creative freedom necessary to innovate. Despite our commitment to the Sustainable Development Goals (SDGs), we often encountered skepticism due to our age and lack of traditional experience. Achieving the SDGs requires the integration of diverse perspectives, including those of youth innovators who bring fresh ideas and a unique understanding of current and future challenges. However, for intergenerational collaboration to thrive, young people must be empowered to pursue self-directed projects and have access to the resources they need.

5.2 Impact on the 2030 Agenda (max 1000 words)

A success metric for your project is primarily in how it delivers for all persons in our societies. Describe how other principles of the 2030 Agenda, for example, respect for all human rights, gender equality, the principle of Leaving No One Behind, non-discrimination, etc, have been mainstreamed in your science project.

More info on: 2030 Agenda: https://sdgs.un.org/2030agenda

Please select also the transition relevant to your science project:

(1) **food systems**; ~~(2) energy access and affordability; (3) digital connectivity; (4) education; (5) jobs and social protection; and (6) climate change, biodiversity loss and pollution~~

More info on Six transitions: https://unsdg.un.org/sites/default/files/2023-09/Six%20Transitions%20English.pdf

6 Forward-looking Statement

6.1 To further advance your science project, you will need:

Please select an option and develop it further (50 words). Multiple selection is possible.

6.1.1 **Access to Funding** Funding will enable research on new innovative approaches to improve soil health, reduce biodiversity loss and enhance agricultural productivity. It would also provide provisions for rewarding farmers and land managers for strengthening of ecosystem services (i.e., carbon sequestration, water conservation) through protection, sustainable management, and restoration of global soil resources.

- **Skilled Personnel**
- **Open Access to Data:** Citizen science enables adaptive management strategies, allowing land managers and conservation planners to adjust and respond quickly to environmental changes and challenges such as climate.

- **Access to Resources (**laboratory facilities, research tools, and technology).
- **Establish Partnerships and Collaborations**
- **Dissemination and Communication activities:** Funding will enable educational initiatives and partnership to disseminate and scale-up new approaches and technologies.
- **Enhance the Regulatory Environment** that supports research initiatives.
- **Access to Market**
- **Advanced Technology** Research on new innovative approaches to improve soil health, reduce biodiversity loss and enhance agricultural productivity, focus areas could include digital technology and data generation.