Summary Report

International Summit of Health and Lifestyle: Global Soil Threats, Faculty of Geography, University of Tehran, Tehran, Iran, 4-5 May 2016
Organized by: the Secretariat for the Advancement of Science and Technology in the Islamic World (SASTIW) & Faculty of Geography , University of Tehran

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Table of Contents

■ *Introduction*

Soil links biosphere, hydrosphere, and atmosphere, and also soil is home to many living organisms. Soil's health and cleanness are of paramount importance. It is one of the most important natural resources; however, compared with other natural resources, its preservation, protection, and proper utilization have not received the due attention. The only way to manage soil is by preventing its destruction and promoting its safe utilization. This issue would not be possible without having the knowledge of soil protection and applying that knowledge. According to the World Soil Charter, soils are essential natural resources for sustaining life on Earth. We recognize the vital role of soils for the well being of humans and all the living. Due to the necessity of using rated methods and also the inability to test all methods in practice, we need to exchange knowledge and experience through interaction with soil scientists and experts from all around the world. This issue was the objective of the international "Global Soil Threats" summit which was held at the Faculty of Geography, University of Tehran from 4 to 5 May 2016.

During the summit scholars from all over the world, particularly Islamic countries, exchanged their ideas about soil threats. Several senior scientists and experts from seven countries (Iran, Russia, Australia, Pakistan, Malaysia, Lebanon, and Turkey) participated in the summit. The summit recognized the fact that soils are misused and mismanaged throughout the Near East and North Africa (NENA), both of which are severely affected by water shortage and incipient climate change. The summit addressed the following issues: 1) Soil degradation, 2) Sustainable soil management, and 3) Soil and human life.

On the first day of the summit, the delegates recognized the reasons of soil degradation, sustainable soil management and the role of soil in human life. On the following day, the foreign speakers of the summit and a group of Iranian speakers from the Faculties of Geography and Soil Science discussed the main points raised in the meeting at Negarestan Garden. The present report is divided into three sections. The first section deals with the global soil threats. Section two describes the main points and ideas of the participants of the summit and shows the different approaches that can be taken in order to address the threats. In the final section, a series of policy-making suggestions discussed in Negarestan meeting will be presented.

■ *Statement of the Problem*

▸ *Global Soil Threats*

Soil resources are the basis of global food security and therefore are directly related to the common good of the mankind. Global soil resources are limited and non-renewable. According to the recently released report of the Intergovernmental Technical Panel on Soils (ITPS), there are major global soil threats affecting these limited resources. The demand of human population and growth and development are putting massive pressure on soil worldwide through increasing intensification of land use.

Global soil threats include climate change, salinization, pollution due to human activities, widespread desertification caused by the loss of carbon soil, significant physical erosion from mechanical disturbance of land surface through agriculture practices, habitat degradation, and loss of biodiversity including impacts on organisms that transform and supply nutrients to plants. Loss of soil fertility, soil erosion, and decline of soil organic carbon have been identified as major threats to the global food security that should be addressed in the near future.

In this regard, the most important missions of the International Summit of Health and Lifestyle: Global Soil Threats were:

1. exchange of experiences and knowledge of soil management, conservation, and exploitation,
2. creating a framework for scientific cooperation between researchers in Iran and other countries,
3. reviewing and analyzing organizational structures among different countries in order to deal with soil threats, and
4. increasing awareness and knowledge of experts about soil threats.

▸ *The Intergovernmental Technical Panel on Soils (ITPS)*

The Intergovernmental Technical Panel on Soils (ITPS) was established at the first Plenary Assembly of the Global Soil Partnership (GSP) held at FAO Headquarters on 11 and 12 June, 2013. The ITPS is composed of 27 top soil experts representing all the regions of the world. The main aim of the ITPS is to provide scientific and technical advice and guidance on global soil issues to the Global Soil Partnership and to specific requests submitted by global or regional institutions. Since its establishment, ITPS has held five working sessions from 2013 to 2016 and has played a fundamental role in positioning soils on the global agenda through sound science.

The Five Pillars of Action

The Global Soil Partnership will support the process leading to the adoption of sustainable development goals for soils. In order to achieve these objectives, the GSP should address five main pillars of action:

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

The Main Points of the International Summit of Health and Lifestyle: Global Soil Threats

The International Summit of Health and Lifestyle: Global Soil Threats held on 4-5 May at the Faculty of Geography, University of Tehran included an inaugural session, three discussion sessions, and a closing session.

Inaugural Session

In the inaugural session, three keynote speakers expressed their ideas about global soil threats, the significance of soil degradation and sustainable management of soil, and highlighted the role of soil in human life and food security. The following part presents the main points made by the keynote speakers.

▸ *Prof. Ali Akbar Moosavi-Movahedi: Director General of the Secretariat for the Advancement of Science and Technology in the Islamic World (SASTIW), University of Tehran*

The first keynote speaker of the summit Prof. A.A. Moosavi-Movahedi began his lecture by noting that human achievements are not synchronous with sustainable developments and can have damaging consequences for the environment and society. He referred to soil as an essential component of life whose threat is a threat to the life of humans, plants, and other living creatures. Prof. Moosavi-Movahedi added that soil provides food for both human body and soul. He stated that a threat to soil is a threat not only to the environment but also to human nature, identity, dignity, and civilization. At the end of his lecture, Prof. Moosavi-Movahedi hoped that the summit would lead to the creation of a new spiritual and influential discourse on the importance of soil in human society and lifestyle change.

▸ *Prof. Dr. Ebrahim Moghimi: Dean of Faculty of Geography, University of Tehran*

Prof. Dr. Ebrahim Moghimi began his speech by welcoming all participants in the summit and introduced different departments in the faculty of geography. He noted that culture is a fundamental element based on which people interact with their environment. He highlighted that human beings should consider how natural phenomena such as soil erosion interact with culture to create a dynamic phenomenon that can sometimes change rapidly and cut across pre-existing cultural boundaries. Prof. Moghimi explained that various forms of cultural threats increase vulnerability, disasters, hazards and endanger health. Finally, he emphasized that culture is a universal guiding force for soil protection in the Islamic world and common cultural elements can make us adaptable to change. Prof. Dr. Moghimi suggested that the subject of next summit be hazards.

▸ *Prof. Seyed Kazem Alavipanah: Full Professor of Soil, Remote Sensing and GIS, Member of the Department of Remote Sensing and GIS, University of Tehran*

Prof. Seyed Kazem Alavipanah, the chairman and scientific director of the summit was the second keynote speaker who gave a brief review of global soil threats issues. Prof. Alavipanah began his lecture by stating that 2015 was the International Year of Soil, and many countries around the world contributed to organizing events to promote the world soil knowledge, and most importantly, to enhance knowledge about constructive and positive planning as well as local management. He also noted that many counties are suffering from a symptom-based management paradigm, which mainly focuses on secondary problems rather than addressing the main causes. He explained that soil is known not only as a complex, dynamic and open system but also a social system. Prof. Alavipanah added that the development of specific and appropriate measures to be adopted by local decision-makers requires comprehensive and multidimensional initiatives. Partnership is essential in this regard. In addition, he noted that soil management decisions should be implemented locally because they occur within widely differing socio-economic contexts. Finally, Prof. Alavipanah emphasized that developing a practical cooperation protocol was the most important expected achievement of the summit. He stressed that the establishment of soil network in the Islamic World was required to promote collaboration among the Islamic countries. Finding a practical and sustainable soil management system using scientific and local knowledge as well as evidence-based proven and remotely sensed data and GIS techniques, Prof. Alavipanah stated, was the means to help us increase nutritious food supply and sustain the environment

▸ *Mr. Mehdi Ansari: Communication and Advocacy Specialist of FAO Representation in Iran*

Mr. Ansari spoke on behalf of Mr. Serge Nakouzi who is the FAO Representative in Iran. He stated that "the Status of the World's Soil Resources" report should constitute a key road map, a Rosetta stone, which leads to the establishment of the basis for planning future interventions in promoting sustainable soil management reflecting the main challenges in all regions of the world. He listed some of the priorities that should be taken into consideration as follows:

minimizing further degradation of soils and restoring the productivity of soils that are already degraded in those regions where people are most vulnerable. [Sustainable soil management];

stabilizing or increasing the global stores of soil organic matter [SOC improving management practices];

stabilizing or reducing global nitrogen (N) and phosphorous (P) fertilizer use while simultaneously increasing fertilizer use in nutrient-deficient regions; and improving our knowledge about the current state and trends of soil condition.

Mr. Nakouzi concluded his lecture by pointing out that the summit could help to promote sustainable soil management for food security and nutrition, climate change adaptation, and an overall development for everyone.

The First Discussion Session

Following the lectures of the inaugural session, three discussion sessions were held, one in the morning and two in the afternoon. Prof. Ahmet Mermut, Full Professor at University of Harran from Turkey was the chair of the session on soil degradation.

▸ *Prof. Pavel Krasilnikov: Member of the Lomonosov Moscow State University, Russia*

The lecture of Prof. Pavel Krasilnikov focused on the issue of "food security, ecosystem services, and economics of land degradation". Prof. Krasilnikov argued that soil scientists should develop new landscape adapted technologies to contribute to the sustainable intensification of agriculture, especially in the developing countries. He noted that the main trends of the development of agriculture in future would be, on the one hand, smart land use planning and construction of artificial soilscapes, and, on the other hand, the use of new generations of biochemical fertilizers such as humates, biochar, etc. Prof. Krasilnikov referred to the economics of land degradation (ELD) as a challenging initiative which focuses on the motivation of the decision makers to pay attention to land and soil degradation, which in turn would lead to the promotion of sustainable land management approaches in land use. He highlighted that the current approach to the ELD focuses mainly on the decision making at global and national levels; however, much needs to be done in the future to include ELD in the management procedures at the farm level.

International Summit Of Health And Lifestyle
Global Soil Threats

▸ *Prof. Seyed Kazem Alavipanah: Full Professor of Soil, Remote Sensing and GIS, Member of the Department of Remote Sensing and GIS, University of Tehran*

The second speaker was Prof. Seyed Kazem Alavipanah who delivered a lecture titled "Soils under Threat in the Near East and North Africa". He emphasized that soil resources in the Near East and North Africa are adversely affected by wind and water erosion, salinity/sodicity, contamination, and sealing/capping and to a lesser extent by water logging and acidification. Prof. Alavipanah indicated that constructive government policies and legislations and socio-economic factors in individual countries could reverse land degradation due to erosion. He explained that different field methods were adopted to reduce detrimental effects on land productivity. Finally, Dr. Alavipanah concluded that mitigating measures should be strengthened with government policies aiming at land conservation

Dr. Talal Darwish: Center for Remote Sensing, Lebanon

Dr. Talal Darwish's lecture was on "Human Pressure on Limited Soil Resources in Lebanon-East Mediterranean". Dr. Darwish gave a brief introduction about Lebanon as a small mountainous country located on the eastern Mediterranean shore with both topographic nature and climatic conditions which precondition the high vulnerability of the soil cover to water erosion. He noted that human pressure on soil erosion is directly related to the high rates of deforestation and recent urban expansion. Dr. Darwish asserted that Lebanon's forest stand was reduced from 33.5% to 14.3%, equivalent to 3500 and 1500 Km2 respectively. He indicated that a large change in land cover contributed to accelerated runoff, intensive erosion, and reduced natural recharge. Dr. Darwish argued that human pressure and increased food demands led to large and intensive agricultural production and often mismanaged fertilization, and also irrigation practices caused a drop of the groundwater level by intensive pumping, promoted seawater intrusion into coastal aquifers and led to secondary salinization of the soil-groundwater system. He concluded that the foundation of the Global and Regional Soil Partnerships and announcement of 2015 by FAO as International Year of Soil contributed to the development of guidelines and action plans to promote sustainable land management which helps to raise awareness of the multiple and diverse functions of the soil.

The Second Discussion Session

In the second discussion session, chaired by Prof. Dr. Mohammad H. Roozitalab, four scholars presented their lectures.

▸ *Prof. Hossein Ghadiri: Full Professor at Faculty of Environmental Science, Griffith University, Brisbane, Australia*

Prof. Ghadiri presented the first lecture of the second discussion session and provided lecture on "What do We Mean by Sustainable Soil Management?". He placed emphasis on land management, as a process by which the resources of land are put to good effect in a way that productivity is not diminished over time, or such production does not adversely impact on the viability or survival of species other than human beings. He noted that most Western countries such as Australia and New Zealand have agreed on sustainable land management with respect to climate change as part of their government programs. Prof. Ghadiri argued that the developed countries consider climate change in their policy, planning, and practice of land and water resources management, while most developing countries are still following unchecked exploitation of their resources in order to raise the standard of living of their populations. He also asserted that another major limitation of any land management system, which is especially acute in the developing countries, is that economically and politically powerful users can easily quantify and argue for their needs, or worse corruptly influence the decision makers. In addition, he pointed out that the economic value of ecosystem services is hard to define and therefore the ecosystems and the people most dependent on them for their subsistence become voiceless and often neglected.

▸ *Dr. Amanullah Khan: Associate Professor in Department of Agronomy, Faculty of Crop Production Sciences, the University of Agriculture Peshawar, Pakistan*

The second speaker was Dr. Amanullah Khan who presented a lecture on the "Integrated Nutrient Management Improve Crop Productivity and Profitability under Semiarid Climates: Field Experiences". He noted that integrated nutrients management refers to the maintenance of soil fertility and improvement in crop productivity by using plant nutrients through combined application of organic, inorganic and bio fertilizers, residues etc.; composts, biochar, ash, etc.. Furthermore, he argued that the combined application of plant nutrients especially major nutrients (nitrogen, phosphorus, and potash) along with different organic sources had significantly improved crop growth and increased productivity and profitability in different field crops. Dr. Amanullah Khan highlighted that under semiarid conditions the application of beneficial microbes (Biofertilizers) was found beneficial in terms of higher nutrients use efficiencies, yield, and growers' income. He concluded that the combined use of micro and macro nutrients as foliar spray also increased wheat and maize productivity and profitability under moisture stress condition in semiarid climates.

Dr. Wan Rasidah Kadir: Member of Forest Research Institute and President of Malaysian Society of Soil Science, Malaysia

Dr. Wan Rasidah Kadir delivered her lecture on “Soils of Malaysia; Potential Threats and Strategies for Sustainable Soil Management”. She indicated that the major soil threats in Malaysia are soil erosion by water (including coastal erosion), decline in soil organic matter in both peat and mineral soils due to land use change, soil compaction, soil sealing due to urbanization and population pressure, soil contamination (coastal deposits and mining), acidification (acid sulphate soil formation), flooding and landslides, and decline in soil biodiversity due to the loss of top soil. She maintained that management strategies to sustain soil productivity and quality are basically published as guidelines and acts such as National Land Code, which is rather general but relevant as it spells out land use categories in Malaysia.

Dr. Mohammad R. Balali: Member of Soil and Water Research Institute, Iran

Dr. Mohammad R. Balali gave a lecture entitled “Stewardship Soil and Water Management Approaching Sustainability in the Islamic Context: Case of Iran”. He pointed out that in order to accomplish a successful transition to sustainable land and water management, we need to construct a framework to be context dependent and also sensitive to the specific features of the region. He also noted, “Islamic stewardship should be considered as the platform for the construction and development of the definition of sustainability and can be characterized by the revitalization of traditional structures and their integration with the structures of industrial modernity, in such a way that the benefits and advantages of both will be preserved as much as possible.” Finally, he concluded that land and water professionals of tomorrow were portrayed as a “trans disciplinary engineer”, “public leader”, and “stewardship engineer”.

The Third Discussion Session

The third session, chaired by Prof. Hossein Ghadiri, included two lectures by Prof. Ahmet Mermut, and Prof. Dr. Mohammad H. Roozitalab.

Prof.. Ahmet Mermut: Full Professor at University of Harran, Turkey

Prof. Ahmet Mermut delivered a lecture on “Soils the Most Important Natural Resources for Life on Earth”. He pointed out that soils are vital to both production of food and fiber and global ecosystems function, especially in developing countries. He noted that scientists around the globe are now making a significant contribution to sustainable land management by translating scientific knowledge and information on soil function into practical tools and approaches by which the land managers can assess the sustainability of their management practices. Prof. Mermut argued that soil problems arise from local conditions and can only be resolved by local actions. He emphasized that soil serves as a platform for human activities, our landscape, and heritage, and it also plays a central role as the habitat and gene pool. Also, he indicated that soil stores, filters, and transforms substances such as water, plant nutrients, and carbon. Finally, he concluded that food security is becoming a very important matter for mankind on Earth, and soil is considered central to ensure this issue.

Prof. Mohammad H. Roozitalab: Member of the Agricultural Research and Education Organization, Iran

Prof. Dr. Mohammad H. Roozitalab delivered his lecture on “Soils and Food Security in Iran”. He noted that the gradual decline in soil quality might be a major contributing factor in the reduction of crop productivity in Iran and other countries in the region. He explained that about 97 percent of the soils in Iran have been developed in the arid to semiarid climates. In addition, he indicated that soil plays an important role in the development of agriculture and enhancement of food security in the country, and it is classified in three orders of Aridisols (%41.1), Entisols (%41.3) and Inceptisols (%14.5). Prof. Roozitalab argued that increased salinity is a major constraint in the irrigated farming system. Another major challenge facing soils is the loss of soil organic carbon, which adversely affect the soil productivity and crop yield, particularly in irrigated areas. He pointed out that the productivity of dryland agriculture has remained very low in spite of the numerous technologies developed during the last 25 years to enhance production. Prof. Roozitalab asserted that many soils under dryland are facing severe erosion and loss of organic matter at the surface. He concluded that conservation agriculture and integrated soil and water management are recognized to be the key issues for sustainable soil management under irrigated and dryland farming systems.

Negarestan Meeting

The day after the summit the foreign speakers and a selected group of Iranian speakers from the Faculty of Geography gathered in Negarestan Garden in order to discuss the main points raised in the summit.

The summit discussed the challenges for food security and nutrition at global and regional levels and emphasized that the access to sufficient, safe, and nutritious food for everybody is one of the most important and noble tasks of the 21st Century. The summit recommends strengthening soil research related to food security, which is intimately connected with agricultural production, which in turn closely depends on soil fertility.

We believe that politicians and decision-makers should be informed about the crucial role of soils in food production, as well as its important role in food quality and safety. We note that land and soil degradation are major threats to food security and ecosystem services at a global scale. The main soil threats on our planet are soil erosion, organic matter loss, nutrient imbalance, and soil sealing. However, each region has particular threats, and the summit stresses that soil salinization is a specific threat to NENA region and should be addressed by all stakeholders.

Food security cannot be discussed without considering other soil-related ecosystem services. Sustainable soil management requires attention to all of these services, and their value should be assessed and taken into account. Economics of land degradation is a novel approach that allows quantitative assessment of the benefits of sustainable soil management. This approach might be a useful means for demonstrating to decision-makers and general public the benefits of sustainable soil management in a long-term perspective.

To accomplish a successful transition to sustainable land and water management in the Islamic context, we need to construct a framework and also be sensitive to the specific features of the region.

The Summit recognized soil protective agriculture and integrated soil and water management as the key issues for sustainable land management in irrigated and rained farming systems. Water scarcity and impact of incipient climate change were identified as major threats to soil productivity in many countries of the region. Therefore, the countries need to make an active national policy to support and strengthen civil society organizations and farmer associations to develop and implement effective programs for enhancing knowledge and skill of the small resource farmers and other stakeholders in land and water management to meet the paramount challenges ahead. There is also an urgent need for a comprehensive law to protect and regulate agricultural lands around big cities and towns. It is recommended that the governments facilitate investment by public and private sectors for promoting integrated and multidisciplinary research for sustainable agricultural development. Generating suitable technologies and providing an enabling environment for increased resiliency and adaptation of agriculture to the outcome of climate change are also recommended.

International Summit Of Health And Lifestyle
Global Soil Threats