



Plan of Action for Pillar Two of the Global Soil Partnership

Adopted by the GSP Plenary Assembly

Encourage Investment, Technical Cooperation, Policy, Education, Awareness and Extension

Pillar Two Working Group

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*“Every unique herb vegetated next to a stream
is as if grown from the lip of an angelical beauty
don’t stampede (degrade) that herb
because it is vegetated from the soil of a beauty whose face is like a
tulip”*

(Khayyam Neyshabouri)

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Acronyms

CAADP	Comprehensive Africa Agriculture Development Programme
CBD	Convention on Biological Diversity
CST	Committee on Science and Technology
CGIAR	Consortium of International Agricultural Research Centers
CIAT	International Center for Tropical Agriculture
CIMMYT	International Maize and Wheat Improvement Center
ELD	Economics of Land Degradation
ENSA	European Network Soil Awareness
EVS	European Voluntary Service
FAO	Food and Agriculture Organization of the United Nations
GEOSS	Global Earth Observation System of Systems
GDP	Gross Domestic Product
GHG	Greenhouse gas
GSIF	Global Soil Information Facilities
GSP	Global Soil Partnership
GWP	Global Water Partnership
HWSD	Harmonized World Soil Database
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IFA	International Fertilizer Industry Association
IIASA	International Institution for Applied Systems Analysis
IITA	International Institute of Tropical Agriculture
INM	Integrated Nutrient Management
INSII	International Network of Soil Information Institutes
IPCC	Intergovernmental Platform for Climate Change
IPR	Intellectual Property Rights management
IRRI	International Rice Research Institute
ISFM	Integrated Soil Fertility Management
ISO	International Standard Organization
IPBES	Intergovernmental Platform on Biodiversity and Ecosystem Services
ISFM	Integrated Soil Fertility Management
ITPS	Intergovernmental Technical Panel on Soils
IUSS	International Union of Soil Sciences
IYS	International Year of Soils
LADA	Land Degradation Assessment in Drylands

MDG	Millennium Development Goal
NGO	Non-governmental Organization
OGC	Open Geospatial Consortium
PTF	Pedo-transfer Functions
PTR	Pedo-transfer Rules
QA/QC	Quality assurance and Quality Control
RSP	Regional Soil Partnership
RSPO	Roundtable on Sustainable Palm Oil
R&D	Research and Development
SCAPE	Soil Conservation and Protection in Europe
SOTER	Soil and Terrain Database
SDG	Sustainable Development Goal
SLM	Sustainable land management
SSSA	Soil Science Society of America
SSM	Sustainable Soil Management
SSS	Soil sampling, Sample preparation and Sample storage
SOC	Soil Organic Carbon
SPI	Science Policy Interface
SSSA	Soil Science Society of America
UN	United Nations
UNCCD	United Nations Convention to Combat Desertification
UNCED	United Nations Conference on Environment and Development
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
USDA	United States Department of Agriculture
WGSIS	Working Group on Soil Information Standards
WOCAT	World Overview of Conservation Approaches and Technologies
WSC	World Soil Charter
WSD	World Soil Day
WRB	World Reference Base for Soil Resources
WWOOF	World Wide Opportunities on Organic Farms

Glossary

Agriculturally productive soil refers to soil with the suitability to produce certain yield of an agricultural crop or crops due to its inherent physical, chemical and biological properties.

Agronomic biofortification refers to the application of soil and foliar mineral fertilizers and/or improving solubility of mineral nutrients in the soil to promote nutrient accumulation in edible parts of food crops.

Climate Smart Agriculture refers to agriculture that sustainably increases productivity, resilience (adaptation), reduces/removes greenhouse gases (mitigation), and enhances the achievement of national food security and development goals.

Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food.¹

Integrated Nutrient Management refers to the maintenance of soil fertility and plant nutrient supply at an optimum level for sustaining the desired productivity by optimizing the benefits from all possible sources of organic, inorganic, biological and sustainable recyclable waste components in an integrated manner, to prevent environmental impacts from nutrient outflows.

Integrated Soil Fertility Management refers to a set of soil fertility management practices that necessarily include the use of fertilizer, organic inputs, and improved germplasm combined with the knowledge on how to adapt these practices to local conditions, aiming at maximizing agronomic use efficiency of the applied nutrients and improving crop productivity.²

Nutrient Use Efficiency refers to getting the maximum amount of nutrients applied to soils and crops into the harvested portion of a crop. This implies the recovery of nutrients supply through fertilizer application by the crop, through uptake of nutrients by the plant and depends on plant characteristics (transport, storage, mobilization and usage within the plant) and on the environment.

Nutrition security means access to the adequate utilization and absorption of nutrients in food, in order to be able to live a healthy and active life.¹

Potentially agriculturally productive soil refers to soil that is not agriculturally productive, but can be transformed into agriculturally productive soil through the implementation and application of appropriate amendments and management practices.

¹ FAO. 2009. *The State of Food Insecurity in the World 2009*. Food and Agriculture Organization of the United Nations.

² Van Lauwe B. 2013. Integrated Soil Fertility Management – a concept that could boost soil productivity. *Rural 21*. 3:34-37.

Region indicates a Regional Soil Partnership (RSP) established under the GSP among interested and active stakeholders. The RSPs will work in close coordination with FAO Regional Offices to establish interactive consultative processes with national soils entities, regional soil science societies and relevant regional mechanisms under the related conventions. The following seven regions have been identified:

- Asia
- Africa
- Europe and Eurasia
- Middle East and North Africa
- North America
- Latin America
- Southwest Pacific

Soil conservation indicates the (i) preventing soil degradation processes such as physical soil loss by erosion or biological, chemical and physical deterioration; including, excessive loss of fertility by either natural or artificial means; (ii) a combination of all management and land use methods that safeguard the soil against depletion or deterioration by natural or by human-induced factors; and (iii) the branch of soil science that deals with soil and water conservation in (i) and (ii).³

Soil contamination implies that the concentration of a substance (e.g. nutrient, pesticide, organic chemical, acidic or saline compound, or trace elements) in soil is higher than would naturally occur (See also *soil pollution*).

Soil functions refer to the seven key functions of soil in the global ecosystem as:

1. Biomass production, including in agriculture and forestry;
2. Storing, filtering and transforming nutrients, substances, and water;
3. Biodiversity pool, such as habitats, species and genes;
4. Physical and cultural environment for humans and human activities;
5. Source of raw materials;
6. Acting as carbon pool;
7. Archive of geological and archaeological heritage.

Soil pollution refers to the presence of substances at concentrations above threshold levels where they become harmful to living organisms (See also *soil contamination*).

Sustainable Production Intensification refers to increasing food production or yields on existing farmland without adverse environmental impact and without the cultivation of more land.

Sustainable Land Management (SLM) means the use of land resources, including soils, water, animals and plants, for the production of goods to meet changing human needs,

³ SSSA. 2008. Glossary of Soil Science Terms. Madison, WI, USA.

while ensuring the long term productive potential of these resources and the maintenance of their environmental functions.⁴

Sustainable productivity means the ability to maintain productivity, at field, farm or territorial scale, where productivity is the output of valued products per unit of natural resource input.

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⁴ UNCED. 1992. *The RIO Declaration on Environment and Development*. United Nations Conference on Environment and Development (UNCED), Rio de Janeiro, 3-14 June 1992.

⁵ UNCED. 1992. *The RIO Declaration on Environment and Development*. United Nations Conference on Environment and Development (UNCED), Rio de Janeiro, 3-14 June 1992.

Executive Summary

Pillar Two of the GSP underpins many of the actions under the other Pillars by addressing the general lack of societal awareness of the importance of soil in people's lives and the well-being of the planet. In many cases, deficiency in education is the specific underlying cause of unsustainable land management practices, of the general lack of investment (both in education and physical measures to protect soil) and, as importantly, of the widespread political reluctance to adopt short- and long-term measures to preserve and enhance soil conditions. The Plan of Action (PoA) for Pillar 2 consists of six interlinked and interdependent components: policy, investment, education, extension, public awareness and technical cooperation. The development of the PoA was initiated at the European Network Soil Awareness (ENSA) workshop in Aberdeen in September 2013. This was followed by discussions at the 2013 Global Soil Week in Berlin which led to the establishment of a Working Group to produce a draft plan of action, which was eventually endorsed by the ITPS in April 2014. The PoA was presented, reviewed and adopted by the Plenary Assembly of the GSP in July 2014. Seven key recommendations are presented.

Robust policy frameworks are one means of ensuring the sustainable management and protection of soils. Therefore, governments must be invited to create or reinforce policies on soil and its protection. Whereas soil protection and management is a long-term aim, most political decisions are governed by short-term ambitions that reflect the lifetime of governments or politicians. Today's highly urbanised society means that the population is largely detached from food and fibre production issues and lacks a fundamental understanding of the role of soil in enabling such life-critical services. It is disappointing to observe that society in many parts of the world attaches a greater value to developments in subjects such as particle physics and mobile communication than essential issues such as soil fertility.

The PoA calls for a systematic awareness raising campaign in all countries on how soil relates to people's everyday lives. This can be done through brief and vivid messages, not only as part of the World Soil Day celebrations and during the forthcoming International Year of Soils, but also as a sustained long-term outreach and engagement programme. The PoA recommends a significant increase in investments to support such actions.

Education in soil sciences is important and needs to be taken into account by other disciplines. The current soil science community should strive to show synergies with other domains to demonstrate its relevance. Pressure should be brought at all levels to halt the decline in soil science teaching at tertiary level, while boosting professional technical qualifications and support to educationalists, so that soils and agriculture can be more appealing for the younger generations.

Soil extension services should interpret and present relevant research-based information to a broader range of stakeholders in an understandable and usable form, including farmer-to-farmer schemes or through initiatives such as the Soils Doctors Programme. The technical approach underlying the extension services should reflect mutually beneficial cooperation rather than mere transfers from one partner to another. Finally, investments must go hand in hand with awareness of the importance of soil resources. These investments should develop an effective skills base and entrepreneurship among soil users. The GSP should make full use of such tools as the Healthy Soils Facility to generate and facilitate the collection of financial contributions to the PoA.

Summary of recommendations and potential timeframe

Recommendation 1 (Policy): Politicians, policy advisors, decision makers and associated agencies should be informed, through FAO formal channels and GSP partners, to better appreciate the true societal value of soil (i.e. environmental and economic) to their specific sectors in order to encourage the development of enabling frameworks for soil protection or sustainable management in line with the goals of the World Soil Charter

Recommendation 2 (Policy): Policy development should be supported by regular and harmonised assessments of the state of soil, associated pressures, their impacts and trends to prioritise and target interventions (Pillar 4 of the GSP).

Recommendation 3 (Education): Education on soil should be promoted:

- as a theme into school curricula at all ages in order to boost the understanding of its value and functions;
- at tertiary level, soil science should be promoted as a key subject or taught as a cross-cutting discipline;
- to the broader soil user community through diverse communication and learning channels;
- by updating relevant documentation, tools and training materials - traditional and emerging pedagogic channels should be explored to ensure maximum dissemination of such materials;
- through cooperation with existing programmes (e.g. UNESCO, FAO, UNCCD, etc);
- by increased support for the participation of young soil scientists from developing countries in international training events.

Recommendation 4 (Awareness): GSP partners and the broad soil user community should promote strategies to engage with society as a whole and utilise the expertise of professional communicators (including social scientists). This could include the development of public awareness campaigns and initiatives, such as the World Soil Day, which can be adapted to different regions, cultures and scales of implementation. Governments should consider investment and sustained funding to support large scale national outreach programmes.

Recommendation 5 (Extension): Extension services should be supported (politically and financially), developed and revitalised to reflect the multi-functional services of soil and expanded beyond the traditional agricultural community to ensure the sustainable use of soil and to reduce degradation across all land uses. Regional priorities need to be determined in terms of the disparities in agricultural extension knowledge-base,

expertise, motivation and support, and then professionally and efficiently communicated in order to develop solutions to these challenges and set goals for their implementation.

Recommendation 6 (Technical Cooperation): Scientific and technical cooperation should be promoted and strengthened between partners of the Regional Soil Partnerships and through South-South and North-South cooperation schemes (links to Pillars 1 and 3).

Recommendation 7 (Investment): The GSP should foster investments in soils to benefit society and future generations through inter-alia the "Healthy Soils Facility" to ensure effective implementation of activities under the five plans of action. The return from investments (including cost-benefit analysis) should be assessed to provide funding agencies, soil users and policy makers with evidence based success stories for future investment schemes. Investment strategies should reflect regional and national priorities and stakeholder needs.

Suggested timeline for implementation

Short-term

 No: 1, 4 and 5

Medium-term

 No: 2 and 3

Long-term

 No: 6 and 7

1. Introduction

The Global Soil Partnership (GSP) was formally established by members of the Food and Agriculture Organization of the United Nations (FAO) during its Council in December 2012. The Council recognized soil as an essential natural resource which is often overlooked and has not received adequate attention in recent years, despite the fact that production of food, fibre, fodder and fuel critically depends on healthy soils. The **Mandate of the GSP** is to improve governance of the limited soil resources of the planet in order to guarantee agriculturally productive soils for a food secure world, as well as support other essential ecosystem services, in accordance with the sovereign right of each State over its natural resources.

In order to achieve its mandate, the GSP addresses the following five pillars of action to be implemented in collaboration with its regional soil partnerships:

1. Promote sustainable management of soil resources for soil protection, conservation and sustainable productivity;
2. Encourage investment, technical cooperation, policy, education, awareness and extension in soil;
3. Promote targeted soil research and development focusing on identified gaps and priorities and synergies with related productive, environmental and social development actions;
4. Enhance the quantity and quality of soil data and information: data collection (generation), analysis, validation, reporting, monitoring and integration with other disciplines;
5. Harmonisation of methods, measurements and indicators for the sustainable management and protection of soil resources.

The Plans of Action for each pillar were formulated in an open and participatory format following strictly the Guidelines for the development of Plans of Action of the GSP Pillars as presented in the Rules of Procedure.

This document presents a plan of action for **Pillar Two**. As indicated by the title, this Pillar covers several cross-cutting themes which are important to raise the global understanding of the importance of soil for food security, provision of ecosystem services and sustainable development.

The Action Plan is based on the presumption that the current lack of investment and political will reflects an overall lack of societal awareness and appreciation, which is, in its turn, a result of the deficiencies in soil education at all levels. In addition, practical support to stakeholders in the form of soil extension services should be encouraged and expanded to reflect the multitude of services provided by soil. Awareness raising and education, at societal scales, are therefore seen as a prerequisite for the achievement of the other strands in this pillar – co-operation, investment and public and political awareness will only be achieved through coherent and co-ordinated awareness and education programmes.

The process started with discussion at the European Network Soil Awareness (ENSA) workshop held in Aberdeen on 18-20 September 2013 and was followed up by discussions at the 2013 Global Soil Week in Berlin. A working group was then established to produce the final document. Predominantly by email exchanges, the following topics were addressed:

- Institutional dimensions
- Recommendations for enhancing/expanding soil education at all levels
- Awareness raising strategies from global to local levels
- Extension programmes/strategies on sustainable soil management
- Developing a bank of priority projects for technical cooperation
- Preparation of strategies for increasing investment

The plan begins with a reflection on the policy framework that needs to be underpinned by a current and coherent data and information base as there is overriding consensus that effective policy instruments will lead to an increase in commitment to the other elements of the Pillar. A multi-level awareness raising and education strategy is essential to present targeted messages to individual shareholders. This document recognises that there exists a well-developed scientific base for many of the issues under consideration but notes that historically there has often been a reluctance within the academic soil community to engage with society and other thematic disciplines. Although there are signs of recent improvement, much remains to be done. National soil science societies, universities, NGOs public administrations, museums and private companies should be encouraged to develop extensive engagement programmes. This document acknowledges that many stakeholders do not consider long-term implications of sustainable soil management. In this context, the main goal of the GSP Pillar 2 awareness raising activities should be to bring about a societal change in the perception of soil. This reflects a radical change in the scale and nature of existing activities and should involve communication experts and use all media channels. However, such scale issues require significant investments.

By necessity, this document presents preliminary options and pathways to encourage investment, develop technical cooperation, strengthen the political framework, raise the profile of soil through education, heightened societal awareness and effective and available extension services.

The potential investment necessary to build each component of the system has yet to be specified. Likewise, priorities and a detailed roadmap for implementation at regional level have not been proposed as these should reflect specific needs of each node.

The draft plan of action was submitted to the ITPS for its review and endorsement. After a very dynamic process in which ITPS recommendations were included, the draft plan of action was endorsed by ITPS during its second working session in April 2014. In July 2014, the plan of action was presented to the Plenary Assembly of the GSP. There was general support for the goals of the Pillar but the participants felt that the number of recommendations should be consolidated. Following discussions with the floor and members of the Pillar 2 Working Group present at the meeting, the number of

recommendations were redrafted and reduced to **seven**. A revised draft action plan was subsequently approved by the plenary assembly.

2. Why is strengthening investment, technical cooperation, policy, education awareness and extension at the global and national scale needed for soil?

There is no doubt that it is necessary to give maximum priority to the protection of soil resources in the national development agendas of the countries around the world. But the struggle to convince decision makers of this continues across the planet. The current lack of investment and political will for soil reflects a shortfall in societal awareness and appreciation, which is, in its turn, a result of the deficiencies in education at all levels. The need to overcome this situation should translate into effective actions to support the GSP's Pillars not only in the generation of policies (in those countries where no policy exist at all, or where it is weak) but also through the allocation of the corresponding financial resources. This also includes efficient mechanisms to handle potential private investment.

Governments must be invited at the highest level to generate and enforce well-defined national policies on soil, complemented, where needed, by legal measures with the protection of soil as the central focus. Soil should be at the heart of environmental and sustainability policies, rather than on the fringes; the GSP demonstrate the vital role of soil in the energy, water, food security, biodiversity, and environmental change nexus, together with the economic value provided by soil functions and the financial consequences associated with degradation processes. It should also be established by a bylaw or a regulation, from where the financial resources should come, for the implementation of a protection-of-the-soil law. The policy should also take into account that the investment could also come from private sources and not only public sources, with due consideration to ensure the right application on protection of the soil at a national and global level. Society should understand that soil needs attention because it faces important challenges, and to solve the existing problems a significant shift in policy and investment into soil is needed. This shift would have three main applications: it would help us to face the need for increasing food production and maintaining food security, address the menace of ecosystem degradation, and face global changes in climate and related environmental conditions.

While historically in many cultures, the importance of soil in sustaining civilisations was understood and recognised by social status and culturally, the need to raise its awareness and understanding currently both in the urban and rural environments, has been highlighted by many voices. But there remains a serious underinvestment in this activity which needs to be redressed. In several parts of the world, land-based pressures and unsustainable practices are slowly affecting the future functions that the soil resource will be able to perform. The soil science community needs to connect more effectively with wider society to portray their science as relevant. This presents a serious challenge as soil

is often not bestowed with the same importance in society as a whole as for example water or air quality might be. In fact, it can be easily showed that protecting water and air quality requires a high-level and dedicated protection of the soil. It is therefore essential that soil scientists deliver the important positive message that soil perform functions which are essential for life. Research outputs should increasingly be judged on both their scientific integrity and their relevance and societal impact. In addition to the production of scientific papers and reports, new ways of communicating the importance of soil and soil science to diverse groups from national and international politicians to primary-age school students, must be found at national scales.

Some examples of good practice in raising awareness to, and exchanging information with, different groups of stakeholders are presented on the GSP web site.

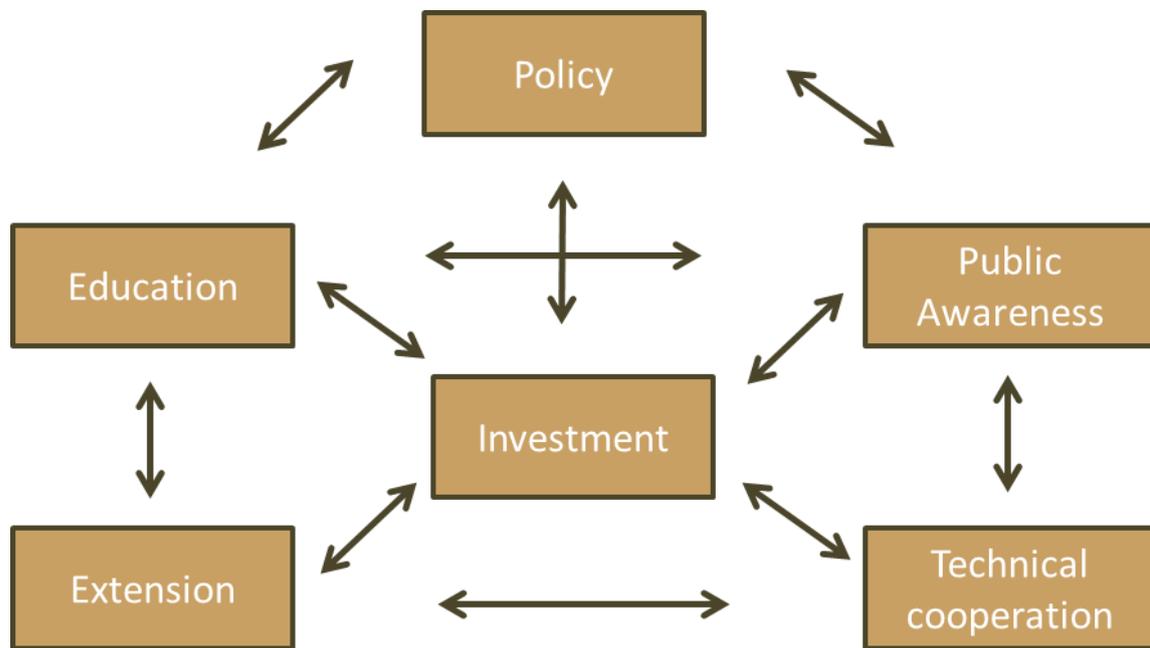


Figure 1: The interdependencies and interrelationships between the components of Pillar 2.

3. Major components of Pillar 2

Logically, the activities under Pillar 2 can be divided into six components: policy, investment, education, extension, public awareness and technical cooperation. As Figure 1 shows, these components are closely interlinked and, in many ways, interdependent. While the title of Pillar 2 lists these issues in a certain order, there is general consensus that effective policies for the sustainable use and preservation of soil resources is at the heart of the GSP. In this context, politicians are heavily influenced by public opinion, which is in turn a function of education and awareness of a specific issue. For this reason, the order of discussions on Pillar 2 reflect this assumption.

3.1. Policy and the role of different institutions.

A robust policy framework is **the key issue** for the development of the GSP. In recent years, there has been an increasing appreciation of the economic and environmental value

of soil to society and a realisation that soil needs at least the same level of attention and protection as air and water. In fact, many social crises throughout the developing world are triggered to a large extent by inadequate soil management policies and practices.

In 1982, the FAO adopted a World Soil Charter detailing some basic principles and guidelines for sustainable soil management and soil protection to be followed by governments, international organisations and users of the land. The Charter calls for a commitment to manage soil resources for long-term benefit rather than for short-term expediency. Special attention was drawn to the need for land-use policies that create incentives for people to participate in sustainable soil management and conservation work, taking into account both the technical and socio-economic elements of effective land use. The Charter specifically notes that the use of soil resources should not cause their degradation or destruction and the imperative need to give high priority to promoting optimum land use, to maintaining and improving soil productivity and to conserving soil resources.

However, in many countries, many of the principles of the Charter have not or are not being applied. Continued human-induced soil degradation suggests that policy makers, land users and the broad public are not being informed of the need and the means of improving soil productivity and conservation or of the economic value of soil-based services, or more strikingly, the cost due to a loss of these functions. As a response, the Global Soil Partnership should give a strong signal that politicians and policy makers must take note of the total value of soil and how it is being utilised across their territories. A significant element in the lack of political importance that is attached to soil. Primarily this is due to the mismatch between short-term political goals and the long-term aspect of soil protection and the consequences of soil degradation. Underpinning this situation is a lack of public interest or awareness in the role of soil in their daily lives. A situation exacerbated by an ever increasing detached urbanised electorate. In this context, any supportive policy environment and technical solutions that lead to the effective protection and management of soil must be driven by large-scale awareness raising campaigns with the aim to reinforce the need for soil, highlight the consequences of mismanagement and loss, to spur political and policy reaction. To this end, a new version of the World Soil Charter is under preparation. Its contents will be updated to take advantage of the current momentum associated with soils in order to obtain a commitment towards the promotion of sustainable soil management by all parties.

Policies should be proportionate because there is a risk that over-zealous administration will not be supported by governments; the GSP has an important role in helping achieve enhanced protection but with real policy support. The established Intergovernmental Technical Panel on Soils have developed a Soils Brief as the contribution to the Sustainable Development Goals and Post-2015 Development Agenda. This brief now constitutes FAO's proposal for its members to consider when deciding about these fundamental policy commitments. ITPS members are currently advocating for the inclusion of soils into this key development agenda. Efforts by all partners and stakeholders involved on development should be performed in order to advocate for the

final inclusion of soils into this process even if at targets and indicators levels. Otherwise, there is the risk that the current good soil momentum could not be translated into policies, which at the end will be the path towards mainstreaming soils in all related decisions and interventions.

In parallel, long-term and large-scale policy instruments measures must be put in place to build greater resilience to soil degradation and to reduce human vulnerability to disaster events. Key to this goal is the enhancement of capability and capacity for soil survey and monitoring, with a particular focus on assessments of soil productivity, soil carbon and soil biodiversity in light of soil protection (strongly links to Pillar 4 of the GSP). Possible implementation mechanisms may include:

- targeted information material such as policy briefs for policy makers on key issues (max 2 pages A4);
- measures to assess the impacts of current policies and land use practices on soil quality in areas such as agriculture, forestry, waste management, urban development or mining, and to ensure the sustainable use of soil and its functions;
- development of action programmes to deal with the main issues of local concern, along with remediation strategies for degraded and contaminated land;
- formal requirements for the collection of harmonised soil information (links to Pillar 4 of the GSP);
- inviting high-ranked administrators and politicians to the events related to the World Soil Day and promote the development and implementation of voluntary guidelines for the sustainable use and management of soil resources through FAO governing bodies;
- preparing a series of events together with national governments devoted to the International Year of Soils in 2015;
- preparation and presentation at high level of the new version of the World Soil Charter by the ITPS;
- the nomination of soil advocates to provide strong leadership and promotion of the importance of healthy soil at national, regional or local levels so that the healthy condition of soils becomes a priority;
- preparation and presentation at high-level of the Status of the World Soil Resources Report by ITPS members and corresponding Working Group;
- a joint project of FAO and UNESCO, including a topic "Education and Public Perception of Soil" in their programs (e.g. there is a program called "One Planet, One Ocean" developed by UNESCO, then the next may be called "One Planet, Many Soils, Many Choices"), and participation in the events organised by UNESCO (e.g. the World Conference on Education in November 2014 to be held in Japan).

Recommendation 1 (Policy): Politicians, policy advisors, decision makers and associated agencies should be informed, through FAO formal channels and GSP partners, to better appreciate the true societal value of soil (i.e. environmental and economic) to their specific sectors in order to encourage the development of enabling frameworks for soil protection or sustainable management in line with the goals of the World Soil Charter

Recommendation 2 (Policy): Policy development should be supported by regular and harmonised assessments of the state of soil, associated pressures, their impacts and trends to prioritise and target interventions (Pillar 4 of the GSP).

3.2. Education

To facilitate policy development and decision-making related to the most appropriate use of terrestrial resources, relevant and up-to date information on the state of soil is critical. This information is traditionally obtained through soil surveys and related land resource inventories. In combination with socio-economic data, soil data can be analysed and interpreted in the process of land evaluation to indicate the suitability of different tracts of land for various uses. Such information can also be used as a baseline for monitoring changes in the state of natural resources under different uses. In this context, the development of a soil monitoring programme is essential. For this to occur, there is a need for a supportive skills base, trained to collect the necessary data and interpret the results for decision makers.

Education is a science, and, as a science, it requires, like all science, to start off from a worldview that defines the general framework in which its development is enrolled, an educative goal, a pedagogical model, and the definition of an appropriate context as to the goals to achieve, such as the objectives to develop. Soil science education should not be viewed in isolation from education in related disciplines such as water conservation or ecology. Only by demonstrating synergy with other sciences can soil science demonstrate its relevance. Soil science education should follow with actual research priorities as for instance the impacts of climate change on soils and food security. To increase data on soil properties and analysed in a socio-economic perspective, soil science should become integrated and adapted to attain targeted demands and needs on the ground. This is also fundamental step to attract young people and new talents into soil science relating opportunities for them to apply their knowledge. In this context, a soil education programme is needed for capacity building, strengthening capacity to attaining an adequate skills base, trained to collect the necessity data and interpret the results for decision makers. Further, other tools should be implemented on education such as

distance courses, e-learning, web forum for both soil users as well as all genres in public society.

Education should also not just be about the accumulation of knowledge but also in the development of competencies that allow the application of that knowledge to move forward. Education allows citizens to understand the need to build, promote and require their governments to create appropriate soil-related policies is also required. Education also extends into a society's ability to obtain, manage and administrate the financing, investment and resources. In this respect the provision of relevant education the farming community, as guardians of the soil, is paramount.

Therefore, this proposal proposes the targeting of specific educational sectors ranging from schools (but targeted to age ranges), tertiary level and professional technical qualifications. It should be noted that at tertiary level, there is a perception that soil science is a dry, uninteresting or static subject, coupled with a decline in the vocational opportunities in the agronomy sector. Universities should be encouraged to refresh their course content and presentation, especially through the inclusion of innovative aspects (e.g. use of drones, novel systems for data and knowledge delivery, e-content).

Possible implementation mechanisms may include:

- School gardens can be used to link into food production, soil biodiversity, nutrient cycles, etc.;
- Soil is excellent for cross curriculum projects at secondary-level and can be introduced as an element in a wide range of scientific subjects (e.g. physics, chemistry, biology, geology, ecology, economics,);
- Learning opportunities in the real world through out-of-school learning can extend public outreach programmes, overcome learning disabilities, develop practical talents, strengthen communities and increase interest in soil. Such events could be arranged as study clubs, mentoring, community service and summer schools. New educational technologies, such as video content, distance learning and the possibility of practical exercises to be done at home, in gardens or parks, should be at the forefront of these initiatives;
- Encourage funding organisms to encourage and reward education and outreach aspects within research programmes and proposals;
- Soil science curricula should especially be developed for schools, adapted to different age groups, and education departments urged and convinced to include such education in the school curricula. Such curricula should be stimulating, fun, practical and provide a combination of theoretical and practical learning for scholars to understand the importance of soil in the daily existence of humans through the production of target education material and modern delivery media (games, cds, books, web portals, etc.);
- Documentation, tools and curricula need to be updated and developed to adequately supply training institutions at all levels with evidence based information about soil science, sustainable use of soils and the interaction

between soils and the broader natural resource environment. The development of such documentation and training curricula should be motivated and driven by the GSP at global, regional and national levels.

- At tertiary level soil science as a stand-alone discipline should be broadened to include training on the use of systemic approaches (such as farming systems and ecosystem services), technical advances in sustainable soil management, and spatial aspects of soil distribution and use, including land use zoning, accurate digital soil mapping and information for accurate and targeted advice.
- Refresher courses for farmers and land managers (links to section on Extension).

Recommendation 3 (Education): Education on soil should be promoted:

- as a theme into school curricula at all ages in order to boost the understanding of its value and functions;
- at tertiary level, soil science should be promoted as a key subject or taught as a cross-cutting discipline;
- to the broader soil user community through diverse communication and learning channels;
- by updating relevant documentation, tools and training materials - traditional and emerging pedagogic channels should be explored to ensure maximum dissemination of such materials;
- through cooperation with existing programmes (e.g. UNESCO, FAO, UNCCD, etc);
- by increased support for the participation of young soil scientists from developing countries in international training events.

3.3. Public awareness raising

Soil-related outreach involves the dissemination and acceptance of information about soil to stakeholders who have not been aware of its importance. Public awareness can support efforts to involve private sector, indigenous and local communities and NGOs to engage on soil related activities. In the urban areas, in addition, the importance of soils should be mainstreamed in all activities beyond agriculture. Historically, the value and limitations of soil was more understood and appreciated. By adopting shifting cultivation practices, the indigenous populations of central Africa understood the limited nutrient content and the need to reduce the acidity of certain soil types. Omar Khayam, about one thousand years ago, wrote about the importance and also the nature of soil and its relation with vegetation.

*Look how the morning breeze has helped the rosebud bloom
And how at the sight of the rose the nightingale swoons
Come sit in the shade of the rosebush for such a rose
Has often grown out of the soil to fall dawn again*

Khayyam Neyshabouri

Fallow was a recognised practice of medieval European agriculture and even the poems of Omar Khayyam Neyshabouri noted the importance of soil. The increased urbanisation of society and detachment from the food production process means that a significant proportion of people (probably the majority), lack a fundamental understanding of soil, its functions and indeed where their food comes from. Life-critical questions such as what makes soil fertile are a mystery to many. Major providers of such material should be the national soil science societies, museums, NGOs, universities, public administrations and extension services and to be effective, requires appropriate funding. Traditionally, there has been little engagement between the soil scientist and the public. Funding and performance targets mean that greater emphasis is placed on high-level research and peer reviewed publications than on outreach activities, often only carried out by motivated ‘volunteers’. As a result, soil scientists have evolved to communicate soil through a complex language, dominated by a technical vocabulary that is incomprehensible to almost everyone outside the soil science community. Equal emphasis and reward should be given to public outreach activities through awareness programs, they should be properly funded and not just be add-ons to projects. In addition, such outreach activities should be structured in a way that ensures active participation and discovery by participants in order to assist them in understanding the links between soil, its functions and cause-effect relationships in its use and misuse.

It should be noted that sustained funding is needed for large-scale soil awareness activities and broadcasting. Measures should be put in place to ensure that such outreach activities can be professionally structured and implemented to reach full target audiences and allow for participatory approaches to be implemented in the process.

The main objectives for awareness extension is promotion of the issues related to soil through brief but vivid messages on how soil relates to their existence promoting international links and collaboration within different sectors, agencies and stakeholders. Measures that can be taken to promote soil awareness among policy-makers, donors and the general public include:

- increasing the visibility of soil across all sectors, driven by soil science but delivered using professional communicators and the use of advertising agencies;
- involvement of mass media outlets at local and national levels. In particular web fora and other social networking platforms for the discussion of soil-related issues that would also capture the younger generation;
- targeted mass participation events including museum exhibits (e.g. Dokuchaev Institute, ISRIC, Osnabruck, Soil Science Society of America and the Smithsonian Institute), supermarket promotions, celebrity endorsements and high volume media outlets;
- wide dissemination, worldwide (through FAO recommendation to the governments of member countries), the celebrations of the International Soil Day (5/12) and Year (2015);
- developing computer games on soil-related subjects (e.g. a 3D-shooter or a quest in soil pore space).

- development of a platform presenting current scientific results in a clear and simple language. The involvement of scientific publishers would be desirable (e.g. the creation of more "public" versions of peer-review journals);
- increasing the number of public events dedicated to soil, especially targeting existing mass gathering events (e.g. agricultural shows, music festivals, etc.)
- volunteer engagement is increasingly becoming a significant trend within young people. Many bodies such NGOs, youth associations and organic farmers are proposing volunteer projects. Soil protection could be incorporated in these project (e.g. European Voluntary Service, Service Civil International/WWoof).
- Where appropriate, use alternative communication channels; e-mail is becoming an overused medium.
- Development of public awareness materials in appropriate language to reach out the general public within countries through hard copy, television, radio, internet, music and social media.
- Developing a basic soil awareness raising toolkit with information templates (presentations/manuals/pictures/worksheets), examples and practical tools that can be implemented by scientists and awareness raisers at land user level through project implementation.
- Establishment of regional soil advocates.
- Utilization of cultural and traditional understanding of soil issues (ethnopedology, art, literature, customs).

Key awareness raising events for 2015

International Year of Soils (IYS) 2015
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The aim of the GSP is to make the IYS 2015 a memorable and milestone year during which the soil community can truly contribute to efforts towards food security, hunger eradication, climate change adaptation, poverty reduction and sustainable development. Within this context, the importance of SSM should be highlighted, publicized and advocated in terms of current knowledge, challenges in achieving increased adoption, and most importantly, constructive and positive plans and actions of how this can be achieved. Despite the global challenges in terms of current soil use, degradation, unsustainable management and sub-optimal production, the IYS should be used as a positive platform to create a spirit of understanding, action and collaboration to increase SSM in the long term. The responsibility of celebrating IYS 2015 resides with all elements of the GSP. The opportunity of showcasing the importance of soils should be utilized for the full year, culminating in final celebrations on WSD. RSP implementation plans, which will be developed following the endorsement of the plans of action for the five GSP Pillars of action, should be made public. As part of the IYS celebration, the ITPS will launch the Status of World Soil Resources Report on 5th December 2015 and will assess global soil resources within the framework of ecosystem services while providing a scientific assessment of current and projected soil conditions, their implications in practice, and the identification of soil-related knowledge gaps that constrain the achievement of sustainable development.

World Soil Day

Because the importance of soils, in 2002 the International Union of Soil Sciences made a resolution to propose December 5th as the World Soil Day (to honour His Majesty the King of Thailand for his promotion of soil science and soil resources conservation). This day aimed to celebrate the importance of soil as a critical component of the natural system and as a vital contributor to the human commonwealth through varied services. It is celebrated particularly by the global community of 60 000 soil scientists charged with responsibility of generating and communicating soil knowledge for the common good. FAO, through the GSP and under the leadership of Thailand, requested the UN system to recognize the date as the World Soil Day and institutionalise its observance accordingly. In 2013, the United Nations General Assembly, declared December 5th as World Soil Day. From 2014 onwards, all regions, countries and GSP partner institutions should officially celebrate WSD as an opportunity to create awareness on relevant soil issues. World Soil Day should be used as a simultaneous reporting deadline for Regional Soil Partnerships to report to the Secretariat on progress of their implementation plan activities. This will enable the GSP Secretariat to publicize progress on implementation of its five pillars of action and maintain regular communication of the same to the global audience.

World Expo 2015 Milan

The next Universal Exposition will be hosted by Milan (Italy) from May 1st –October 31st 2015 under the theme ‘Feeding the planet, energy for life’. Soil, as the key resource

for food production should be a major element of the event. As a global occasion, the Expo is a significant outreach and political forum – more than 20 million visitors are expected. The soil community should be encouraged to utilize this opportunity to raise the profile of soil, particularly through associated events and in national pavilions. [http:// expo2015.org](http://expo2015.org)

Recommendation 4 (Awareness): GSP partners and the broad soil user community should promote strategies to engage with society as a whole and utilise the expertise of professional communicators (including social scientists). This could include the development of public awareness campaigns and initiatives, such as the World Soil Day, which can be adapted to different regions, cultures and scales of implementation. Governments should consider investment and sustained funding to support large scale national outreach programmes.

3.4. Extension

Soil extension services provide a vital link between soil users, indigenous communities, land managers and other users of soil and the science community. Extension services need to interpret and present relevant research-based information to stakeholders in an understandable and usable form. Extension services already offer vast quantities of data, information and advice to the agricultural sector in many countries, driven largely by the need for soil testing and plant diagnostic services. However, there is a large disparity in the extent, efficiency, expertise and experience of extension services between different countries, with particular concern in Africa. In addition, agricultural extension in many countries is regarded as a low level form of employment and socio-economic standing which adds to the challenges in the resurrection of effective extension services where it has deteriorated. The level of extension and knowledge support across the world is therefore highly variable, resulting in continued use of inappropriate farming practices and a lack of support to advise clients on appropriate amendments. Governmental bodies, research institutions, NGOs and other private sectors play a key role in implementing these services. To offer the adapted technology on demand, outreach programmes are useful in cooperation between public-private sector, NGOs and other groups. In addition, extension services promoting farmer to farmer learning should be encouraged to facilitate and disseminate knowledge as well as to earn trust among soil users. Soil related training for soil users should also be increased by capacity building and strengthening capacity development. The Soil Doctors programme is a viable example of capacity building and strengthening capacity development through training of specific experts who will be in charge of the dissemination of knowledge to other soil users. Farmer field Schools is another method commonly used by FAO for small-scale farming. The services should follow local adaptation so soil users will not need to rely on blanket recommendations. Moreover, extension services should be provided in electronic form including cell phones to reach soil users who are able to utilize such information.

Information and advice services would be operated from a central server and location with dedicated personnel available to respond to specific queries, requests for information, support and advice.

In parallel, the activities of extension services should be expanded to reflect the broad range of services provided by soil beyond the agricultural sector. In essence, this is an additional type of awareness raising but driven by specific technical need, for example engineers, conservationists, archaeologists and planners. Extension services are well placed to target these additional markets.

Potential implementation measures could include:

- initiatives such as the Global Soil Doctors Programme should be established in order to provide support and capacity development for extension on soils where formal extension services are not available;
- placing particular emphasis on education and participatory training of agricultural staff at all levels in a way that research outcomes can be made available for users in various forms;
- the provision of extension material in electronic form including via cell phones for soil users able to utilise such information, operated from a central server and location. Extension personnel would be available to respond to specific queries, requests for information, support and advice.

Recommendation 5 (Extension): Extension services should be supported (politically and financially), developed and revitalised to reflect the multi-functional services of soil and expanded beyond the traditional agricultural community to ensure the sustainable use of soil and to reduce degradation across all land uses. Regional priorities need to be determined in terms of the disparities in agricultural extension knowledge-base, expertise, motivation and support, and then professionally and efficiently communicated in order to develop solutions to these challenges and set goals for their implementation.

3.5. Technical cooperation

Technical cooperation aims at assisting in mobilising resources for soil-protective agriculture, forestry, rural development, food security, nutrition and resilience (in particular for technology transfer and capacity building).

The cooperation should develop between the following stakeholders:

- partners who are mutually interested in each other; this cooperation can be realised within Regional Soil Partnerships or using South-North, South-South, East-West and other cooperation schemes ;

- research institutions, such as the CGIAR (Consortium of International Agricultural Research Centers) with its international institutes and centres (CIAT, CIMMYT, IITA, ICRISAT, IRRI, etc.) and other partners on issues related to training and international cooperation involving the soil-related themes;
- financial organs such as the World Bank, the Global Environment Facility, private investment and philanthropic organisations;
- the FAO and multiple partners, where the FAO acts as a coordinator of joint activities, which could not be organised in the frameworks of Regional Soil Partnerships or other schemes;

It is important to note that in this context technical cooperation involves mutually beneficial collaboration rather than a direct donation from one partner to another.

Documentation of cost-benefit scenarios for implementation of technologies including local innovations and modern scientific advances which can be useful at policy level and communicated to soil users.

Recommendation 6 (Technical Cooperation): Scientific and technical cooperation should be promoted and strengthened between partners of the Regional Soil Partnerships and through South-South and North-South cooperation schemes (links to [D:\11... 4 ... 1 2\](#))

3.6. Investment

Investments are tangible products of growing awareness on the importance of soil resources. Thus, the growth of investments would reflect the effectiveness of a heightened awareness of the significance of soil to society. Increasing investment opportunities regarding soil activities increases its value and results as a good mechanism to advocate for soil related matters for policy makers. Due to the recognition that soils are a finite resource and its increased value once land is privatized, there is a high interest by private investors to own healthy and fertile soils. Investments should target relevant skills and support development and entrepreneurship among soil users. It should stimulate synergies and diversification, seizing new opportunities such as soil eco-tourism and soil conservation for example. These integrated approaches would be done through the promotion of linkages among institutions, soil users and public-private partnerships giving capacity to youth and women in rural areas. Many studies have shown the strong relationship between investment and productivity levels. Low investment is almost always a precursor to land and soil degradation. The impact of erosion by itself on agricultural production (decline in yield) has been estimated to be equivalent of between 5-10% of GDP for developing countries. The implementing of erosion control measures, either through physical infrastructure or through changes in land management practices, have been shown to result in the restoration of the natural capital of the soil and the economic value of the land. The greening of the Tigray region

of northern Ethiopia through investment in conservation measures is a clear example of the value of investment.

More effective public and private investments are needed among all ranges of soil users, at small scale and large scale, ensuring more sustainable projects. To bring back investment to the rural areas would also make it more attractive for youth which is a big issue since an aging population dominates many rural areas. Many young adults abandon rural jobs which are dangerous, exhausting, low paid and ill-protected and due to limited infra-structure. Rural communities should be recognised for their potential whereby investment can empower them.

In order to facilitate the collection of financial contributions as extra-budgetary funds and/or in-kind from interested partners such as international financing institutions, multilateral donors, intergovernmental organisations and development agencies, an umbrella program of the Global Soil Partnership should be established, "The Soils Multi-Partner Platform" is considered as a the most appropriate mechanism to recourse partners willing to join forces in support of the GSP activities at local, regional or even global level. The development of education, public awareness extension, technical cooperation and policy should similarly lead to growth in investment. However, specific measures should be also taken, namely:

- preparation of a "data bank of problems" - a database on the existing unresolved issues in soil management and conservation, which need investment for the R&D;
- preparation of a "data bank of solutions" - a database of existing proposals for solving certain problems in soil management and conservation, but which have not been applied due to the lack of investment;
- preparation of a "data bank of partners" - a database of the persons, laboratories and companies, which are ready to undertake a R&D project to resolve a certain soil-related problem;
- preparation of a "data bank of donors" – a database of the potential investors of soil-related R&Ds.
- development of financial incentives to encourage farmers to adopt good agricultural practices that assist to improve soil conditions and associated secondary benefits (e.g. minimise GHG emissions, SOC sequestration, increased water holding capacity, increased biodiversity);
- investment programme for the restoration of damaged peatlands and natural flood management schemes;
- research programmes that provide rapid, accessible and integrated scientific information and advice for key policy areas, particularly in relation to the consequences of environmental or climate change and the development of indicators and tools to monitor soil quality and threats to soils;
- establishment of monitoring networks and active collection of data;
- development of tools of relevance to farmers, land managers and the public.

Recommendation 7 (Investment): The GSP should foster investments in soils to benefit society and future generations through inter-alia the "Healthy Soils Facility" to ensure effective implementation of activities under the five plans of action. The return from investments (including cost-benefit analysis) should be assessed to provide funding agencies, soil users and policy makers with evidence based success stories for future investment schemes. Investment strategies should reflect regional and national priorities and stakeholder needs.