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GLOBAL RESEARCH INITIATIVES FOR SUSTAINABLE AGRICULTURE–AN OVERVIEW

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Our earth provide the basis for food production. The interaction of different enterprises with different cultures in different climates results in the need for unique approaches to sustainable agricultural systems in each situation. The transition to systems that are both sustainable and sufficiently intense to support the increasing density of human population will be faster or slower depending on the resources available. The renewed recognition of the sustainable resource management for assuring food security and the fundamental role in climate change adaptation and mitigation has triggered numerous projects, initiatives and actions on a global scale. But fertile soils are limited and are increasingly under pressure by competing land uses for cropping, forestry, and pasture/rangeland but also for energy production, settlement and infrastructure, raw materials extraction, etc. Sustaining and feeding the growing population of the world and meeting their needs for biomass (energy), fibre, fodder and other products will be the guiding principles and drivers of future research thrusts on a global scale. As should be maintaining soil/land uses that allow to also sustain the other ecosystem services on which our livelihoods and societies depend including water regulation and supply, climate regulation as well as biodiversity conservation and other cultural services. Increasing land use changes are threatening this resource and urgent action is needed to reverse this trend if we want to assure the necessary food production for future generations.

In the meeting at the United Nations Headquarters in New York from 25-27 September 2015 as the Organization celebrated its seventieth anniversary, have decided on new global Sustainable Development Goals. UN adopted a historic decision on a comprehensive, far-reaching and people-centred set of universal and transformative Goals and targets and committed to working tirelessly for the full implementation of this Agenda by 2030.

The sustainable development goals : The sustainable development goals (SDGs) are a new, universal set of goals, targets and indicators that UN member states will be expected to use to frame their agendas and political policies over the next 15 years.The SDGs follow and expand on the millennium development goals (MDGs), which were agreed by governments in 2001 and are due to expire at the end of this year.

Need for set of goals : There is broad agreement that, while the MDGs provided a focal point for governments – a framework around which they could develop policies and overseas aid programmes designed to end poverty and improve the lives of poor people – as well as a rallying point for NGOs to hold them to account, they were too narrow.

The eight MDGs–reduce poverty and hunger; achieve universal education; promote gender equality; reduce child and maternal deaths; combat HIV, malaria and other diseases; ensure environmental sustainability; develop global partnerships – failed to consider the root causes of poverty and overlooked gender inequality as well as the holistic nature of development. The goals made no mention of human rights and did not specifically address economic development. While the MDGs, in theory, applied to all countries, in reality they were considered targets for poor countries to achieve, with finance from wealthy states. Conversely, every country will be expected to work towards achieving the SDGs.

What are the proposed 17 goals?

End poverty in all its forms everywhere

End hunger, achieve food security and improved nutrition, and promote sustainable agriculture

Ensure healthy lives and promote wellbeing for all at all ages

Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

Achieve gender equality and empower all women and girls

Ensure availability and sustainable management of water and sanitation for all

Ensure access to affordable, reliable, sustainable and modern energy for all

Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all

Build resilient infrastructure, promote inclusive and sustainable industrialisation, and foster innovation

Reduce inequality within and among countries

Make cities and human settlements inclusive, safe, resilient and sustainable

Ensure sustainable consumption and production patterns

Take urgent action to combat climate change and its impacts (taking note of agreements made by the UNFCCC forum)

Conserve and sustainably use the oceans, seas and marine resources for sustainable development

Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification and halt and reverse land degradation, and halt biodiversity loss

Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels

Strengthen the means of implementation and revitalise the global partnership for sustainable development

Within the goals are 169 targets, to put a bit of meat on the bones. Targets under goal one, for example, include reducing by at least half the number of people living in poverty by 2030, and eradicating extreme poverty (people living on less than $1.25 a day). Under goal five, there's a target on eliminating violence against women, while goal 16 has a target to promote the rule of law and equal access to justice.

The interlinkages and integrated nature of the Sustainable Development Goals are of crucial importance in ensuring that the purpose of the new Agenda is realised. If we realize our ambitions across the full extent of the Agenda, the lives of all will be profoundly improved and our world will be transformed for the better.

This paper focuses on what are the recent developments undertaken for sustainable management that have wide, although not universal, applicability and can help guide the transition to sustainability.During the past half century agriculturalists allowed the immediate effectiveness of modern agricultural inputs such as fertilizers and pesticides to somewhat divert their attention from the need to manage soil organic matter. There is a large number of research activities and projects related to soils around the world. Many projects would benefit from an increased coordination with other on-going research activities. Communication among the research communities dealing with the various aspects of soils are often limited or inexistent and interdisciplinary research is still very limited. Bridging between the various research communities could bring large benefits to the global scientific knowledge base and lead to more coherent soil related activities. Breaking the still existing walls between geology, soil science, agronomy, forestry, pasture/rangeland management, agro-climatology, soil biology and ecosystems research could improve the quality and applicability of research and provide new avenues for future integrated research and development programs.

The Global Research Alliance (GRA) : Is an international network of nine applied research organisations that works to promote application of science and technology to solve large scale issues facing developing countries. The alliance was formed in 2000 in Pretoria, South Africa. Today, the GRA has access to over 60,000 people across its membership. Vision is for a world where the application of innovative science and technology, through collaboration and co-creation, delivers access equality, improves lives, and solves global development challenges.The GRA uses the best science and technology to solve some of the biggest problems in the developing world. These global issues span borders, cultures and religions and require a cross-boundary response. They address these problems by :

mobilising the creative energy of our globally and culturally diverse researchers to address global development challenges through innovation

sharing the breadth and depth of our science and technology resources and uniting with local partners, communities, industry and collaborators

generating and implementing appropriate, affordable and sustainable solutions with positive and lasting impact

The GRA is a dynamic alliance of nine knowledge intensive research and technology organisations from around the world. Its goal is to create 'A Global Knowledge Pool for Global Good'. The focus is to apply science, technology and innovation in the pursuit of solving some of world's gravest challenges.

GRA and Inclusive Innovation : The Global Research Alliance (GRA) believes Inclusive Innovation requires a holistic and new way of approaching demand-driven projects and co-creation with partners such as end-users, technology organisations and both the private and public sectors. This includes: success through technical innovation (products), social innovation (interaction/ co-creation), management innovation (business models); and chain innovation (relationships in the value chain). Inclusive Innovation is not new to the GRA. Over the last few years, the GRA has systematically addressed global challenges through the deployment of Inclusive Innovation initiatives.

Eco-friendly artificial coral reefs : A ceramic-based product used to increase fish populations as well as supporting the eco-tourism activities of local communities. This community-based product, developed

by SIRIM, could have significant impact as many countries with coral reefs depend on them as a significant contribution to source of income through tourism and fisheries.

CSIR India have developed a Traditional Knowledge Digital Library (TKDL) which digitised information in 30 million pages in five languages, from 150 codified texts in Sanskrit, Arabic, Persian, Urdu on Ayurveda, Unani and Sidhasystem.

Increasing the productivity of Africa's farming systems is one of the most significant challenges facing global agriculture. CSIRO is working with African scientists and institutions to help them develop long term solutions. With funding from AusAID, CSIRO is leading a collaborative research program with over 30 National Agricultural Research Institutes, undertaking 13 projects across 15 countries.The purpose of the project is to develop multi-fuel delivery chains for power plants and industrial boilers. Because biomass, particularly when it is agriculture-based, is very much a seasonal product, the use of several different types of biomass fuels will ensure availability all year round.

Biogas socket: rural electrification using biogas. Cooking on biogas can offer a viable local alternative to the expensive and often difficult to access fossil fuel energy sources in rural and remote areas. TNO designed an innovative method which also allows the use of biogas for the production of decentralized electricity: the biogas socket. Along with SNV, TNO are preparing to launch in Bangladesh and Rwanda.

The overarching objective of the project is to explore a new context for the application of science, technology and innovation for development (STI4D) and ICT4D. In addition, through creation of new observational data and analysis of broader policy frameworks, to advance our understanding of appropriate programming practices and policy approaches for the use of STI and ICT for the benefit of poor and rural African communities.

Green and Low-Cost Wireless Communication Network for Africa : Four GRA members involved in developing a low-cost wireless communication network for Africa: CSIR Meraka Institute (South Africa), CSIRO (Australia), VTT (Finland) and Fraunhofer-Gesellschaft (in Germany and Portugal). While Fraunhofer is developing a terrestrial wireless infrastructure to bring this satellite connectivity into the wide area, Fraunhofer Portugal develops applications for targeted deployment. CSIR Meraka contributes through its experience in wireless mesh concepts, in particular the community mesh and the wireless backhaul; and CSIRO provides an efficient satellite-based infrastructure to reach rural areas.

VTT will integrate the network management concepts to take advantage of the network's context awareness and MachaWorks will support local deployment, test and evaluation.

The platform includes a comprehensive collection of information on international climate initiatives currently in operation. Initiatives are included which meet our current working definition :

contribute to reduction of greenhouse gas emissions; and

are international in scope or have the potential for significant impact at global scale; and

are either dialogues, formal multilateral processes or implementation initiatives.

Why do we need climate-smart agriculture : The UN Food and Agriculture Organisation (FAO) estimates that feeding the world population will require a 60 percent increase in total agricultural production. With many of the resources needed for sustainable food security already stretched, the food security challenges are huge. At the same time climate change is already negatively impacting agricultural production globally and locally. Climate risks to cropping, livestock and fisheries are expected to increase in coming decades, particularly in low-income countries where adaptive capacity is weaker. Impacts on agriculture threaten both food security and agriculture's pivotal role in rural livelihoods and broad-based development. Also the agricultural sector, if emissions from land use change are also included, generates about one-quarter of global greenhouse gas emissions.

Practical adaptation options to improve food security and resilience : What practical steps can smallholder farmers take to adapt their agricultural practices to secure dependable food supplies and livelihoods? And can they do this while also decreasing greenhouse gas emissions or increasing carbon sequestration, thereby decreasing future climate change?

In a search for answers the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) is working with a vast range of partners to test a range of interventions in climate-smart villages.This Flagship addresses the challenge of how to transition to climate-smart agriculture at a large scale. We work with partners at all levels to test, evaluate, promote and scale up integrated portfolios of technologies and practices that meet the needs of farmers - including women and marginalized groups. We help build adaptive capacity and resilience to climate variability and change, while increasing food availability and generating mitigation co-benefits. We integrate, and apply the best and most promising methods, tools and approaches for equitable local adaptation planning and governance, and

develop innovative incentives and mechanisms for scaling out CCAFS identifies agricultural development options that reduce greenhouse gas emissions and increase carbon sequestration. Together with our partners, CCAFS produces research to improve estimates of farm emissions in smallholder systems, provides tools and information to agriculture decision-makers and supports the widespread implementation of low emissions agricultural practices and policies.

The Global Water Partnership's : vision is for a water secure world. Its mission is to support the sustainable development and management of water resources at all levels.GWP was founded in 1996 by the World Bank, the United Nations Development Programme (UNDP), and the Swedish International Development Cooperation Agency (SIDA) to foster integrated water resource management (IWRM).

IWRM is a process which promotes the coordinated development and management of water, land and related resources in order to maximise economic and social welfare without compromising the sustainability of ecosystems and the environment. The network is open to all organisations involved in water resources management: developed and developing country government institutions, agencies of the United Nations, bi- and multi-lateral development banks, professional associations, research institutions, non-governmental organisations, and the private sector. In the "Our Approach" section one can read about GWP's global strategy-Towards 2020-how GWP are currently pursuing vision of water security.Dealing with water issues requires commitment at the highest political level. Water security will only be reached when political leaders take the lead, make the tough decisions about the different uses of water and follow through with financing and implementation. GWP sees its role as having the technical expertise and convening power to bring together diverse stakeholders who can contribute to the social and political change processes that help bring the vision of a water secure world closer to reality.GWP regularly reports on outcomes at the national, regional, and global level. GWP is implementing its strategy and up-to-date information on activities across the globe.

The Global Water Partnership (GWP) has announced the launch of its new 2014-2019 global strategy.The strategy, Towards 2020, outlines a new direction for GWP with the goals of catalyzing change, sharing knowledge, and strengthening partnerships for a water secure world. The 2014-2019 Strategy builds on GWP's previous work and achievements. It was developed through a year-long process of regional dialogues and consultations with GWP's growing network of over 2,900 Partner Organizations across 172 countries."The strategy Towards 2020 stresses the need for innovative and multi-sectoral approaches to adequately address the manifold threats and opportunities relating to sustainable water resource management in the context of climate change, rapid urbanization, and growing inequalities," Knowledge generation and communication continues to be a central part of GWP's work with this strategy."Knowledge and new tools are needed to support policy development and decision making and enable the effective and sustainable management of water resources," "Knowledge can stimulate behavioural change towards a new 'water culture'. New to this strategy is a thematic approach in six key areas of development – climate change, transboundary cooperation, food, urbanisation, energy, and ecosystems. "Integrated water management is fundamental to all of these areas of the global development agenda. Our new thematic approach will ensure the crucial link to water security is made across these thematic focus areas for meeting sustainable development goals," explains GWP Executive Secretary Dr Ania Grobicki.

The global launch of the strategy took place at the Official United Nations World Water Day celebrations in Tokyo, Japan, on 21 March 2014.

Global Soil Partnership : Soil is under pressure. The renewed recognition of the central role of soil resources as a basis for food security and their provision of key ecosystem services, including climate change adaptation and mitigation, has triggered numerous regional and international projects, initiatives and actions. Despite these numerous emergent activities, soil resources are still seen as a second-tier priority and no international governance body exists that advocates for and coordinates initiatives to ensure that knowledge and recognition of soils are appropriately represented in global change dialogues and decision making processes. At the same time, there is need for coordination and partnership to create a unified and recognized voice for soils and to avoid fragmentation of efforts and wastage of resources.

Maintaining healthy soils required for feeding the growing population of the world and meeting their needs for biomass (energy), fiber, fodder, and other products can only be ensured through a strong partnership. This is one of the key guiding principles for the establishment of the Global Soil Partnership.

Responses to soils today :

Soil data-fragmented, partly outdated (fertility, SOC, etc.)

heterogeneous and difficult to compare, not easily accessible, not responding to users needs

Soil capacities-increasingly a scarce resources (loss of soil expertise and skills)

Soil knowledge and research-fragmented (fertility, CC, ecology), domain of soil scientists, not accessible for use by various disciplines and for decision making, not tailored to address problems/development agendas of today

Awareness and investments in soil management-extremely low compared to the needs that soil is a precarious resource and requires special care from its users

Soil policy-Often received as a second tier priority; lack of international governance body to support coordinated global action on their management

Need for compatible and coordinated soil policies-a unified and authoritative voice is needed to better coordinate efforts and pool limited resources (for agriculture, forestry, food security, UNCCD, CBD, UNFCCC, disaster and drought management, land competition, rural and urban land use planning and development).

The 5 pillars of action : The Global Soil Partnership will support the process leading to the adoption of sustainable development goals for soils.

It will contribute to environmental wellbeing through, for example, preventing soil erosion and degradation, reducing greenhouse gas emissions, promoting carbon sequestration and promoting sustainable use of agricultural inputs for soil health and ecosystems management.

It will equally contribute to human wellbeing and social equity through improved use and governance of soil resources, finding alternatives to soil degrading practices through participatory experiential processes, and being sensitive to issues of gender and rights of indigenous peoples.

In order to achieve these objectives, the GSP should address five main pillars of action :

Promote sustainable management of soil resources for soil protection, conservation and sustainable productivity

Encourage investment, technical cooperation, policy, education awareness and extension in soil

Promote targeted soil research and development focusing on identified gaps and priorities and synergies with related productive, environmental and social development actions

Enhance the quantity and quality of soil data and information: data collection (generation), analysis, validation, reporting, monitoring and integration with other disciplines

Harmonization of methods, measurements and indicators for the sustainable management and protection of soil resources

Intergovernmental Panel on Climate Change (IPCC) is the leading international body for the assessment of climate change. It was established by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO) in 1988 to provide the world with a clear scientific view on the current state of knowledge in climate change and its potential environmental and socio-economic impacts. In the same year, the UN General Assembly endorsed the action by WMO and UNEP in jointly establishing the IPCC. The IPCC is a scientific body under the auspices of the United Nations (UN). It reviews and assesses the most recent scientific, technical and socio-economic information produced worldwide relevant to the understanding of climate change. It does not conduct any research nor does it monitor climate related data or parameters. Thousands of scientists from all over the world contribute to the work of the IPCC on a voluntary basis. Review is an essential part of the IPCC process, to ensure an objective and complete assessment of current information. IPCC aims to reflect a range of views and expertise. The Secretariat coordinates all the IPCC work and liaises with Governments. It is established by WMO and UNEP and located at WMO headquarters in Geneva. Because of its scientific and intergovernmental nature, the IPCC embodies a unique opportunity to provide rigorous and balanced scientific information to decision makers. By endorsing the IPCC reports, governments acknowledge.

The Intergovernmental Technical Panel on Soils (ITPS) was established at the first Plenary Assembly of the Global Soil Partnership held at FAO Headquarters on 11 and 12 of June, 2013.

The ITPS is composed of 27 top soil experts representing all the regions of the world. The main function of the ITPS is to provide scientific and technical advice and guidance on global soil issues to the Global Soil Partnership primarily and to specific requests submitted by global or regional institutions. The ITPS will advocate for addressing sustainable soil management in the different sustainable development agendas.

Functions of ITPS : The ITPS have the following functions :

provide scientific and technical advice on global soil issues primarily to the GSP and in relation to specific requests submitted by global or regional institutions.

advocate for the inclusion of sustainable soil management into different development agendas.

review and follow up on the situation and issues related to soils in the contexts of food security, use and management of natural resources, ecosystem services provision, climate change adaptation and mitigation, and other relevant areas.

review and endorse from a technical viewpoint the GSP Plans of Action.

Follow up on the implementation of these Plans of Action with due attention to their impact and contributions to different global policies and initiatives related to sustainable development, MDGs, food security, climate change adaptation and other subject matters.

in exceptional cases, when complex technical matters arise, request the Plenary Assembly and the Secretariat to form technical committees aiming to gather specific advice.

Intergovernmental Platform on Biodiversity and Ecosystem Services : The Intergovernmental Platform on Biodiversity and Ecosystem Services is a mechanism proposed to further strengthen the science-policy interface on biodiversity and ecosystem services, and add to the contribution of existing processes that aim at ensuring that decisions are made on the basis of the best available scientific information on conservation and sustainable use of biodiversity and ecosystem services. It was established in 2012 as an independent intergovernmental body open to all member countries of the United Nations. The members are committed to building IPBES as the leading intergovernmental body for assessing the state of the planet's biodiversity, its ecosystems and the essential services they provide to society.

What is the science-policy interface : Science- policy interfaces are social processes which encompass relations between scientists and other actors in the policy process, and which allow for exchanges, co-evolution, and joint construction of knowledge with the aim of enriching decision-making at different scales. This includes 2 main requirements:

that scientific information is relevant to policy demands and is formulated in a way that is accessible to policy and decision makers; and

that policy and decision makers take into account available scientific information in their deliberations and that they formulate their demands or questions in a way that are accessible for scientists to provide the relevant information.

Need for IPBES : There are already several mechanisms and processes at national, regional and global level that are designed to ensure that scientific information is considered when designing policies or making decisions (examples of this are technical bodies/panels under the environmental agreements or national research institutions attached to ministries, among many others). However, there is no global ongoing mechanism recognized by the scientific and policy communities, that pulls this information together, synthesizes and analyzes it for decision making in a range of policy fora.

We have listed some of the numerous global alliances which have been established to address the global research platfirms. This is in brief and there are others also across the globe taking shapes : One of the fundamental lessons learned through the past half century of agricultural research is that there are no "one size fits all" sustainable management practices and a holistic approach is the need of the hour.

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