SINO–EU SOIL OBSERVATORY FOR INTELLIGENT LAND USE MANAGEMENT

SIEUSOIL

Newsletter #1

We are delighted to welcome you in our very first SIEUSOIL project newsletter! Get to know what this project is about and learn more on land degradation, soil sensors, precision agriculture and land suitability.

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GET TO KNOW SIEUSOIL

Land degradation is considered as a major global environmental issue of this century (Paolo D'Odorico, 2016). It is happening at an alarming pace, threatening food security and environmental quality. The effects of land and effectively soil degradation involve a complex interplay of environmental and socioeconomic–political factors acting at different spatial and temporal scales. Land resources (i.e. soil, water, and biodiversity) are largely determined by our management practices, governance systems, and environmental changes. Unsustainable farming practices contribute not only to soil degradation at a local level, but also to increased carbon emissions, reduced biodiversity, and diminished rainfall on regional and global scales.

SIEUSOIL aims to develop sustainable and holistic soil management practices based on a harmonised land information system suitable for diverse climate and operation conditions along different EU and China locations. SIEUSOIL will design, implement and test a shared China-EU Web Observatory platform that will provide Open Linked Data to monitor status and threats of soil and assist in decision making for sustainable support of agro- ecosystem functions, in view of the projected climate change. The Observatory platform will through customizable modules support the wise management of soil at field level and will provide showcase of good practices on soil management both for EU and China. The final target will be to support sustainable management of soil, increase land productivity sustainably, reduce crop yield variability across time and space, and support the policy formulation process. Innovative practices and tools will be tested in SIEUSOIL and their impact will be assessed for improved soil fertility and land suitability.

A consortium of 23 partners, 16 based in Europe and 7 in China, has launched this project to design, implement and test a shared China–EU Web Observatory platform that will provide Open Linked Data to monitor status and threats of soil and assist in decision making for sustainable support of agroecosystem functions, in view of the projected climate change.

Soil is the earth's fragile skin that anchors all life on Earth

Land degradation and its consequences

Land degradation is a process in which the value of the biophysical environment is affected by a combination of human-induced processes acting upon the land (Conacher, A.; Conacher, J., 1995). It is viewed as any change or disturbance to the land perceived to be deleterious or undesirable. Land degradation can take many forms, as it is caused by multiple forces, including extreme weather conditions particularly drought, and human activities that pollute or degrade the quality of soils and land utility negatively affecting food production, livelihoods, and the production and provision of other ecosystem goods and services.

As land is degraded a serious disruption of a healthy balance between five key ecosystem functions occurs. These are: food production; fibre provision; microclimate regulation; water retention; and carbon storage. Its impacts can be far-reaching, including loss of soil fertility, destruction of species habitat and biodiversity, soil erosion, and excessive nutrient runoff into lakes. Land degradation also has serious knock-on effects for humans, such as malnutrition, disease, forced migration, cultural damage, and even war. At its worst, land degradation can result in the desertification or abandonment of land (or both).

Over the last 50 years the two most significant direct causes of land degradation are the conversion of native vegetation into crop and grazing lands, and unsustainable land-management practices. Other factors include the effects of climate change and loss of land to urbanisation, infrastructure and mining.

However, the underlying driver of all these changes is rising per-capita demand from growing populations for protein, fibre and bioenergy. This in turn leads to more demand for land and further encroachment into areas with marginal soils.

According to a report (2018) of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), an independent intergovernmental body set up by UN member states, land degradation is harming the wellbeing of 3.2 billion people and the impact of its effects will only grow with time.

By 2050, the report states, humans will have transformed almost every part of the planet, apart from uninhabitable stretches such as deserts, mountains, tundra and polar regions.

Nonetheless land degradation is not an insurmountable problem. While no single approach can address every situation, many low-impact farming, pastoral forest management, and urban planning solutions do exist. Solutions are based on a mix of scientific, local, and indigenous knowledge, which is a useful resource for understanding how land threatened under modern management approaches can be handled more sustainably or even restored.

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Precision agriculture to increase soil productivity at reduced input and environmental footprints.

Precision agriculture uses a growing range of technologies and data to make farming, including plant nutrition, more efficient while increasing crop yields and quality.

Precision agriculture aims to optimize field-level management with regards to:

↦ crop science: by matching farming practices more closely to crop needs (e.g. fertilizer inputs);

↦ environmental protection: by reducing environmental risks and footprint of farming (e.g. limiting leaching of nitrogen);

↦ economics: by boosting competitiveness through more efficient practices (e.g. improved management of fertilizer usage and other inputs).

To this end some farmers use global positioning systems (GPS) and GPS-computer guided tractors and harvestors.

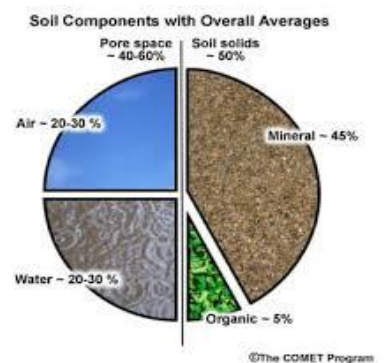Other geo-referenced site-specific practices may include:

- electromagnetic soil mapping
- soil sample collection
- crop yield data collection
- aerial imagery
- crop or soil color index maps
- soil types
- soil characteristics
- drainage level
- potential yields

What 's the big deal with soil?

Soil can be considered as the "living skin of Earth" (EEA, 2019). It is a complex, dynamic and living body, composed of mineral and organic components, as well as air and water. Mineral components consist of particles such as sand, silt and clay composed of different chemical components, while organic components derive from living organisms, including plants, bacteria, fungi, fauna and their residues.

Soils are important reservoirs of biodiversity. In fact, the diversity of soil life is often significantly higher than above the ground in the same site. The biodiversity of soil can include organisms ranging from microscopically small bacteria and nematodes, to springtails, mites, millipedes, earthworms, moles and mice.

Additionally, soil acts as a water filter and a growing medium; and is the basis of our nation's agroecosystems which provide us with feed, fiber, food and fuel.

Soil Components with Overall Averages
Pore space ~ 40-60% | Soil solids ~ 60%
Air ~ 20-30 %
Water ~ 20-30 %
Mineral ~ 45%
Organic ~ 5%
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> " To forget how to tend the soils is to forget ourselves.
>
> *Mahatma Gandhi* "

LATEST NEWS: Plenary Meeting in Budapest

The 3rd Project Meeting took place on the 21 and 22 November 2019 in Budapest. All project partners from Europe and China met to discuss about all the activities implemented within the first semester of the project implementation, review the project developments and plan the activities for the next semester.

The main issues presented and discussed were the progress on the Eurasian Soil Platform design and its elaboration, the processes for enabling environment and economic impact as well as findings on precision agriculture.

The next Project Meeting will take place on May in China.

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Upcoming Events

World Soil Date 5/12
Stop soil erosion, Save our future

World Soil Day 2019 (#WorldSoilDay) and its campaign "Stop soil erosion, Save our future" is envisaged to raise awareness on the importance of sustaining healthy ecosystems and human well-being by addressing the increasing challenges in soil management and, raise the profile of healthy soil by encouraging governments, organizations, communities and individuals around the world to engage in proactively improving soil health.

Global Symposium on Soil Biodiversity

The Food and Agriculture Organization of the UN (FAO) will convene the Global Symposium on Soil Biodiversity (GSOBI20) at its headquarters in Rome, Italy, from 10–12 March 2020.
The Symposium will bring together international experts with the aim of reviewing the status of knowledge on soil biodiversity and ecosystem services, the sustainable use and conservation of soil biodiversity, and the contributions of soil organisms to the SDGs.

Eurosoil 2020

Eurosoil is organised by the European Confederation of Soil Science Societies in Geneva, 24–28 August 2020. Its objective of Eurosoil 2020 is to bring together leading research scientists working on soil related topics and stakeholders dealing with issues of public concern, such as soil degradation and consequences of climatic changes.
The important bridging role of soil practitioners to translate scientific knowledge into practice will be emphasised during Eurosoil 2020.

Other events

- World Climate Summit, 9/12/2019, Madrid, Spain
  https://worldclimatesummit.org/

- GEO Data and Knowledge Week 2020, 17–22/2/2020, Beijing, China
  https://www.earthobservations.org/geodataweek20.php

- International Conference on Environmental Sciences, 23–26/3/2020, Plovdiv, Bulgaria
  https://www.geolinks.info/

project partners