Food and Agriculture Organization of the United Nations

CONCEPT NOTE & AGENDA

BE THE SOLUTION TO SOIL POLLUTION

GLOBAL SYMPOSIUM ON SOIL POLLUTION

2 - 4 MAY 2018 | FAO - ROME, ITALY

GLOBAL SOIL PARTNERSHIP

itps INTERGOVERNMENTAL TECHNICAL PANEL ON SOILS

World Health Organization

UN environment

STOCKHOLM CONVENTION

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BASEL CONVENTION

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GLOBAL SYMPOSIUM ON SOIL POLLUTION (GSOP18)

Co-organized by

FAO - Food and Agriculture Organization of the United Nations
GSP/ITPS - Global Soil Partnership / Intergovernmental Technical Panel on Soils
UN Environment
Basel, Rotterdam and Stockholm Conventions
WHO - World Health Organization

2-4 May 2018

FAO Headquarters, Rome, Italy

www.fao.org/about/meetings/global-symposium-on-soil-pollution

CONTENT

CONCEPT NOTE

Soil pollution is one of the ten major soil threats identified in the 2015 *Status of the World's Soil Resources* report (FAO and ITPS, 2015a) and subsequently addressed in the *Voluntary Guidelines for Sustainable Soil Management* (VGSSM) of the FAO (FAO, 2016). Soil pollution is a chemical degradation process of soils caused by the presence of certain chemical elements or potentially harmful substances in amounts that exceed recommended levels for the health of humans, animals and plants or cause a detriment on soil normal functioning (Orgiazzi *et al.*, 2016; Pierzynski *et al.*, 2005). Soil pollutants include inorganic (e.g. metallic trace-elements, metalloids and radionuclides) and organic compounds (e.g. xenobiotic molecules, persistent organic pollutants (POPs) and antibiotics), some organic wastes (e.g. untreated biosolids and wastewaters) that can enhance the risk of spreading infectious diseases, and the so-called "chemicals of emerging concern" (CECs)[1] in amendments (e.g. antibiotics in manure) added to soils (e.g. manures) (FAO and ITPS, 2015a).

Soil pollution, whether local or diffuse, occurs from a wide range of sources, but those resulting from anthropogenic activities have become a widespread problem globally. Point source pollution occurs where intensive agricultural and industrial activities, inadequate solid, liquid and hazardous waste disposal, unbalanced or excessive organic and mineral fertilizer and pesticide applications, mining, military activities, or accidents introduce excessive amounts of pollutants to the local soil pool. Diffuse soil pollution, on the other hand, is the presence of a substance or agent in the soil because of human activities emitted from moving liquid or gaseous sources, covering a large area, or from multiple sources. Diffuse soil pollution is therefore caused by dispersed sources and occurs where emission, transformation and dilution of pollutants has occurred in other media prior to their transfer to soil. The three major pathways responsible for the introduction of diffuse pollutants into soil are (i) atmospheric deposition, (ii) agricultural inputs, and (iii) flood events. Causes of diffuse pollution tend to be dominated by the transport of pollutants by erosion processes (wind and water erosion and sedimentation), and excessive nutrient and pesticide applications, heavy metals, POPs and inorganic pollutants. As a result, the relationship between the pollutant sources and the level and spatial extent of soil pollution is indistinct (FAO and ITPS, 2015a).

While some soil degradation processes are directly observable in the field, others like soil pollution cannot be directly assessed or observed, making them insidiously hazardous. In the case of soil pollution, the uncertainties increase the challenges associated with its assessment and management. The diversity of pollutants, their different physicochemical properties, the possible interactions between pollutants, and the biological transformation of organic compounds in soil into diverse metabolites make these difficult to assess using soil surveys. However, the effects of soil pollution also depend on soil properties that are included in the soil survey and that have an impact on the mobility, bioavailability, residence time and storage of pollutants. Direct effects of pollutants may not be immediately revealed because of the capacity of soils to store and immobilize them, but can suddenly become evident after changes that may alter the environmental conditions (e.g. land use change) (FAO and ITPS, 2015a).

There is a direct link between the quality and safety of the food we eat and the level of soil pollutants. Soil pollution has also a direct impact on food security (FAO, 2006). Because some pollutants are taken up by plants through different pathways, they accumulate in the food chain, compromising the safety of the food consumed by both humans and animals (Tóth *et al.*, 2016). Bioaccumulation in organisms and biomagnification along the food chain are causes of concern in particular for persistent organic pollutants. Ingestion of soil contaminated with POPs by poultry and cattle can result in the bioaccumulation of these chemicals in food such as eggs and milk (Weber *et al.*, 2014, 2015). In order to address this problem, food safety policies should be harmonized with environmental regulations on soil, and water pollution (Lu *et al.*, 2015). Additionally, soil pollution affects food availability by reducing crop yields due to toxic levels of pollutants that hamper crop growth and reduce soil biodiversity, thus increasing the problem of food security (Vargas *et al.*, 2016). For example, the Ministry of Environmental Protection of China estimated that approximately one fifth of China's total farmland is polluted with cadmium, nickel, and arsenic, which may result in annual reductions of more than 10 million tons of food supplies (FAO and ITPS, 2015b).


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1 CECs include, for example, nanoparticles, pharmaceuticals and personal care products, estrogen-like compounds, antibiotics and hormones, flame retardants, detergents, current-use pesticides, plastics and microplastics, heavy metals, perfluorinated alkyl substances and polycyclic aromatic hydrocarbons associated with electronic waste and some industrial chemicals additives, stabilizers and adjuvants.

Soil-borne human and animal health problems can develop through several mechanisms: 1) toxic levels of chemicals (e.g. trace elements and organic pollutants) that directly (vegetables and fruits) and indirectly (animal pathway) enter the food chain from the soil; 2) direct encounters with pathogenic organisms in soil; 3) production of nutrient-deficient crops from soils, thereby contributing to malnutrition, undernutrition and food insecurity; and 4) direct exposure to dust originating from soils, and contaminated water. In many countries, there is significant public concern about health problems from exposure to trace elements (often including heavy metals) and to organic pollutants in the soil. Increasing releases of potentially harmful trace elements (also known as heavy metals) to soil has led to a growing concern worldwide, particularly in rapidly developing countries such as China and India, where regulation, management and mitigation have struggled to keep pace with the rate of pollutant release to the environment. However, developed and developing nations are not immune to threats to soil function imposed by trace elements. The long legacy of improper hazardous waste disposal, emissions and releases from industrial activities and metal and POPs build-up in soils presents grave challenges for use and reclamation of polluted land (FAO and ITPS, 2015b).

In 2015, the Food and Agriculture Organization (FAO) of the United Nations and the Intergovernmental Technical Panel on Soils (ITPS) published the Status of the World's Soil Resource report including a regional assessment of the main soil threats, soil pollution being one of them. This report shows that in regions with mature industrial sectors and a well-developed regulatory framework such as Europe, North America, and parts of the Southwest Pacific, the primary issue is the identification and remediation of legacy sites of pollution. In these countries, increasingly stringent government regulation limits the spread of pollution and specifies the level of remediation of existing polluted sites required. Hence, pollution is arguably a soil threat that responds directly to policy initiatives, at least in situations where the pollution can be readily linked to a specific pollution source and where significant public concern about pollution spurs policy development and implementation (FAO and ITPS, 2015a, b). The international community has established global regimes to minimize pollution from hazardous chemicals and wastes and to support countries in taking measures to achieve this objective. Three of the global instruments that have a significant impact on soil pollution are:

- The **Basel Convention** on the Control of Transboundary Movements of Hazardous Wastes and their Disposal that entered into force in 1992. Its fundamental aims are to reduce the transboundary movements (TBM) of hazardous and other wastes, prevent and minimize their generation and promote their environmentally sound management, with the purpose of protecting human health and the environment against their adverse effects (Basel Convention, 2011);

- The **Rotterdam Convention** on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade that entered into force in February 2004. Its overarching goals are: 1) promoting shared responsibility and cooperative efforts among parties in the international trade of certain hazardous chemicals, and 2) contributing to the environmentally sound use of those hazardous chemicals by facilitating information exchange about their characteristics, by providing for a national decision-making process on their import and export, and by disseminating these decisions to Parties (Rotterdam Convention, 2010); and

- The **Stockholm Convention** on Persistent Organic Pollutants (POPs) that has been in force since May 2004. It aims to protect human health and the environment from chemicals that possess toxic properties, remain intact in the environment for long periods and travel long distances, and accumulate in ecosystems with the risk of significant adverse effect on human health and the environment. The convention calls on parties to jointly work on eliminating or reducing the release of POPs into the environment (Stockholm Convention, 2008).

Attention was also given to long-range atmospheric pollution and the related atmospheric deposition of pollutants onto the soil surface. Therefore, the Convention on Long-Range Transboundary Air Pollution (LRTAP) was signed in 1979 in response to the detrimental impact of acid rain in Europe and entered into force in 1983. Over the past 30 years, the Convention on LRTAP has been extended by 8 protocols that target pollutants such as sulfur, nitrous oxides, persistent organic pollutants, volatile organic compounds, ammonia and heavy metals.

More recently, the Minamata Convention on Mercury was signed in 2013 with the purpose of protecting human health and the environment from the adverse effects of mercury (FAO and ITPS, 2015a), and the Sustainable Development Goals (SDGs) on soil protection and restoration were established in 2015. In this context, the international community recognized the role of soils in providing ecosystem services, enabling life on Earth and ensuring human well-being. In particular, the reduction of soil pollution and the restoration of polluted sites can contribute to achieving food security (SDG 2), increasing the provision of clean water (SDG 3 and 6), sustainable consumption and production (SDG 12), strengthening resilience and adaptive capacity to climate related hazards and natural disasters (SDG 13), preventing marine pollution from land-based activities, combating desertification, achieving a land degradation neutral world, and halting biodiversity loss (SDG 15), and it is related to technology development and land use and urban planning (SDG 9 and 11) (United Nations, 2017).

Awareness on soil pollution is increasing around the world. The seventh actions by Governments defined in the revised World Soil Charter (FAO, 2015) establish the need for implementing regulations and limiting the accumulation of contaminants beyond established levels to guarantee human health and wellbeing, and facilitating remediation of contaminated soils that exceed these levels where they pose a threat to human health and the environment.

The Third session of the United Nations Environmental Assembly (UNEA-3, 2017) has adopted a resolution in which decisions called for accelerated actions and collaboration to address and manage soil pollution. The resolution commits to increasing research and development, targeting pollution through tailored actions, moving societies towards sustainable lifestyles based on a circular economy, strengthening and enforcing laws on soil pollution. The declaration aims to work towards a pollution-free world.

The UN Food and Agriculture Organization and its Global Soil Partnership (GSP), Intergovernmental Technical Panel on Soils (ITPS), together with the Secretariats of the Basel, Rotterdam and Stockholm Conventions, UN Environment and World Health Organization (WHO) has jointly organized the Global Symposium on Soil Pollution as a neutral platform to bring the best scientific information available on the status, trends and actions (both scientific and political) on soil pollution. The symposium is a bold action to implement the VGSSM and the UNEA3 resolution on soil pollution in terms of combating soil pollution and bringing scientific facts and evidences for launching global activities to reduce soil pollution and remediate polluted sites.

AIM AND OBJECTIVES

The Global Symposium on Soil Pollution is the first step in implementing the Voluntary Guidelines for Sustainable Soil Management in terms of preventing and reducing harmful substances in soils as a way to maintain healthy soils and food safety in accordance with the Sustainable Development Goals.

Specifically, the symposium's outcomes should provide scientific evidence to support actions and decisions to prevent and reduce soil pollution for increased food safety, food security and nutrition, ecosystem services, and promote the restoration of polluted sites.

The specific objectives of the symposium are to:

1. Examine the current scientific understanding of soil pollution and its effects on food production and safety, the environment and human health;

1. Critically reflect on the impact of land use decisions at the national level (e.g. related to mining, siting of waste disposal facilities and intensive agriculture and livestock production) on soil pollution and eventually, air and water where polluted soil or its pollutants can be transported by erosion processes or water runoff;

2. Identify limitations and prioritize key challenges related to restoring polluted sites;

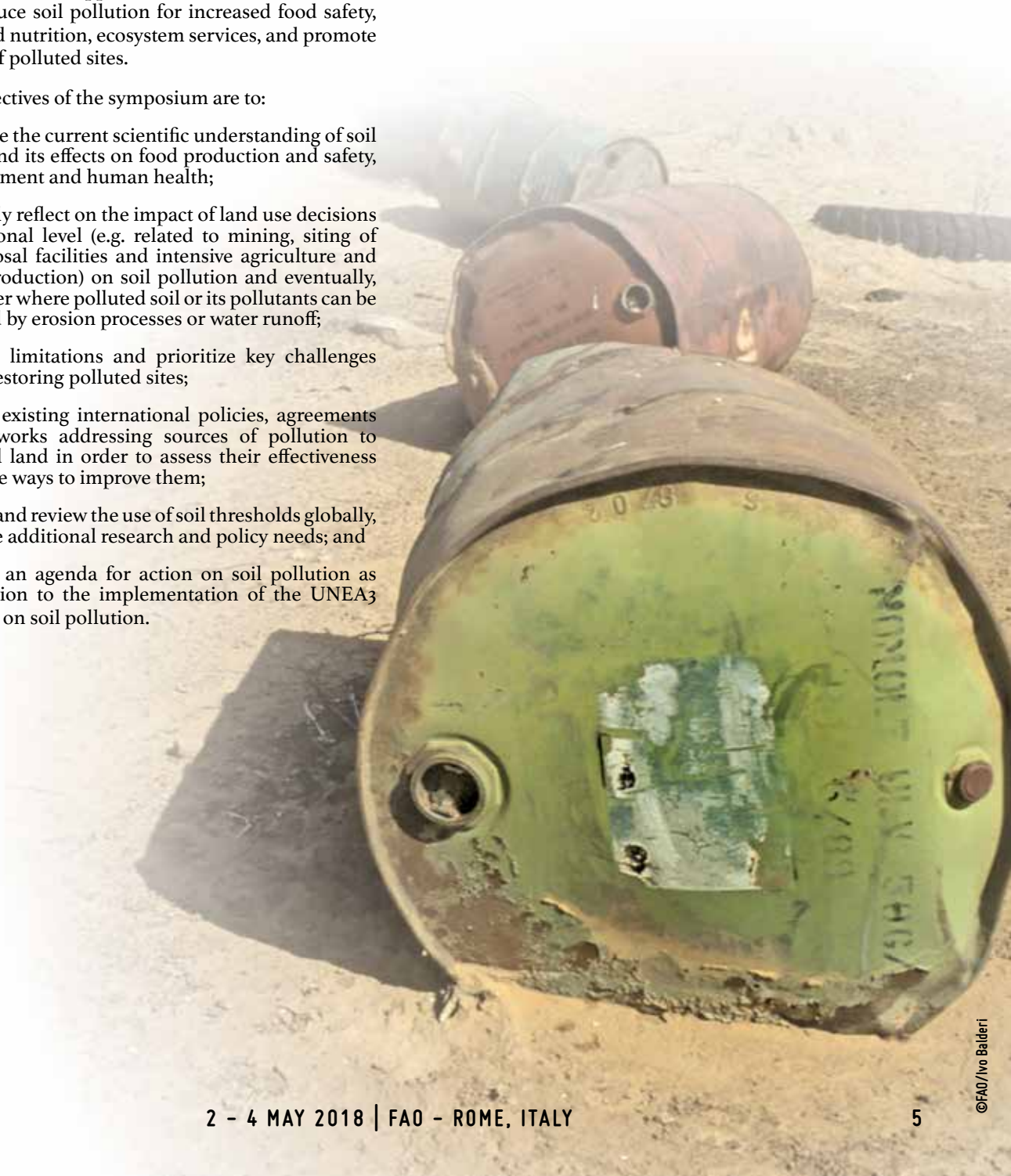
3. Review existing international policies, agreements and frameworks addressing sources of pollution to agricultural land in order to assess their effectiveness and propose ways to improve them;

4. Survey and review the use of soil thresholds globally, and explore additional research and policy needs; and

5. Launch an agenda for action on soil pollution as a contribution to the implementation of the UNEA3 declaration on soil pollution.

EXPECTED OUTPUT

The symposium outcome document "Be the solution to soil pollution" will highlight the importance of addressing soil pollution from the food safety, environment and human health perspectives and will include a joint agenda for action based on scientific evidence to prevent it, mitigate it and remediate it where feasible.



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SYMPOSIUM STRUCTURE

The Symposium will be a scientific meeting, held over three (3) days at the FAO headquarters in Rome, Italy from 2-4 May 2018 with over 500 participants representing all regions of the world.

The meeting will open with high level plenary addresses by representatives of the hosting organizations to present the policy context, the importance of soil pollution from various perspectives and the outcomes sought from the symposium.

Keynote presentations will be given by invited leading experts in relation to the following main themes (the themes are further elaborated under Item 6):

- Theme 1: Soil pollution on agricultural fields and other land uses
- Theme 2: The impact of soil pollution on food production and safety, the environment and overall human well-being
- Theme 3: Remediation of polluted sites
- Theme 4: Global status of soil pollution

PARALLEL SESSIONS

Parallel sessions will be held for all the sub-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 sufficiently presented and discussed to compile the key aspects needed for the outcome document. Regional status of soil pollution will be discussed collectively during plenary sessions.

ABSTRACTS AND PAPERS

Abstracts for key topics (as identified by the organizing and scientific advisory committees) have been submitted and will support the above themes and incorporate case studies from different countries.

PARTICIPANTS

Participants will include representatives from FAO member states, UN Environment, Basel, Rotterdam and Stockholm Conventions and WHO country parties, presenters whose abstracts are accepted and scientists and practitioners working in related fields, representatives from NGOS, civil society and land users. Additionally, the symposium has called the attention of the private sector working on agricultural inputs production and distribution, pollutant management, and technology development for measuring and controlling soil pollution, and restoring polluted sites.

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/ITPS, Basel, Rotterdam and Stockholm Conventions, UN Environment, and WHO). It has overseen the overall organization of the symposium, guided the formats of the parallel sessions, and will oversee the finalization of the symposium outputs.

SCIENTIFIC COMMITTEE

Comprised of representatives from the co-organizing organizations, as well as additional leading experts in the four main themes, this committee has been responsible for evaluating submitted abstracts and papers, as well as ensuring the scientific quality of the parallel sessions and symposium outputs.

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SYMPOSIUM THEMES AND KEY QUESTIONS TO BE ADDRESSED

Based on the listed objectives, the symposium will focus on four themes to collate relevant information as elaborated below. In order to address the objectives, the main questions to be addressed during the symposium are listed under each theme.

THEME 1: SOIL POLLUTION ON AGRICULTURAL FIELDS AND OTHER LAND USES

Soil pollution is closely related to land use. On one hand, the local and neighboring land use determines the type and amount of pollutants in a given soil. On the other hand, land use on a given soil depends on its level of pollution. This theme is shaped around the direct and indirect sources of pollution of agricultural soils and the impacts that these soils can have on nearby ecosystems. It also links to the achievement of SDGs 3, 6, 9 and 11 on food security, the provision of clean water, the development of environmentally sound technologies, and sustainable urban planning, respectively.

SUB-THEME 1.1: DRIVERS OF SOIL POLLUTION IN AGRICULTURAL FIELDS

This sub-theme aims to discuss direct (e.g. pesticide application, use of organic and mineral fertilizers, use of polluted water, urban waste, releases from industrial production facilities, waste disposal facilities and landfills etc.) and indirect (e.g. atmospheric deposition from mining, smelting and waste incineration, surface runoff, water and wind erosion, etc.) sources of pollution of agricultural soils, the processes related to the transport and storage of pollutants in the soil and the role of land use planning in anticipating these processes. Two successful and valid movements - organic and urban agriculture - will also be discussed in relation to the use and safety of organic fertilizers, including sewage sludge, which may contain pollutants such as heavy metals and POPs. In this context, the link between soil pollution and SDG targets 9.4[2], 11.3[3] and 15.3[4] is stressed in the framework of developing and adopting clean and environmentally sound technologies and industrial processes; enhancing inclusive and sustainable urbanization for participatory, integrated and sustainable human settlement planning and management; and combating erosive processes leading to soil degradation by pollution. Additionally, the economics of sound management and mismanagement of agricultural inputs (pesticides and organic and mineral fertilizers application) will be discussed in relation to food security, soil health and the economics of soil degradation, with a direct link to protecting soil, especially soils that are the most vulnerable (e.g. atoll soils) to pollution.

Core questions:

- Is there sufficient scientific-based evidence on soil pollution in agricultural fields?
- How does land use and urban and industrial planning influence the type and amount of pollutants in agricultural soils?
- How can the Code of Conduct on Pesticide Management contribute to prevent the risk of soil pollution on agricultural fields?
- How can soil pollution affect food production and safety?

SUB-THEME 1.2: DRIVERS OF SOIL POLLUTION IN OTHER LAND USES

This sub-theme explores the sources of pollutants from other land uses (mining, industrial activities, urban uses, etc.) and the impacts of soil pollution on other ecosystem compartments, such as air, surface water, groundwater, organisms. Therefore, it aims to discuss the impacts of soil pollution and to highlight the nexus between soil pollution, water quality, and biodiversity and habitat preservation. In this framework, it links directly to SDGs 3 and 6 on water quality (Targets 3.9[5] and 6.3[6]) and the protection of water-related ecosystems including mountains, forests, wetlands, rivers, aquifers and lakes.

Attention is given to the mobility of mineral and organic pollutants such as fertilizers and antibiotics, heavy metals and micro-organisms in the environment. For example, changes in soil water condition by flooding (waterlogging) or draining can impact arsenic mobility, with arsenic becoming mobilized under flooded, anaerobic conditions. Arsenic can then be leached to pollute groundwater, resulting in human exposure to arsenic through well-water consumption. Arsenic causes many health problems in humans, including nervous system disorders, kidney and liver failure, as well as anemia and skin cancer. Over 130 million people worldwide routinely consume well-water with arsenic concentrations that exceed the World Health Organization's recommended limits (FAO and ITPS, 2015a). Additionally, by involving isotope techniques, this sub-theme aims to discuss the half-life period and mobility (absorption, volatilization and leaching) of parent molecules, their metabolites, and additives in pesticides.

Core questions:

- What are the main drivers of soil pollution in non-agricultural land uses?
- Is there reliable information about the extent of soil pollution on other land uses?

2 Target 9.4: By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities.

3 Target 11.3: By 2030, enhance inclusive and sustainable urbanization and capacities for participatory, integrated and sustainable human settlement planning and management in all countries.

4 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

5 Target 3.9: By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water, and soil pollution and contamination.

6 Target 6.3: By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally.

THEME 2: THE IMPACT OF SOIL POLLUTION ON FOOD PRODUCTION AND SAFETY, THE ENVIRONMENT AND OVERALL HUMAN WELL-BEING

Soil pollution affects human well-being by compromising the ability of the soil to produce safe and nutritious food. In drylands especially, where water availability is a limiting factor to agriculture production, wastewater from treatment plants is used as an alternative source of water for irrigation to create resilience to climate change. Often, this water (and the solid waste it carries) lacks physical, chemical and sanitary quality, causing soil pollution and human health problems (Blume *et al.*, 1982; Blume *et al.*, 1980; Horn *et al.*, 1980). In this context, Theme 2 links to the achievement of SDGs 2 and 3 on zero hunger and good health and well-being.

SUB-THEME 2.1: SOIL POLLUTION AND FOOD SAFETY

The susceptibility of a plant to pollutants and its rate of uptake varies with the plant species and the type of pollutants (Orita, 2012). For example, cadmium (Cd) is a chemical analogue of zinc (Zn) and plants may not be able to differentiate between the two ions. In this case, Cd is adsorbed and transported through the root system and can be bio-accumulated in plants (Yashim *et al.*, 2014). In some cases, plants that take up soil pollutants are used to bio-remediate polluted soils via phytoextraction (Tangahu *et al.*, 2011). In other situations, the uptake of pollutants such as antimicrobials, metals and POPs by plants, influences their safety and nutritional value and affects the food chain and ultimately human health, due to the bioaccumulation of pollutants at various stages (Ismail *et al.*, 2005; Tasho and Cho, 2016).

It is the purpose of this sub-theme to assess the impact of soil pollution on the four dimensions of food security: availability, access, utilization and stability.

Core questions:

- How does soil pollution influence the quality and safety of the food we eat?
- How does soil pollution affect long-term food production, safety and nutrition (future scenarios)?
- Are there actions towards the prevention of soil pollution in the food chain?

SUB-THEME 2.2: RISK ASSESSMENT OF SOIL POLLUTION ON THE ENVIRONMENT AND HUMAN HEALTH

This subtheme aims to address the impacts soil pollution has on the environment and human health. Once the sources of pollution have been identified, it is time to analyze the mechanisms and pathways contaminants follow from soils into human body and other compartments of the environment, such as air, and water bodies. Soils have the ability of storing, immobilizing and degrading contaminants, what ensures good quality of groundwater and a safe food production (Blum, 2005). However, they can act as a source of human health and eco-toxicological problems (Science Communication Unit, University of the West of England, 2013).

In many cases, solubility, mobility and bioavailability of pollutants depend on soil properties. Suspended pollutants are retained in soils, controlled by the soil porosity and the pore size distribution. Trace metals are adsorbed on the surface of colloidal particles in soils, principally humus, hydrous oxides of Fe, Mn and Al, alumino-silicate clays. Similar affinity has been observed between clay minerals and radionuclides (Ven der Graaf, Koomans, Limburg, & De Vries, 2007). Organic matter plays an important role not only in forming complexes, but also in retaining and transporting heavy metals in an exchangeable form (Yaron, Dror, & Berkowitz, 2012; Dragovic, Mihailovic, & Gajic, 2008). But when a change occurs in soil properties due to external pressures, solubility and bioavailability of pollutants may be affected, posing a risk to the environment and living organisms, including humans.

Generally, people can be exposed to contaminants in soil through ingestion (eating or drinking), dermal exposure (skin contact) or inhalation (breathing). The route of human exposure to a soil contaminant will vary with the contaminant and with the conditions and activities at a particular site (Shayler, McBride, & Harrison, 2017).

A clear example of the impact of soil pollution on the environment and human health is the use of manure, from animals treated with antimicrobials, as fertilizers. They contain residual concentrations of antimicrobial agents and antimicrobial resistant (AMR) bacteria. The application of biological soil amendments of animal origin not only loads the environment with AMR organisms, but also creates a selective pressure leading to the further development of drug resistance (O'Neill, 2015). The development of drug resistant bacteria and infections represents a serious threat to animal and human health globally, and needs to be addressed in a multi-disciplinary way. It is the purpose of this sub-theme to discuss the relevance of soil amendments in contributing to the ecology of AMR and transmission to humans and animals.

Core question:

- What is the impact of polluted soils on nearby or downstream ecosystems?
- How can the risk posed by polluted soils on the environment be assessed?
- What is the impact of antibiotic residues and AMR organisms in soil amendments and industrial waste on the microbial ecology in soils and soil-mediated ecosystem services?

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THEME 3: REMEDIATION OF POLLUTED SITES

Waste disposal and treatment, agricultural inputs, industrial and commercial activities, chemicals, agrochemicals and fuel storage, transport spills on land, military operations, and nuclear operations are the key sources of local soil pollution. In developed countries, potentially contaminated sites are managed following surveys (searching for sites that are likely to be polluted), performing site investigations where the actual extent of pollution and its environmental impacts are defined, and implementing remedial and after care measures. However, this is not always true in developing countries, which often suffer from the lack of legislation and legal frameworks to support such actions, financial resources to conduct monitoring and remediation activities, and access to technology. In addition to local pollution of the soil (which is easier to assess), diffuse soil pollution is in many instances not directly apparent, although it covers very large areas and represents a major threat to soil health (FAO and ITPS, 2015a).

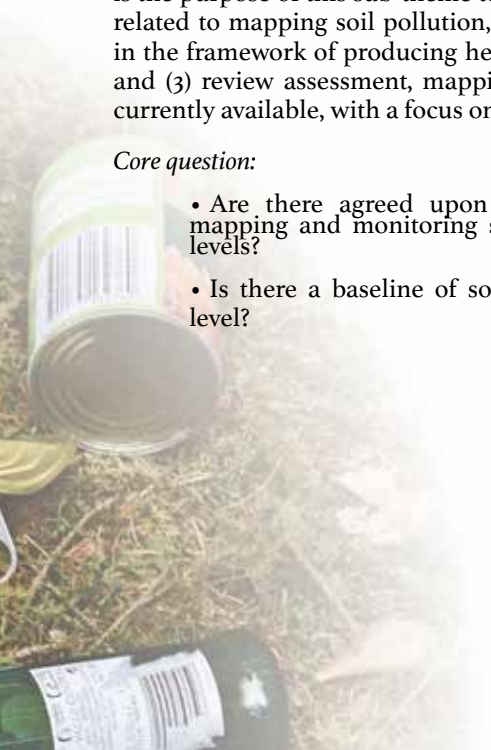
In this framework, it is important to increase efforts to identify, assess, map, monitor and model soil pollution with the purpose of preventing human exposure to pollutants and restoring polluted sites, and ultimately ensuring the provision of sufficient, healthy and nutritious food. This session will address the achievement of SDG 15 on the protection, restoration and promotion of terrestrial ecosystems, with a focus on combating desertification, halting and reversing land degradation, and halting the loss of biodiversity (Targets 15.1, 15.3 and 15.5). Indeed, the impacts of soil pollution on biodiversity in general should not be overlooked.

SUB-THEME 3.1: MONITORING SOIL POLLUTION

National monitoring and reporting on the presence of pollutants in the soil is becoming increasingly important due to the scarcity of land for agriculture and other land uses, which is further exacerbated by population growth. This is especially true in developing countries where regulations on waste disposal and agrochemical applications are sometimes weak or inexistent. (Stalin *et al.*, 2010; Bradon, 2013). However, the most developed countries are no strangers to this problem. Although they have implemented long-term soil surveys and have regulating instruments, they still lack a harmonized soil monitoring system and the real extent of local and diffuse soil pollution is not clearly known (FAO and ITPS, 2015a). It is the purpose of this sub-theme to (1) review the limitations related to mapping soil pollution, (2) draw future scenarios in the framework of producing healthy and nutritious food, and (3) review assessment, mapping, and monitoring tools currently available, with a focus on bio-indicators.

Core question:

- Are there agreed upon protocols for assessing, mapping and monitoring soil pollution at different levels?
- Is there a baseline of soil pollution at the global level?



SUB-THEME 3.2: STATE OF THE ART OF REMEDIATION TECHNIQUES OF POLLUTED SITES

Remediation of polluted soils is important to restore an affected site to a standard at which the current or proposed site use may proceed with minimal risk to humans and the environment (Bradon, 2013). Cleaning soil pollution is far from easy because site managers may often have little knowledge on how the pollutant is behaving beneath the surface. In the case of remediation of agricultural fields, this implies bringing polluted fields back to their original productive capacity. This is a topic of crucial importance nowadays, because of global human population growth and the recognition that there is limited availability of land suitable for agricultural production.

Numerous attempts are being made to decontaminate polluted soils, including an array of both in situ (on-site, in the soil) and off-site (removal of contaminated soil for treatment) techniques. None of these are ideal for remediating contaminated soils, and often, more than one of the techniques may be necessary to optimize the cleanup effort. Due to the huge costs associated with many clean-up procedures, the remedial actions in some countries are currently aimed at minimizing the risk of further spreading of contaminants.

The main question of this sub-theme is to identify the most commonly used remediation techniques and analyze their feasibility and efficiency. To work towards the identification of the best available techniques (BAT) for remediating polluted soils, considering them as the most effective, ecosystem-friendly and economically feasible way of reducing damage to the environment, must be a goal for the scientific and industrial communities. Regarding polluted agricultural soils, further discussion is needed on whether productivity can be restored in all polluted sites previously used for agriculture, considering to what extent the food produced on such land would be healthy and nutritious. Additionally, this sub-theme aims to discuss solutions to overcome limitations related to political settings, technology availability and the economic cost of remediating polluted sites, taking into consideration that remediation standards and procedures may differ or change depending on the country and the actual and future land use.

Core questions:

- What are the criteria that determine whether a polluted site can/must be remediated?
- Which tools/technologies can be used to increase the remediation of polluted sites?
- To what extent can polluted sites be restored for safe food production?

THEME 4: GLOBAL STATUS OF SOIL POLLUTION

The UNEA3 resolution invites member States to promote the reduction, mitigation, and remediation of pollution and to work on establishing legislative and regulatory frameworks. Governments should establish and implement regulations to limit the accumulation of contaminants beyond established levels to safeguard human health and well-being and facilitate remediation of contaminated soils that exceed these levels where they pose a threat to humans, plants, and animals. Furthermore, it requests the GSP and its Intergovernmental Technical Panel on Soil to prepare a report based on available scientific information and data, on the extent and future trends of soil pollution, considering both point source contamination and diffuse pollution. To achieve the mandate, further research and international discussion are needed.

SUB-THEME 4.1: DEVELOPING POLICIES AND SETTING THRESHOLDS FOR ADDRESSING SOIL POLLUTION

Legislation proved to have a direct impact on the extent of soil pollution and the incidence of remediation actions (FAO and ITPS, 2015a). Furthermore, the existence of legislation that ensures the liability for soil pollution and regulates new activities contributes to prevent new soil pollution. In this context, the number of remediated sites is expected to grow in countries with well-established legislation on polluted/contaminated land such as those belonging to the European Union, or having developed comprehensive contaminated land management (CLM) frameworks such as South Korea and Japan. The launch of national activities on soil pollution is promoted by the establishment of networks, international frameworks (i.e. the Thematic Strategy on Soil Protection (COM(2006)231 of the EU) and conventions (i.e. the Rotterdam, Stockholm and Basel Conventions).

This session aims to highlight the importance of policy in preventing and managing soil pollution by reviewing the existing international tools and frameworks, and outlining actions for filling the identified gaps.

At the same time, this session aims to respond to the request of many FAO member countries to establish thresholds for soil pollutants to be used as guidelines to prevent and monitor soil pollution and remediate polluted sites. Particularly, it is of interest to discuss the need for establishing such thresholds, for which compounds, their scale of applicability (i.e. local, regional or global) and how these should be organized (i.e. by soil type, by pollutant, by land use, etc.). Recommendations made in this session will be reflected in the development of the thresholds by an open ended working group.

Core questions:

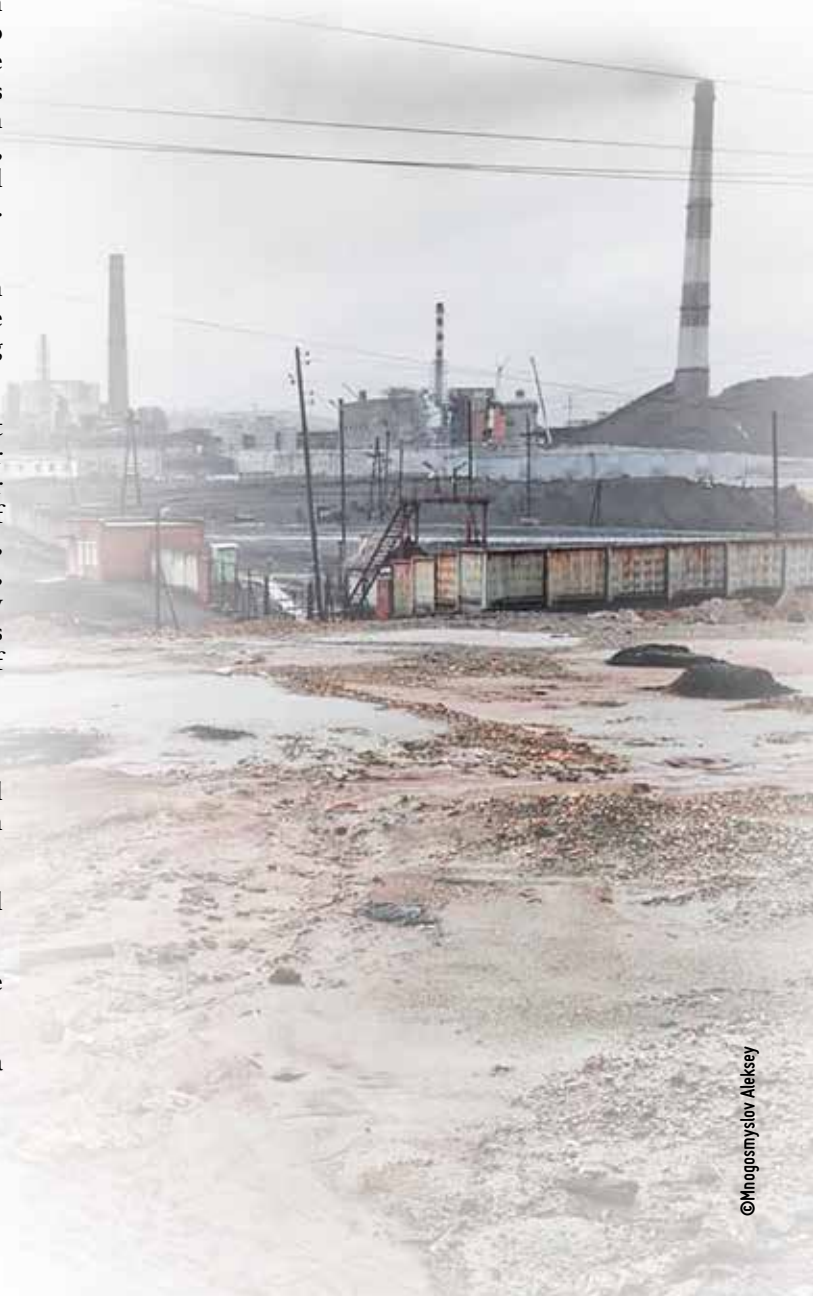
- What are the gaps in the existing international legal instruments and frameworks that have an impact on soil pollution and how can they be filled?
- What is the importance of setting thresholds for soil pollutants?
- Based on what criteria should thresholds be established?
- Is the setting of thresholds for soil pollutants a necessary part of policy development?

SUB-THEME 4.2: CASE STUDIES AT GLOBAL, NATIONAL AND REGIONAL SCALES

National attempts to estimate soil pollution extent and to remediate it have been done mainly in developed countries, but there is little data on the real extent of soil pollution in developing countries or at a global scale. However, the available data is alarming; soil pollution has been identified as the third main threat to soil for the European continent and the fourth main threat to the southern Mediterranean Basis (Montanarella, *et al.*, 2016). Furthermore, soil pollution may facilitate and accelerate other degradation processes. This subtheme aims to gather the available information on the status of soil pollution around the world, to identify emerging pollutants, to discuss risk-assessment approaches and the best remediation techniques, to define which after-care measures must be adopted to ensure a safety environment and healthy food production and to present successful examples of remediation, as well as the estimated costs for remediating polluted.

Core questions:

- What is the extent of soil pollution in the world?
- What are the main knowledge gaps?
- Where will it be necessary to focus future efforts?



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REFERENCES

Basel Convention, 2011. Basel Convention – Controlling transboundary movements of hazardous wastes and their disposal. Available at http://www.basel.int/

Blum, W. E., 2005. Functions of soil for society and the environment. Reviews in Environmental Science and Bio/Technology, 4, 75-79.

Blume, H.P. & Horn, R., 1982. 100 years of sewage water irrigation and consequences for soil ecological properties. (in German, with English summary and captures) Veränderung der Belastbarkeit von Böden nach 100 jähriger Abwasserverrieselung. Kulturtechnik u. Flurbereinigung, 23: 236-248

Blume, H.P., Horn, R., Alaily, F., Jayakodi, A.N. & Meshref, H., 1980. Sandy cambisol functioning as a filter through long term irrigation with waste waters. Soil Sci., 130: 186-192

Bradon, E., 2013. Global Approaches to Site Contamination Law. Chapter 2 – The Nature and Extent of Site Contamination. Springer Netherlands, 378 p. ISBN: 978-94-007-5744-8

Dragovic, S., Mihailovic, N., & Gajic, B., 2008. Heavy metals in soils: Distribution, relationship with soil characteristics and radionuclides and multivariate assessment of contamination sources. Chemosphere, 72, 491-495.

FAO & ITPS, 2015a. Status of the World's Soil Resources (SWSR) – Main report. Food and Agriculture Organization of the United Nations and Intergovernmental Technical Panel on Soils, Rome, Italy.

FAO & ITPS, 2015b. Status of the World's Soil Resources (SWSR) – Technical summary. Food and Agriculture Organization of the United Nations and Intergovernmental Technical Panel on Soils, Rome, Italy.

FAO, 2006. Policy Brief – June 2006, Issue 2. Food Security. Available at http://www.fao.org/forestry/13128-0e6f36f27e0091055bec28ebe830f46b3.pdf

FAO, 2015. World Soil Charter. Rome: Food and Agriculture Organization of the United Nations.

FAO, 2016. Voluntary Guidelines for Sustainable Soil Management. Food and Agriculture Organization of the United Nations. Rome, Italy.

Horn, R., Blume, H.P., Jayakodi, A.N., Meshref, H. & Wemken, R., 1980. Ecological effects of many years waste water irrigation. Water, air and nutrient conditions. Bull. 2 nd Int. Ecol.Symp., 217-229

Ismail, B.S., Farihah, K. & Khairiah, J., 2005. Bioaccumulation of heavy metals in vegetables from selected agricultural areas. Bulletin of environmental contamination and toxicology, 74.2: 320-327.

Lu, Y., Song, S., wang, R., Liu, Z., Meng, J., Sweetman, A.J., Jenkins, A., Ferrier, R.C., Li, H., Luo, W. & Wang, T., 2015. Impacts of soil and water pollution on food safety and health risks in China. Environment International, 77: 5-15.

Montanarella, L., Pennock, D., McKenzie, N., Badraoui, M., Chude, V., Baptista, I., *et al.*, 2016. World's soils are under threat. Soil, 2(1), 79-82.

O'Neil, J., 2015. Antimicrobials in agriculture and the environment: reducing unnecessary use and waste. Review on antimicrobial resistance: tackling drug-resistant infections globally. Available at https://amr-review.org/sites/default/files/Antimicrobials%20in%20agriculture%20and%20the%20environment%20-%20Reducing%20unnecessary%20use%20and%20waste.pdf

Orgiazzi, A.; Bardgett, R.; Barrios, E.; Behan Pelletier, V.; Briones, M.J.I.; Chotte, J-L.; De Deyn, G.; Eggleton, P.; Fierer, N.; Fraser, T.; Hedlund, K.; Jeffery, S.; Johnson, N.; Jones, A.; Kandeler, E.; Kaneko, N.; Lavelle, P.; Lemanceau, P.; Miko, L.; Montanarella, L.; Moreira, F.M.S.; Ramirez, K.S.; Scheu, S.; Singh, B.K.; Six, J.; van der Putten; W.H.; Wall, D.H. (Eds.), 2016, Global Soil Biodiversity Atlas. European Commission, Publications Office of the European Union, Luxembourg. 176 pp. Available at https://esdac.jrc.ec.europa.eu/content/global-soil-biodiversity-atlas

Orita, N., 2012. Root uptake of organic contaminants into plants: species differences. All Graduate Theses and Dissertations. Paper 1287. Utah State University

Pierzynski, G.M., Sims, J.T. and Vance, G.F., 2005. Soils and Environmental Quality, Third Edition. Taylor and Francis, Boca Raton, FL. 569 p.

Rotterdam Convention, 2010. Rotterdam Convention – Share responsibility. Available at http://www.pic.int/

Science Communication Unit, University of the West of England, Bristol, 2013. Science for Environment Policy In-depth Report: Soil Contamination: Impacts on Human Health. Report produced for the European Commission DG Environment, September 2013. Available at: http://ec.europa.eu/science-environment-policy

Shayler, H., McBride, M., & Harrison, H., 2017. Cornell Waste Management Institute. Retrieved from Department of Crop & Soil Sciences: http://cwmi.css.cornell.edu

Stalin, V.K., Balakumaran, R. & Thenmozhi, S., 2010. Assessment of soil contamination using GIS. Indian Geotechnical Conference – 2010, GEOtrendz. Available at https://gndec.ac.in/~igs/ldh/conf/2010/articles/095.pdf

Stockholm Convention, 2008. Stockholm Convention – Protecting human health and the environment from persistent organic pollutants. Available at http://chm.pops.int/

Tangahu, B.V., Adbullah, S.R.S., Basri, H., Idris, M., Anuar, N. & Mukhlisin, M., 2011. A review on heavy metals (As, Pb, and Hg) uptake by plants through phytoremediation. International Journal of Chemical Engineering, Volume 2011, Article ID 939161, 31 pages

Tasho, R.P. & Cho, J.Y., 2016. Veterinary antibiotics in animal waste, its distribution in soil and uptake by plants: a review. Science of the Total Environment, 563: 366-376.

Tóth, G., Hermann, T., Da Silva, M.R. & Montanarella, L., 2016. Heavy metals in agricultural soils of the European Union with implications for food safety. Environment International, 88: 299-309.

United Nations, 2017. Sustainable Development Knowledge Platform. Available at https://sustainabledevelopment.un.org/sdgs

Vargas, R., Achouri, M., Maroulis, J., & Caon, L., 2016. Healthy soils: a prerequisite for sustainable food security. Environmental Earth Sciences, 75(3), 180. https://doi.org/10.1007/s12665-015-5099-7

Ven der Graaf, E., Koomans, R., Limburg, J., & De Vries, K., 2007. In situ radiometric mapping as a proxy of sediment contamination: assessment of the underlying geochemical and physical principles. Applied Radiation and Isotopes, 65, 619-633.

Weber, R., Albrecht, M., Ballschmiter, K., Berger, J., Bruns-Weller, E., Kamphues, J., Körner, W., Malisch, R., Nöltner, T., Schenkel, H., Severin, K., Vossler, C., Wahl, K., 2014. Safe food production from free range beef – minimizing TEQ-levels in meat by tracking PCB-sources. Organohalogen Compounds 76, 815-818.

Weber R, Watson A, Petrlik J, Winski A, Schwedler O, Baitinger C, Behnisch P., 2015. High levels of PCDD/F, PBDD/F and PCB in eggs around pollution sources demonstrates the need to review soil standards. Organohalogen Compounds 77, 615-618.

Yaron, B., Dror, I., & Berkowitz, B., 2012. Soil-Subsurface Change. Chemical Pollutants Impacts. Berlin: Springer. doi:10.1007/978-3-642-24387-5

Yashim, Z.I., Israel, O.K. & Hannatu, M., 2014. A study of the uptake of heavy metals by plants near metal-scrap dumpsite in Zaria, Nigeria. Journal of Applied Chemistry. Volume 2014, Article ID 394650, 5 pages

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AGENDA

02 MAY 18

TIME	ITEM	MODERATOR	ROOM
8:30 10:00	**Registration**		PLENARY HALL
10:00 10:30	**Opening of the symposium** ***Ms. Maria Helena Semedo***, Deputy Director-General of Climate and Natural Resources (DDN), FAO ***Mr. Illar Lemetti***, Deputy Minister of Rural Affairs of Estonia ***Mr. Dun Niu***, Ambassador and Permanent Representative of the People's Republic of China to FAO ***Mr. Carlos Martin-Novella***, Deputy Executive Secretary, Basel, Rotterdam and Stockholm Conventions ***Ms. Astrid Schomaker***, Director of Global Sustainable Development, European Commission		
10:30 10:45	**Introduction to the GSOP18** ***Mr.René Castro Salazar***, Assistant Director-General of Climate, Biodiversity, Land and Water Department (CB), FAO		
11:00 12:00	**Setting the scientific scene for GSOP18** ***Mr. Luca Montanarella***, Chair ITPS, European Commission, Italy *Status of World's Soil Resources* ***Ms. Mette Wilkie***, Director of Ecosystems Division, UN Environment, Kenya *Tackling the growing challenge of soil pollution* ***Mr. Marco Martuzzi***, European Centre for Environment and Health, WHO, Germany *Towards a healthier and safer environment: the role of soil contamination* ***Ms. Melisa Lim***, BRS Conventions, Switzerland *Implementing the Basel, Rotterdam and Stockholm Conventions to prevent and mitigate soil pollution*	***Mr. Eduardo Mansur,*** Director Land and Water Division (CBL), FAO, Italy	
12:00 13:30	**Keynote speakers** ***Mr. Ravi Naidu***, University of Newcastle, Australia *Global status of soil pollution* ***Mr. Steve McGrath***, Rothamsted Research, UK *Soil pollution on agricultural fields and other land uses* ***Ms. Esperanza Huerta Lwanga***, El Colegio de la Frontera Sur, Mexico *The impact of soil pollution on the environment and overall human well-being* ***Mr. Roland Weber***, independent consultant for UN Organizations, Germany *The impact of soil pollution on food production and safety* ***Ms. Lena Q. Ma***, University of Florida, US *Remediation of polluted sites*	***Ms. Natalia Rodríguez Eugenio,*** FAO, Italy	

TIME	ITEM	MODERATOR	ROOM
13:30 14:30	Lunch break		
14:30 15:00	**Invited speakers** **Theme 1: Soil pollution on agricultural fields and other land uses** ***Mr. Michael McLaughlin***, University of Adelaide, Australia *Drivers of soil pollution in agricultural fields* ***Ms. Violette Geissen***, Wageningen University & Research, the Netherlands *60 years of pesticide application – pitfalls and prospects*	***Mr. Dan Pennock***, University of Saskatchewan, Canada	PLENARY HALL
15:00 15:30	**Theme 2: The impact of soil pollution on food production and safety, the environment and overall human well-being** ***Mr. David Ingram***, FDA/CFSAN, US *Food Safety and Soil Health: an US Food and Drug Administration (FDA) perspective* ***Ms. Christina D Siebe Grabach***, Universidad Nacional Autónoma de México, Mexico *Pollutant accumulation in soils irrigated with untreated wastewater for more than a century*		
15:30 16:00	**Theme 3: Remediation of polluted sites** ***Ms. Lucia Buvé***, UMICORE NV, Belgium *Addressing contaminated sites : from dig-and-dump to smart land management.* ***Mr. Talal Darwish***, National Council for Scientific Research, Lebanon *Status of heavy metals in agricultural soils and the need for adapted soil thresholds, case study from Lebanon*		
16:00 16:30	**Theme 4: Developing policies and setting thresholds for addressing soil pollution and Global status of soil pollution** ***Mr. Dietmar Müller-Grabherr***, Environment Agency Austria, Austria *Frameworks for understanding risks and viable solutions—an overview on experiences in managing soil pollution* ***Ms. Esther Goidts***, Ministry of the Environment of Wallon Region/Ms. Marie Jailler, SPAQuE, Belgium *Getting thresholds for soil pollutants: experience from legal implementation in Wallonia and specific issues around Arsenic and Lead*		
16:30 17:30	**Regional Soil Partnerships Reports** ***Mr. Nsalambi V. Nkongolo***, Institut Facultaire des Sciences Agronomiques, Dem. Rep. Congo *Status of Soil Pollution in Africa* ***Mr. Olegario Muñiz Ugarte***, Instituto de Suelos, Cuba *Status of Soil Pollution in Central America and the Caribbean* ***Mr. Pavel Krasilnikov***, ECFS, Russian Federation *Status of Soil Pollution in Eurasia* ***Ms. Ana Payá Pérez***, JRC, European Commission, Italy *Status of Soil Pollution in Europe* ***Ms. Ana Maria Rivero Santos***, Ministerio de Relaciones Exteriores, Colombia *Status of Soil Pollution in Latin America* ***Mr. Siosiua Halavatau***, Secretariat of the Pacific Community, Fiji *Status of Soil Pollution in South West Pacific*		
17:30 18:00	**General discussion**		
18:00 19:00	**18.00** Opening speech and artistic performance on soil pollution **18.15** Poster session		ATRIUM
19:00 20:00	**Cocktail**		

03 MAY 18

TIME	ITEM	MODERATOR	THEME CHAIR	ROOM
9:00 10:30	**Sub-theme 1.1: Drivers of soil pollution in agricultural fields** ***Mr. Gan Lin Zhan,***, Institute of Soil Science, China *Soil contamination and risk assessment of phthalate esters in the suburban plastic film greenhouses* ***Mr. Tom Wassenaar***, CIRAD, France *Assessing agricultural soil pollution risks from organic wasterecycling: informing regional participatory waste management* ***Mr. Mark Kibblewhite***, Cranfield University, United Kingdom *Contamination of agricultural soil by highways in urban and peri-urban zones* ***Ms. Rosalina Gonzalez***, Universidad de La Salle, Colombia *Effect of the Soil Properties in the Partitioning of Pesticides (Glyphosate and Paraquat) Used in Corn and Coffee Beans Colombian Crops* ***Ms. Yevheniia Hladkikh***, Institute for Soil Science and Agrochemistry Research, Ukraine *Irrigation: estimation contamination by heavy metals in "water – soil – plants" system* ***Ms. Sara Marjani Zadeh***, FAO, Italy *A global review of water pollution from agriculture*	***Mr. Pavel Krasilnikov***, ECFS, Russian Federation	***Mr. Luca Montanarella***, Chair ITPS, European Commission, Italy	GREEN ROOM
9:00 10:30	**Sub-theme 2.1: Soil pollution and food safety** ***Mr. Frank Swartjes***, RIVM National Institute for Public Health and the Environment, the Netherlands *Soil pollution and food safety* ***Mr. Tomohito Arao***, Central Region Agricultural Research Center, NARO, Tsukuba, Ibaraki, Japan *Strategies for reducing cadmium and arsenic in rice* ***Mr. Pietro Lavazzo***, ERSAF, Italy *Transfer of contaminants from agricultural contaminated soils to crop plants: a field study at Brescia-Caffaro SIN (Italy)* ***Mr. Takuro Shinano***, Tohoku Agricultural Research Station, Japan *Decontamination of agricultural field and mitigation of radioactive cesium uptake after nuclear contamination by TEPCO's FDNPP accident—situation after 7 years* ***Ms. Cristina Lull***, UPV, Spain *Legal approach to measures to prevent soil contamination and increase food safety for the consumer*	***Ms. Maria de Lourdes Mendoça Santos***, EMBRAPA, Brazil	***Mr. Gary Pierzinsky***, Kansas State University, United States of America	RED ROOM
9:00 10:30	**Sub-theme 3.1: Monitoring soil pollution** ***Mr. Kabindra Adhikari***, University of Arkansas, US *Geostatistical mapping of metal elements distribution across conterminous USA* ***Mr. Claudio Colombo***, University of Molise, Italy *Bioaccessibility of Pb and As in contaminated urban soil evaluated by chemical extraction and Vis-NIR spectroscopy* ***Mr. Hussam H. M. Husein***, General Commission for Scientific Agricultural Research, Syria *Mapping Heavy Metal Pollution of Agriculture Soil in Orontes Basin with Semiarid Mediterranean Climate* ***Mr. Donato Visconti***, University of Naples Federico II, Italy *Analyses of native vegetation for a detailed characterization of soil contaminated by tannery waste disposal* ***Mr. Joseph Adu-Gyamfi***, International Atomic Energy Agency (IAEA), Austria *Applying nuclear techniques to assess the sources and transport of antibiotics from intensive agricultural areas to the environment through soil and water* ***Mr. Abdelaziz Belal Belal***, Remote Sensing and Space Sci., Egypt *Detecting soil contamination in East Nile Delta, Egypt using remote sensing and GIS*	***Ms. Isaurinda dos Santos Baptista***, INIDA, Cape Verde	***Ms. Melisa Lim***, BRS Conventions, Switzerland	IRAQ ROOM

TIME	ITEM	MODERATOR	THEME CHAIR	ROOM
9:00 10:30	**Sub-theme 4.1: Developing policies and setting thresholds for addressing soil pollution** ***Ms. Ana Payá Pérez***, JRC, European Commission, Italy *Policy questions addressing the management of contaminated sites in Europe* ***Mr. Co Molenaar***, Ministry of Infrastructure and Water management, Netherlands *Soil policy in the Netherlands. The dynamics of joint policy making* ***Ms. Griet Van Gestel***, OVAM, Public Waste Agency of Flanders, Belgium *Policy on diffuse soil pollution in Flanders: human health issues and local food production* ***Mr. Koen Oorts***, ARCHE Consulting, Belgium *A flexible approach for implementation of bioavailability into derivation of thresholds for ecotoxicological effects of metals in soil for varying protection goals* ***Mr. Erik Smolders***, Katholieke Universiteit Leuven, Belgium *Setting thresholds for addressing pollution of soils with trace metals: concepts, models, and challenges* ***Ms. Griet Van Gestel***, OVAM, Public Waste Agency of Flanders, Belgium *How do soil thresholds function in the policy on contaminated land in Flanders?*	***Mr. Abdelkader Bensada***, UN Environment, Kenya	***Ms. Natalia Rodríguez Eugenio***, FAO, Italy	IRAN ROOM
10:30 11:00	**Coffee break**			
11:00 12:00	**Sub-theme 1.1: Drivers of soil pollution in agricultural fields** ***Mr. Olegario Muñiz Ugarte***, Ministerio de la Agricultura, Cuba *Heavy metals assessment in Cuban soils* ***Ms. Vera Silva***, Wageningen University and Research, The Netherlands *Agricultural soils of the European Union contaminated with pesticide residues* ***Ms. Magalie Lesueur Jannoyer***, MUSE and HortSys Research unit, France *Long term organochlorine soil pollution in agriculture: The lessons learnt from the Chlordecone pollution in French West Indies* ***Ms. Yueling Qi***, Wageningen University and Research, The Netherlands *Plastics in terrestrial ecosystem: effects of macro- and micro- plastic residues on wheat growth*	***Mr. Gan Lin Zhan***, Chinese Academy of Sciences, People's Republic of China	***Mr. Luca Montanarella***, Chair ITPS, European Commission, Italy	GREEN ROOM
11:00 12:00	**Sub-theme 2.1: Soil pollution and food safety** ***Ms. Margot de Cleen***, Ministry of Infrastructure and Water management, the Netherlands *Restauration of contaminated land as part of SDGs. New business models are needed.* ***Mr. Filippo Montalbetti***, UN Environment ***Ms. Dragana Vidojevic***, Serbian Environmental Protection Agency; and ***Mr. Marco Falconi***, Italian Institute for Environmental Protection and Research *Assistance to the Republic of Serbia in the Implementation of MEAs and EU Obligations through Improvement of Pollution Monitoring of Soil Quality at Industrial Sites* ***Ms. Warshi S. Dandeniya***, University of Peradeniya, Sri Lanka *Prevalence of Antibiotic Resistant Bacteria in Poultry Litter based Manures and potential threats on food safety for carrot (Dacus carotova)* ***Mr. Nazaria Marchi***, Servizio Geologico sismico e dei suoli, Italy *First results on the bioavailability of some metals in the soils of the emilia-romagnola plain*	***Ms. Botle Mapeshoane***, National University of Lesotho, Lesotho	***Mr. Gary Pierzinsky***, Kansas State University, United States of America	RED ROOM

TIME	ITEM	MODERATOR	THEME CHAIR	ROOM
11:00 12:00	**Sub-theme 3.1: Monitoring soil pollution** ***Mr. Bernd M. Bussian***, Environmental consultancy, Germany *State of the Art Techniques of Mapping, Monitoring and Modeling Soil Pollution: A Case Study of German Soils* ***Ms. Tatyana Stefanovska***. National University of Life and Environmental Sciences of Ukraine, Ukraine *The development and preliminary assessment of using the biological indicators to evaluate the soil quality under miscanthus x giganteus production at the contaminated abandoned sites* ***Mr. Matar Thiombane***, Università degli Studi di Napoli, Italy *Source patterns of Zn, Pb, Cr and Ni potentially toxic elements (PTEs) through a compositional discrimination analysis: a case study on the Campanian topsoil data* ***Ms. Anna Paltseva***, Brooklyn College of The City University of New York, US *Application of GIS to Characterize Garden Soil Contamination in New York City*	***Mr. Peter de Ruiter***, Wageningen University, The Netherlands	***Ms. Melisa Lim***, BRS Conventions, Switzerland	IRAQ ROOM
11:00 12:00	**Sub-theme 4.1: Developing policies and setting thresholds for addressing soil pollution** ***Ms. Cristina Lull***, UPV, Spain *Soil contamination policy: increasing students' awareness* ***Mr. Johan Ceenaeme***, OVAM, Public Waste Agency of Flanders, Belgium *Lessons learned after 20 years of soil remediation policy in Flanders* ***Ms. Eloana Janice Bonfleur***, Federal University of Paraná, Brazil *Reference values for potentially harmful elements in soils from Atlantic Rainforest, Brazil* ***Mr. Jussi Reinikainen***, Finnish Environment Institute, Finland *Derivation and Application of Soil Guideline Values in Contaminated Land Management—Case Finland*	***Mr. Rainer Horn***, Kiel University, Germany	***Ms. Natalia Rodríguez Eugenio***, FAO, Italy	IRAN ROOM
12:00 13:00	**Poster session**			ATRIUM
12:00 14:00	**Side Event: Moving the global soil pollution agenda forward: Implementing the UN Environment Assembly resolution on addressing soil pollution** Co-organized by FAO and UN Environment			SHEIKH ZAYED CENTRE
13:00 14:00	**Side Event: Water pollution from agriculture** Organized by FAO			IRAQ ROOM
13:00 14:00	**Lunch break**			
14:00 16:00	**Sub-theme 1.2: Drivers of soil pollution in non-agricultural soils** ***Mr. John Vijgen***, International HCH & Pesticides Association (IHPA), Denmark *HCH and Lindane contaminated sites: European and global need for a permanent solution for a long-time neglected issue* ***Ms. Ana T. Lima***, University of Waterloo, Canada *The legacy of surface mining: Remediation, restoration, reclamation, and rehabilitation* ***Ms. Claudia Fontana***, Council for Agricultural Research and Economics, Italy *Radionuclide Soil Pollution* ***Mr. Hans Slenders***, NICOLE, EU *Land Stewardship, Investing in the Natural, Societal and Economical capital of Industrial Land* ***Mr. Geoffrey Siemering***, University of Wisconsin, US *Organic Soil Amendments Ineffective for Pb Mobilization in Mine-Scarred Soil* ***Mr. Ivan Holoubek***, Masaryk University, Czech Republic *Experiences and problems of contaminated sites solution in the Czech Republic*	***Mr. Nsalambi V. Nkongolo***, Institut Facultaire des Sciences Agronomiques (IFA), Democratic Republic of Congo	***Mr. Luca Montanarella***, Chair ITPS, European Commission, Italy	GREEN ROOM

TIME	ITEM	MODERATOR	THEME CHAIR	ROOM
14:00 16:00	**Sub-theme 2.2: Risk assessment of soil pollution on the environment and human health** ***Mr. Kahraman Ünlü***, Middle East Technical University, Turkey *Development and implementation of health risk-based soil Guidelines in Turkey* ***Mr. Paolo Giandon***, ARPAV Soil Protection and Remediation Service, Italy *Assessing Background Values of Metals and Metalloids in Soils of the Veneto Region* ***Mr. Dmytro O. Semenov***, Institute for Soil Science and Agrochemistry Research, Ukraine *Geochemical and anthropogenic factors of variability of heavy metals content in the soil of Ukraine at the example of copper* ***Mr. Gunnar Bengtsson***, Bengtsson Enterprises, Sweden *Past, present and future exposures to natural elements* ***Ms. Andrea Ottesen***, FDA, US *Bacterial microbiota of soils managed with Methyl Bromide, Methyl Iodide and Dimethyl Disulfide* ***Mr. Shadananan Nair***, Centre for Earth Research and Environment Management, India *Soil pollution issues in a tropical agricultural wetland in India* ***Ms. Eva Kohlschmid***, FAO, Italy *Evaluation of pesticide risks to soil biodiversity—A module in the FAO Pesticide Registration Toolkit, addressing pesticide regulators in low and middle income countries* ***Ms. Valéria Cristina Palmeira Zago***, CEFETMG, Brasil *Mining and sustainability -a study case in Minas Gerais, Brazil*	***Mr. Marco Martuzzi***, WHO, Germany	***Mr. Gary Pierzinsky***, Kansas State University, United States of America	**RED ROOM**
14:00 16:00	**Sub-theme 3.2: State of the art of remediation techniques of polluted sites** ***Ms. Engracia Madejón***, Instituto de Recursos Naturales y Agrobiología de Sevilla (IRNAS-CSIC), Spain *Restoration strategies in soils of Guadiamar area (South Spain). Evaluation of the success after twenty years since the Aznalcóllar mine accident* ***Ms. Yevheniia Hladkikh***, Institute for Soil Science and Agrochemistry Research, Ukraine *Remediation of contaminated soils using innovative methods* ***Mr. Petr Sharov***, Blacksmith Institute Pure Earth, Azerbaijan *Remediation of Soil Contaminated with Persistent Organic Pollutants in Sumgait, Azerbaijan* ***Ms. Nouhad Elouadihi***, Ibn Tofail University, Morocco *Phytoremediation of contaminated soils in mining area using Ray Grass Case study: Abandoned Mine of Zaida and Mibladen (High Moulouya, Morocco)* ***Mr. Nicola Testa***, UN CGS, Italy *Remediation by Enhanced Natural Attenuation of POL Polluted Sites in UN Field Missions: A case study on ONUCI, Ivory Coast* ***Mr. Ángel Faz Cano***, Universidad Politécnica de Cartagena, Spain *Is aided phytostabilization a suitable technique for tailings remediation? A field case study in SE Spain* ***Mr. Deyi Hou***, Tsinghua University, China *Green and Sustainable Remediation of Contaminated Sites: Going Beyond the Temporal and Spatial Boundaries* ***Mr. Hans Kristian Westrum***, Soil Steam International AS, Norway *Soil Steaming as alternative to fight weed (seeds), fungus and nematodes in a sustainable way*	***Mr. Miguel Taboada***, INTA, Argentina	***Ms. Melisa Lim***, BRS Conventions, Switzerland	**IRAQ ROOM**

TIME	ITEM	MODERATOR	THEME CHAIR	ROOM
14:00 16:00	**Sub-theme 4.2: Case studies at global, national and regional scales** ***Mr. Ismail Ithnin***, Department of Environment, Malaysia *Contaminated land management in Malaysia: Policies and legal framework* ***Mr. Raúl S. Lavado***, Facultad de Agronomía, Universidad de Buenos Aires, Argentina *The contamination state in Pampas soils* ***Mr. Nandula Raghuram***, Guru Gobind Singh Indraprastha University, India *Indian Nitrogen Assessment, Environmental Impacts and Sustainable Development* ***Mr. Johan Ceenaeme***, OVAM, Public Waste Agency of Flanders, Belgium *The soil certificate—a tool creating awareness about soil pollution* ***Mr. Alan O. Thomas***, ERM, UK *Embedding Sustainability in Contaminated Site Management. Practical Experiences and Case Studies* ***Ms. Tamara Kukharchyk***, Institute for Nature Management, Belarus *Sources and levels of soil pollution by PCBs in Belarus: achievements and problems of management* ***Mr. Tom Bruulsema***, International Plant Nutrition Institute, Canada *Managing nutrients to mitigate soil pollution*	***Mr. Christopher Cox***, UN Environment, Kenya	***Ms Natalia Rodríguez Eugenio***, FAO, Italy	IRAN ROOM
16:00 16:30	**Coffee break**			
16:30 19:00	**Side Event: Tackling soil pollution in Europe. Policies, indicators and assessments** **Co-organized by FAO, the European Commission and the European Environment Agency**			RED ROOM
16:30 18:30	**Side Event: Training on Bioavailability of Contaminants in Soil: Considerations for Human Health Risk Assessment** **Co-organized by FAO and the Interstate Technology & Regulatory Council (ITRC)**			IRAN ROOM

04 MAY 18

TIME	ITEM	MODERATOR	THEME CHAIR	ROOM
9:00 10:30	**Sub-theme 1.2: Drivers of soil pollution in non-agricultural soils** ***Mr. Boudewijn F.H. Fokke***, Tauw nl, The Netherlands *Sustainable management of the DDT contaminated site in Lâm Hoá site, in Quang Binh province Viet Nam* ***Mr. Dmytro O. Semenov***, Institute for Soil Science and Agrochemistry Research, Ukraine *Technogenically contaminated soils of Ukraine* ***Mr. Amanullah Kahn***, University of Agriculture Peshawar, India *Best Management Practices Reduce Soil Pollution and Improve Health of All: a review* ***Ms. Valentina Pidlisnyuk***, Jan Evangelista Purkyne University in Usti nad Laben, Czech Republic *Sustainable soil management of polluted military site by phytostabilization with biomass production using biofuel crop Miscanthusxgiganteus* ***Mr. Daniel Arenas Lago***, Universidad de Vigo, Spain *Effectiveness of hydroxyapatite, hematite and maghemite nanoparticles to reduce the available and dissolved As, Pb and Sb content in mine soils from Iberian Pyrite Belt (Portugal)* ***Mr. Paolo Giandon***, ARPAV Soil Protection and Remediation Service, Italy *Persistent Organic Pollutants in Soils of the Veneto Region*	***Mr. Talal Darwish***, CNRS, Lebanon	***Mr. Luca Montanarella***, Chair ITPS, European Commission, Italy	GREEN ROOM
9:00 10:30	**Sub-theme 2.2: Risk assessment of soil pollution on the environment and human health** ***Mr. Bret Ericson***, Pure Earth (Blacksmith Institute), US *Cost effective approaches to risk mitigation at metals contaminated sites* ***Mr. Julian Campo***, CIDE, Spain *Emerging contaminants in soil and sediment of Mediterranean catchments (Valencia, Spain)* ***Mr. Oloth Sengtaheuanghoung***, Agriculture Land-Use Planning Center , Lao *Interactions between land use, fluxes of water and sediments, and the spread of bacterial contaminants in the uplands of northern Lao PDR.* ***Mr. Taher Ajmi***, ACTA, Direction des Sols, Tunisia *Assessment of heavy metal pollution in the cultivated area around mining. Tunisia case study Medjredah Watershed* ***Ms. Lulu Zhang***, UNU-FLORES, Germany *Assessing soil pollution and application of Water-Waste-Soil Nexus solution for improved Land Use Management* ***Ms. Ana María Rivero Santos***, Ministerio de Relaciones Exteriores, Colombia *Pollution control strategy and soil remediation guidelines in Colombia*	***Ms. Renata Clarke***, FAO, Italy	***Mr. Gary Pierzinsky***, Kansas State University, United States of America	RED ROOM
9:00 10:30	**Sub-theme 3.2: State of the art of remediation techniques of polluted sites** ***Mr. Domenico Morabito***, INRA/Universita degli Studi del Molise, France/Italy *Biochar an efficient tool to decrease Pb and As in metal(loid)s contaminated soils and to allow assisted phytoremediation of multicontaminated technosols using tree species.* ***Ms. Ana T. Lima***, Universidade Federal do Espirito Santo, Brazil *Environmental Electrokinetics for a Sustainable Subsurface* ***Mr. Samuel Tetsopgang***, University of Bamenda, Cameroon *Rock fines as amendment enhances crop yield and soil chemicals while decreasing soil acidity on a tropical soil in the northwest region of Cameroon, Africa.* ***Mr. Vishal Tripathi***, Banaras Hindu University, India *Comparative analysis of leaf litter and biochar for the onsite remediation of Hexachlorocyclohexane polluted soils* ***Ms. Jeyanny Vijayanathan***, Forest Research Institute Malaysia, Malaysia *Reversing soil degradation via phytoremediation techniques in an ex-tin mine and gold mine in Peninsular Malaysia* ***Mr. Karen Ghazaryan***, Yerevan State University, Armenia *Copper phytoremediation potential of wild plant species growing in the mine polluted areas of Armenia*	***Mr. Kazuyuki Yagi***, NIAES, Japan	***Ms. Melisa Lim***, BRS Conventions, Switzerland	IRAQ ROOM

TIME	ITEM	THEME CHAIR	ROOM
10:30 11:00	Coffee break		
11:00 13:00	Theme 1: Soil pollution on agricultural fields and other land uses	*Mr. Luca Montanarella*, Chair ITPS, European Commission, Italy	GREEN ROOM
11:00 13:00	Theme 2: The impact of soil pollution on food production and safety, the environment and overall human well-being	*Mr. Gary Pierzinsky*, Kansas State University, United States of America	RED ROOM
11:00 13:00	Theme 3: Remediation of polluted sites	*Ms. Melisa Lim*, BRS Conventions, Switzerland	IRAQ ROOM
11:00 13:00	Theme 4: Global status of soil pollution	*Ms. Natalia Rodríguez Eugenio*, FAO, Italy	IRAN ROOM
13:00 14:30	Lunch break		
14:30 15:20	Presentation by Theme Chair to provide a summary of the main session outcomes and key messages	*Mr. Eduardo Mansur,* Director Land and Water Division (CBL), FAO, Italy	PLENARY HALL
15:20 16:30	Interactive Panel		
16:30 16:50	Conclusions and way forward *Mr. Ronald Vargas*, Global Soil Partnership Secretariat, FAO		
16:50 17:00	Closure of the Symposium *Mr. René Castro Salazar*, Assistant Director-General of Climate, Biodiversity, Land and Water Department (CB), FAO		

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POSTER SESSION

TITLE	AUTHOR	AFFILIATION
Setting the thresholds for heavy metals based on their background & soil resilience	***Mr. Mykola Miroshnychenko***	National Scientific Center "Institute for Soil Science and Agrochemistry Research named after O.N.Sokolovsky", Ukraine
Current hygienic state of agricultural soils based on soil monitoring system in Slovakia	***Mr. Josef Kobza***	National Agricultural and Food Centre — Soil Science and Conservation Research Institute Bratislava, Slovakia
Soil restoration and management of the UNESCO Mab Maya Biosphere Reserve and Trifinio fraternidad forest ecosystems in Guatemala, Central America	***Ms. Antonethe Castaneda Mena***	Secretariat of Planning and Programming, Presidency of Guatemala, Guatemala
Can microplastics leach to groundwater?	***Ms. Miao Yu***	Soil Physics and Land Management Group, Wageningen University & Research, Netherlands
Erosion as a pollution factor of agricultural soils with copper compounds	***Ms. Tamara Leah***	Institute of Soil Science, Agrochemistry and Soil Protection "Nicolae Dimo", Moldova
Application of Health Belief Model in pesticide pollution: a case study from Nepal	***Ms. Govinda Bhandari***	Wageningen University and Research, The Netherlands
The Status of Heavy Metals (Cd, Pb) in the Agricultural Soils of Iran	***Mr. Hamed Rezaei***	Soil and Water Research Institute, Iran
Heavy metals concentrations in composts and substrates used to production of vegetables in Cuba's urban agriculture	***Ms. Mirelys Rodríguez Alfaro***	Departamento de Suelos y Fertilizantes, Ministerio de la Agricultura, Cuba
Nutrient risk management using organic manures in radish production at chitwan, Nepal	***Mr. Roshan Babu Ojha***	Nepal Agricultural Research Council, Nepal
Cadmium management in New Zealand agricultural soils	***Ms. Jo-Anne E Cavanagh***	Manaaki-Whenua Landcare Research, New Zealand
Heavy metal mobility and PAHs extractability relationships with soil hydrophobicity in coal ash reclaimed technogenic soils (Technosols)	***Ms. Irena D. Atanassova***	Agrotechnologies and Plant Protection Sofia, Bulgaria
Animal and anthropogenic pressures on agricultural soils from Shiga Toxin producing E. coli (STEC): impact on food safety and food security	***Mr. Gianfranco Brambilla***	Istituto Superiore di sanità, Italy
Influence of irrigation waters on heavy metals pollution of agricultural soils in a Mediterranean alluvial plain (Valencia, Spain)	***Mr. Vicente Andreu***	Centro de Investigaciones sobre Desertificación-CIDE , Spain
Environmental fate and off-site impacts of pesticides — a case study of the S. Lourenço do Bairro sub-basin, Portugal	***Ms. Vera Silva***	Wageningen University and Research, The Netherlands
Deterioration of soil quality of tropical home gardens- a case study from Kerala, India	***Mr. G. Lakshmi***	School of Environmental Studies, India
The retention and release of nutrients from polyhalite into the soil	***Mr. Timothy D Lewis***	Sirius Minerals, UK
Multi-isotope Fingerprints to Identify On-Site and Of-Site Impacts of Agricultural Contaminants from Soil to Water Bodies	***Mr. Joseph Adu-Gyamfi***	IAEA, Austria

TITLE	AUTHOR	AFFILIATION
Towards a Holistic Distributed Policy Cluster to Prevent and Remedy Soil Pollution	***Mr. Lal Manavado***	Norwegian Directorate of Health, Norway
Soil quality assessment, risk assessment and remediation strategy for a former pesticide distribution center, practical experiences from Tajikistan	***Mr. Guido M. Van de Coterlet***	Tauw bv, The Netherlands
The bioavailability of cadmium and lead in soil and bioaccumulation in barley from a contaminated soil.	***Ms. Gabriella Rossi***	Center for Agriculture and Environment (CREA-AA), Italy
Uranium, a new villain among the dirty dozen in soil protection	***Mr. Ewald Schnug***	Julius Kuehn-Institut, Germany
Potentially toxic element hyperaccumulator plants: preliminary evaluation of the phytoextraction duration to remediate a contaminated agricultural soil by Brassica juncea successive croppings	***Mr. Luigi Giuseppe Duri***	University of Naples Federico II, Italy
Relationships between a mixture of trace elements and enzyme activities are better explained by potentially available fraction	***Mr. Juan Pedro Martín-Sanz***	1Universidad Complutense de Madrid, Spain
Initial approach for phytoremediation of petroleum hydrocarbons-mixed soil at oil industry in Skopje region	***Ms. Silvana Manasievska-Simikj***	Faculty of Agricultural Sciences and Food, Macedonia
The Effectiveness of using bioremediation measures to podzolized chernozem, which is contaminated by heavy metals	***Ms. Elena Starchenko***	Institute for soil science and research named after O.N. Sokolovsky, Ukraine
Pollution of agricultural soils with heavy metals through irrigation water in Eastern Georgia	***Mr. Giorgi Ghambashidze***	Scientific-Research Centre of Agriculture, Georgia
Halogenic tecynosoils within oil and gas fiendc of Ukraine	***Ms. Olena Drozd***	Kharkiv National University of Municipal Economy named after O. M. Beketov, Ukraine
Assessment of ecological state of the halogenic technosoils in the former well drilling site using biological indicators	***Ms. Oksana Naidonova***	Institute for Soil Science and Agrochemistry Research named after O.N. Sokolovsky', Ukraine
Agronomic feasibility of bioenergy crop cultivation on polluted soils: Insights and opportunities for land use design and environmental suitability	***Mr. Giuseppe Pulighe***	CREA, Italy
Risk assessment of glyphosate/AMPA in wind-eroded dust derived from agricultural soil in North-Netherlands	***Ms. Xiaomei Yang***	Wageningen University and Research, The Netherlands
Assessment of Pesticides in Soil from Obsolete Pesticides Stores: A Caribbean Case Study	***Mr. Gaius D. Eudoxie***	UWI, Trinidad and Tobago
The soil pollution of agricultural solving by organic farming for food safety and friendly environment- Case Study from Thailand.	***Mr. Pathawit Chongsermsirisakul***	Chulalongkong University and Assumption University, Thailand
Bio-solids from Bugolobi wastewater treatment plant, Uganda do not meet the minimum standards for land application	***Mr. Julius Lubuulwa***	School of Agricultural Sciences Makerere University, Uganda
Management of contaminated groundwater in the Netherlands. Criteria for contamination, the management and restauration of groundwater.	***Mr. Co Molenaar***	Ministry of Infrastructure and Water management, Netherlands
Is agricultural production of the upper basin of Pergamino stream responsible for soils and water degradation?	***Mr. Luis A. Milesi Delaye***	INTA, Argentina
Soil contamination in kitchen gardens of urban areas : the need for comprehensive approaches.	***Ms. Colinet Gilles***	Gembloux Agro Bio-Tech, Belgium

TITLE	AUTHOR	AFFILIATION
Study of the spatial and temporal dynamics of heavy metals under the effect of erosion depending of the physico-chemical properties of Soil. J.Ressas mining environment case study	***Ms. Attia Rafla***	DG/ACTA, Tunisia
Effect of Combined Application of Subsurface Drainage and Mineral Fertilization on Iron-Reducing Bacterial Populations' Developments and Fe2+ Uptake by Two RiceVarieties in an Iron Toxic Paddy Soil of Burkina Faso (West Africa)	***Ms. Cécile Harmonie Otoidobiga***	University of Ouagadougou, Burkina Faso
Development of alert systems on sanitary and environmental risks related to pesticides (asser-pesticides) of the Niayes area	***Ms. Marie Ndao***	Fondation CERES-Locustox, Senegal
Soil pollution in urban agriculture can derive from cultivation	***Ms. Francesca Bretzel***	CNR, Italy
Optimization of hydrocarbons biodegradation by bacterial strains isolated from wastewaters in Ouagadougou, Burkina Faso: Case study of SAE 40/50 used oils and diesel	***Mr. Adama Sawadogo***	University of Ouagadougou, Burkina Faso
Use of Red Mud as a Pyrolysis Catalyst and a Carbonated Soil Amendment	***Ms. Amanda Ashworth***	USDA-ARS, US
Use of polyamine compounds for the detection of metals such as cadmium, mercury and lead in waters	***Ms. Laura Garcia-España***	UPV, Spain
Geostatistical analyzes of heavy metals in soil of Zaida mine (Hight Moulouya, Morocco).	***Ms. Meriem Laghlimi***	Agronomic and Veterinary Institute, Morroco
Effect on growth and development of Eisenia foetida of a broad spectrum herbicide	***Ms. Laura García-España***	UPV, Spain
Phytoremediation of Lead and Cadmium in Spent Engine Oil Contaminated Medium using Plantlets and Seedlings of Nauclea diderrichii (De Wild. & T. Durand) Merrill	***Ms. Oluwayomi I. Bolanle-Ojo***	Forest Research Institute of Nigeria, Nigeria
Stabilization of bio-organic waste from farms by composting with rice straw	***Ms. Mª Desamparados Soriano***	UPV, Spain
Recuperation of acid saline soil by application of organic amendments	***Ms. Meththika Vithanage***	University of Sri Jayewardenepura, Sri Lanka
Photochemically-induced fluorescence and UV-VIS absorption determination of diuron, kinetic of photodegradation and rate of leach ability in soils.	***Mr. Dième Diégane Thiaré***	Université Cheikh Anta Diop, Senegal
Simulation of silver nanoparticles transport with runoff water and related erosion processes using LISEM and PestPost models	***Mr. Karrar N.M. Mahdi***	Wageningen University and Research, The Netherlands


Setting the thresholds for heavy metals based on their background & soil resilience
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Current hygienic state of agriculture
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MEETING ROOMS

Please see the map on page 30-31

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- Eighth Floor Bar (Eighth Floor, Building B)
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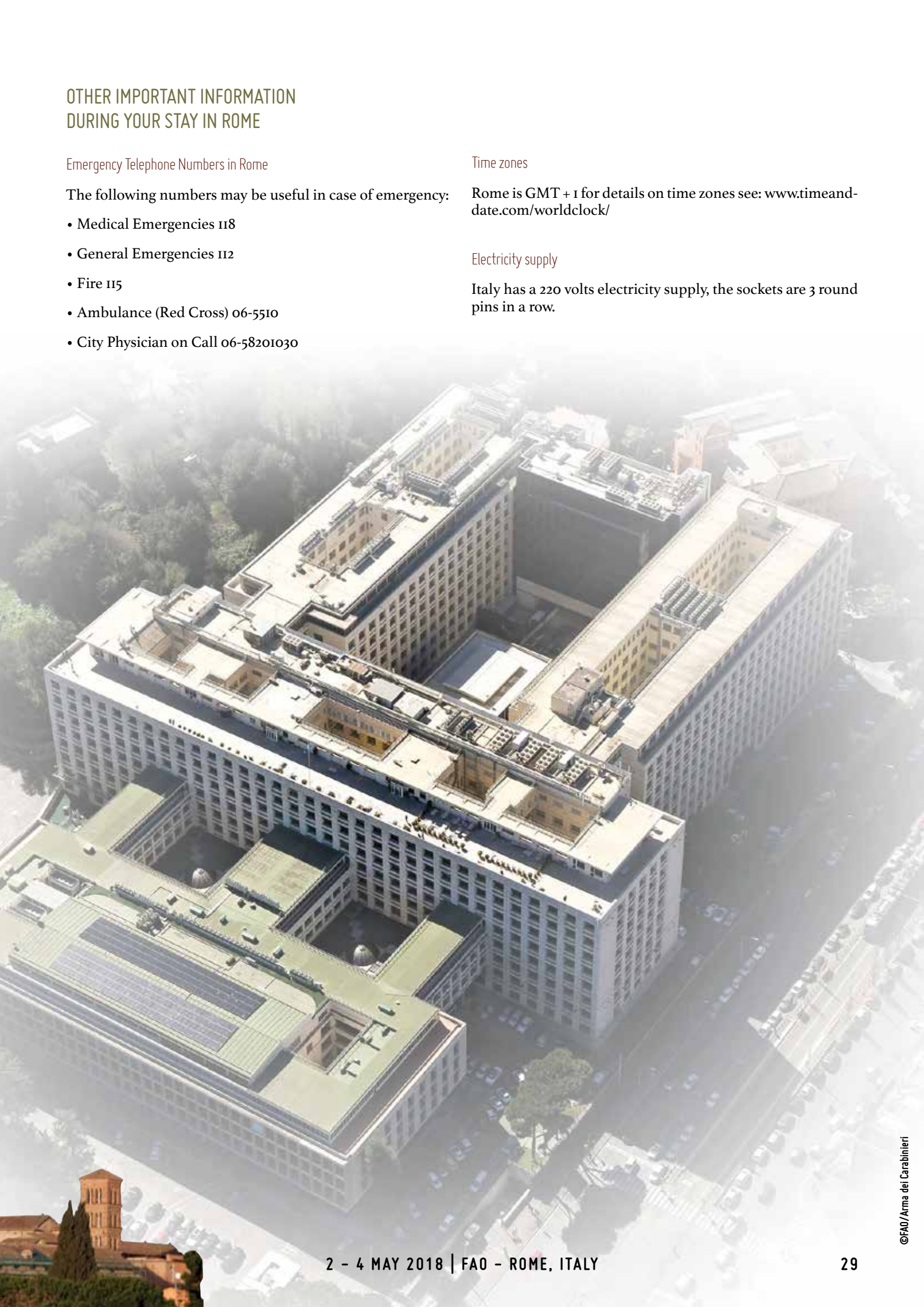

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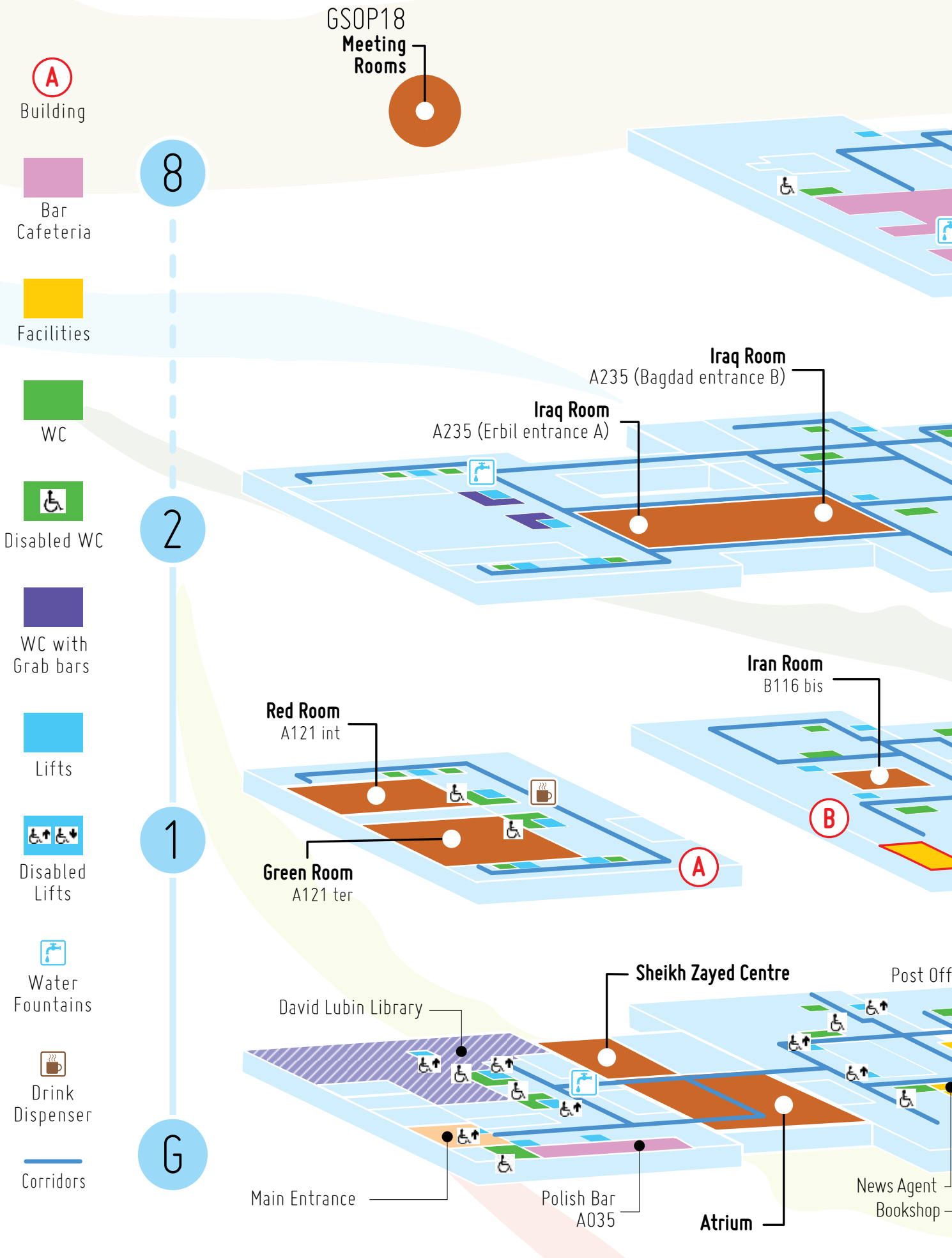
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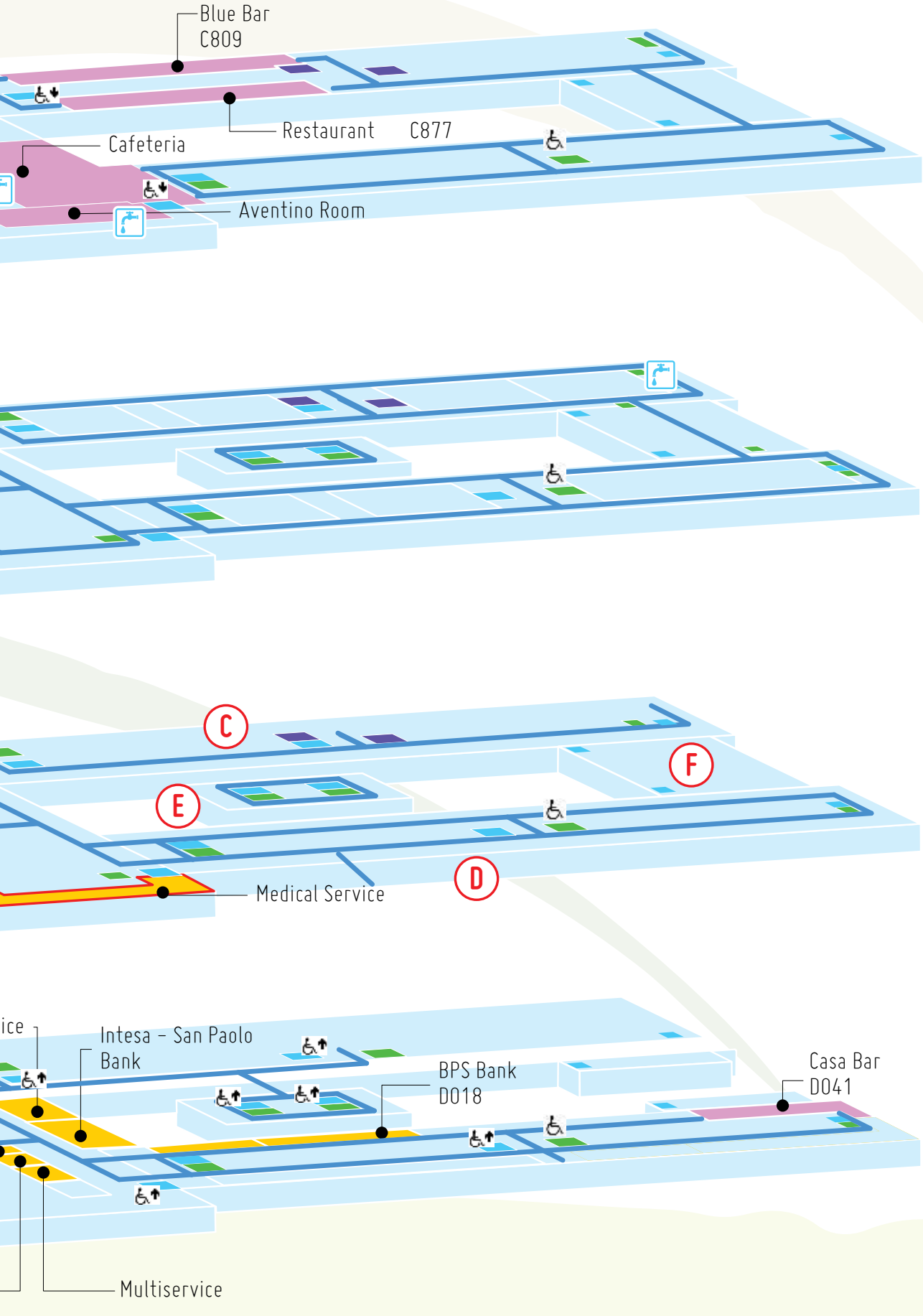
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