



Food and Agriculture
Organization of the
United Nations



Concept Note

Global Symposium on Salt-Affected Soils (GSAS21)

Co-organized by the Food and Agriculture Organization of the United Nations (FAO), the Global Soil Partnership (GSP), the Intergovernmental Technical Panel on Soils (ITPS), the Government of the Republic of Uzbekistan, the International Union of Soil Sciences (IUSS), the International Center on Biosaline Agriculture (ICBA), the International Network of Salt-Affected Soils (INSAS), and the Global Framework on Water Scarcity in Agriculture (WASAG).

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Virtual format

Introduction

Salt-affected soils are widespread around the globe and can be found in all climates and all continents. Salt accumulation in soils can occur under natural conditions, however, human activities may lead to increased salt accumulation to the detriment of agricultural production. Salt-affected soils contain salts and exchangeable sodium at levels that adversely affect the growth and development of many plants, either directly (due to toxicity), or indirectly (due to effects on physical properties of soils which restrict growth of roots and water percolation). Worldwide, salt-affected soils occupy about 10 percent of the land area and more than 20 percent of the cropland (Abrol, Yadav and Massoud, 1988; Wicke *et al.*, 2011). While naturally salt-affected soils are a valuable component of natural ecosystems and harbour rich biodiversity, mismanagement of non- or slightly salt-affected soils leads to secondary salt accumulation and is a threat to agricultural production, food security and sustainability as identified in the Status of the World's Soil Resources report (FAO & ITPS, 2015). Salinization and sodification of soils are among the most important global threats to arid and semi-arid regions (FAO, 2017, Ladeira, 2012). Soil salinity is also becoming a growing issue for croplands in coastal regions of Northern Europe and Southeast Asia, with humid climates, due to sea level rise and seawater intrusions (Pauw, Louw and Essink, 2012; Nhung *et al.*, 2019).

The causes of soil salinity vary depending on the climate, landscape type, agricultural activities and practices, irrigation methods, and policies related to land management (FAO, 2015). FAO confirms that over 1.5 billion people worldwide are directly affected by soil / land degradation, which has a disproportionate impact on the poor, women, and children, and has already reduced the productivity of the earth's surface by about 25 percent from 1981 to 2003 (Nachtergaele *et al.*, 2010). According to the United States Department of Agriculture's (USDA), approximately 10 million hectares of arable land annually drops out of agricultural use around the world, due to salinization, sodification and desertification among other causes. There are some 380 million ha of salt-affected soils that could potentially be used for agriculture (Lambers, 2003). An estimated 2 billion ha — equivalent to 17 percent of all productive land — could benefit from proper management (UN Sustainable Development, 2018).

Salt-affected soils have serious impacts on some of the ecosystem services soils usually provide, which are critical for supporting human life and biodiversity (FAO, 2018) leading to an array of consequences including:

- decreased agricultural productivity, water quality, soil biodiversity, and increased soil erosion;
- decreased ability to act as a buffer and filter against contaminants;
- degraded soil structure;
- decreased functions of ecological systems such as the hydrological, nutrient and biogeochemical cycles;
- increased concentration of ions that are toxic to plants;
- reduced ability of crops to take up water;
- and reduced soil fertility and availability of micronutrients.

The causes of secondary soil salinization and sodification are multiple, complex, and vary across affected regions and countries, but are largely attributable to inappropriate and unsustainable irrigation practices, and deforestation. Soil salinization can also result from natural landscape processes in areas where water evaporates leaving dissolved salts to accumulate at the soil surface. Events such as floods, rising sea level and marine water intrusion, and fires may also contribute to salt accumulation in some areas. Expected agricultural intensification, as well as changes in temperature and precipitation patterns related to climate change, are likely to further affect the salt-water balance of fragile ecosystems.

Thus, soil salinization and sodification are major threats to global food security and to the achievement of the Sustainable Development Goals (SDGs). As it was highlighted in the UNCCD 2018–2030 Strategic Framework (COP 13, China) in 2017, soil health is key in combating soil degradation and climate change. In this regard, salt-affected soils and desertification control can be directly related to the achievement of SDG 15 and its target 15.3: «*by 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world*», and further extended to the achievement of SDGs 2 on zero hunger, 3 on good health and well-being, 6 on clean water and sanitation and 13 on climate action.

FAO and its GSP, and the ITPS together with key partners, are organizing global symposia on the ten soil threats highlighted in the Status of the World's Soil Resources report to bring policy-scientific evidence and set an agenda for action together with multiple stakeholders. During the 7th GSP Plenary Assembly, GSP members endorsed the organization of the Global Symposium on Salt-affected Soils to be held in Tashkent, Uzbekistan as offered by the Government of Uzbekistan. The Global Symposium on Salt-Affected Soils will therefore be co-organized by the Government of Uzbekistan, FAO, the GSP, the ITPS, together with WASAG, INSAS, IUSS, and ICBA. The meeting will provide a common platform to present and discuss the latest information on the status of interventions and innovations in the field of sustainable management of salt-affected areas under scientific and political points of view.

The symposium is a bold action to promote the implementation of the Voluntary Guidelines for Sustainable Soil Management (VGSSM) in terms of finding and promoting the best integrated solutions and achieving the SDGs. Implementation will be undertaken by reviewing and discussing successful case studies in combating salinization and sodification, reviewing existing soil salinization and sodification assessment frameworks, reviewing the status and challenges of soil salinization and sodification mitigation, reclamation and control, and launching a global collaborative effort to promote the adoption of management practices, techniques, instruments and mechanisms that reduce and, where possible, halt or reverse the expansion of secondary soil salinization. The GSP is also working, along with national experts, on the preparation of the Global Soil Salinity map (GSSmap). The latter will be used to strengthen the various discussions under the different symposium themes.

Aim and objectives

The Global Symposium on Salt-Affected Soils represents a critical step toward implementing the VGSSM in terms of minimizing the risks of secondary soil salinization. The Symposium aims to bring science and policy together to review the status and challenges associated with the management of salt-affected soils. In this regard, it will provide concrete examples of effective and reliable sustainable soil management (SSM) practices, techniques, instruments, and mechanisms, which would ultimately expose challenges such as scientific, technological and legislative gaps. This forum will constitute an opportunity to discuss, from a multi-disciplinary perspective, the problems associated with soil salinization and sodification, and strengthen the dialogue between policy makers, scientists, and field experts. Because of the importance of soil health in achieving the SDGs, the link between soil salinization and sodification control and management, and the achievement of the SDGs will be highlighted and discussed.

Specifically, the symposium's outputs will provide scientific and policy evidence to support decision-making and innovative actions to minimize the threat arising from soil salinization and sodification for increased food security, ecosystem services, and to promote the optimal management of salt-affected landscapes.

Specifically, the objectives of this symposium are to:

1. Examine the current scientific understanding of salt-affected soils, and their impact on food security and the environment.
2. Identify options to generate, consolidate and harmonize data on salt-affected soils, taking into consideration diagnosis criteria, distribution, dynamics linked to climate change, and monitoring and mapping techniques.
3. Review and discuss existing national and international policies, strategies, agreements and frameworks addressing the prevention, management and remediation of salt-affected soils to assess their effectiveness, and propose ways to enhance them, promoting regional technical and scientific cooperation.
4. Review and discuss existing materials related to the assessment of impacts of salt-affected soils on agricultural production, food security, ecosystem services and human well-being in different agricultural production systems and fragile ecosystems.
5. Identify and review innovative management practices and technologies for the management and remediation of salt-affected soils.
6. Critically reflect on the economics of soil salinization and sodification, focusing on the sustainable soil management practices that are cost-effective; and
7. Advocate for an agenda for action on salt-affected soils to prevent, adapt to, mitigate and monitor secondary soil salinization and sodification processes as well as to protect and ensure sustainable management of natural salt-affected soils.

Expected outcome

It is expected that the symposium will result in recommendations for sustainable management of salt-affected soils based on scientific evidence on the status of salt-affected soils and successful case studies, which will be reflected in an agenda for action of the outcome document, within the framework of achieving the SDGs. The outcome document will also provide recommendations for developing sound environmental policies and programs to encourage the integrated use and sustainable management for salt-affected areas.

Symposium structure

The symposium will be a scientific-political-practical meeting. The format of symposium will be virtual.

The meeting will open with a high-level plenary address by representatives of the host organizations highlighting the importance of integrated management of salt-affected soils in the context of achieving food security, halting desertification and environmental degradation, combating and adapting to climate change, and achieving the SDGs.

Keynote presentations will be given by invited leading experts in the field of salt-affected soils management on the following main themes (further information is available at “Symposium themes and key questions to be addressed”):

Theme 1: Assessment, mapping, and monitoring of salt-affected soils;

Theme 2: Integrated soil – water – crop solutions in rehabilitation and management of salt-affected areas;

Theme 3: Agenda for action to prevent and rehabilitate salt-affected soils, protect natural saline and sodic soils, and scale-up sustainable soil management practices.

Parallel sessions

Parallel sessions will be held for all the themes, to be organized by session conveners. The format of the parallel sessions will be determined by the conveners (in close collaboration with the organizing and scientific advisory committees) to ensure the themes are adequately presented and discussed to explore the key aspects needed for the outcome document. Abstracts selected for oral presentations will be presented during the parallel sessions.

Abstracts and papers

Abstracts on key topics and case studies / practices (as identified by the organizing and scientific advisory committees) are to be submitted and will support the above themes and incorporate case studies from different countries around the world.

Participants

Participants will include representatives from UN FAO members, IUSS, ICBA, and WASAG, presenters whose abstracts are accepted, and scientists and practitioners working in related fields, representatives from NGOs, academia, civil society, farmers’ associations and land users. Additionally, the symposium calls the attention of the private sector and research institutes working on technology development for measuring and controlling soil salinization and sodification, and restoring salt-affected soils.

Symposium committees

The following Committees have been established:

Organizing committee

This committee is comprised of representatives from each of the co-organizing bodies (FAO, GSP, INSAS, ITPS, Government of Uzbekistan, ICBA, IUSS and WASAG). The organizing committee will oversee the overall organization of the GSAS21, plan the format of the parallel sessions, and will also oversee the finalization of the symposium outcome document.

Scientific committee

The Scientific Committee is comprised of representatives from the co-organizing organizations, as well as additional leading experts in the three main themes. This committee is responsible for evaluating submitted abstracts and papers and assigning them to the relevant theme, as well as ensuring the scientific quality of the parallel sessions and symposium outputs.

References

Abrol, I.P., Yadav, J.S.P. & Massoud, F.I. 1988. *Salt-affected soils and their management*. FAO soils bulletin No. 39. Rome, Food and Agriculture Organization of the United Nations. 131 pp.

FAO. 2018. *Handbook for saline soil management*. Food and Agriculture Organization of the United Nations Rome, Italy

FAO & ITPS. 2015. *Status of the World's Soil Resources*. Main Report. Food and Agriculture Organization of the United Nations Rome, Italy

FAO. 2017. *Voluntary Guidelines for Sustainable Soil Management*. Food and Agriculture Organization of the United Nations Rome, Italy

Ladeira B. 2012. *Saline agriculture in the 21st century: using salt contaminated resources to cope food requirements*. Journal of Botany 2012. p. 7

Lal R. 2009. *Sequestering carbon in soils of arid ecosystems*. Land Degradation & Development, 20: 441–454.

Lambers, H. 2003. *Introduction: Dryland salinity: A key environmental issue in southern Australia*. Plant and Soil, 257(2), V-Vii. Retrieved March 5, 2020, from www.jstor.org/stable/24124331

Nachtergaele, F., Petri, M., Biancalani, R., Van Lynden, G., and Van Velthuizen, H. 2010. *Global Land Degradation Information System (GLADIS)*. Beta Version. An Information Database for Land Degradation Assessment at Global Level. Land Degradation Assessment in Drylands Technical Report, no. 17. FAO, Rome, Italy

Nhung, T. T., Le Vo, P., Van Nghi, V., & Bang, H. Q. 2019. *Salt intrusion adaptation measures for sustainable agricultural development under climate change effects: A case of Ca Mau Peninsula, Vietnam*. Climate Risk Management, 23, 88-100

Pauw, P., Louw, P. G. B. De and Essink, G. H. P. O. 2012 Groundwater salinisation in the Wadden Sea area of the Netherlands : quantifying the effects of climate change , sea-level rise and anthropogenic interferences, in: Netherlands Journal of Geosciences, 91(3), pp. 373–383

UNCCD. 2011. *Desertification: a visual synthesis*. UN Convention to Combat Desertification (UNCCD) Secretariat. 50 pp

UN Sustainable Development. 2018. *High-level political forum on sustainable development*. Available at: <https://sustainabledevelopment.un.org/content/documents/196552018backgroundnotesSDG15.pdf>

Wicke, B., Smeets, E., Dornburg, V., Vashev, B., Gaiser, T., Turkenburg, W. & Faaij, A. 2011. The global technical and economic potential of bioenergy from salt-affected soils. *Energy & Environmental Science*, 4(8): 2669. <https://doi.org/10.1039/c1ee01029h>