

Summary and relevance of MEDAPHON project to the green week theme of resource efficiency

BACKGROUND

Resource efficiency means using the Earth's limited resources, such as metals, minerals, fuels, water, timber, air, and soil for our survival. The limited natural resources are essential for the well-functioning of the economy and for the good quality of our life. One of the main aims of the European Union's framework on reaching a resource-efficient Europe (Roadmap for a resource-efficient Europe 2011) is to „*manage our renewable resources (including ecosystems) to maximise the services they provide us and keep within the limits of the ecosystems that supply us with stable conditions for survival*”. Therefore it is inevitable to assess and monitor the health and quality of natural resources, such as the soil and to foresee if they are prone to degradation or to forecast if disadvantageous processes occur.

A “**good, healthy soil**” (fertile and highly productive) is balanced in nutrients, high in humus, has good structure, and contains a wide diversity of **soil organisms**. Soil organisms play fundamental roles (see details in e.g. <http://oregonfoodweb.com/soil-biology/in-depth.html>) in delivering key ecosystem goods and services of soils and are both directly and indirectly responsible for delivering many important soil functions such as soil organic matter (humus) formation (fertility and plant growth) via decomposition, realising nutrients from soil organic matter (productivity), forming and maintaining soil structure (water infiltration and retention), degradation of pollutants, pollination. Because organic matter of soils is one of the largest carbon pools, humus formation is extremely important to CO² sink. Soil organisms consist mainly of fungi, bacteria, earthworms, and various arthropods in ideal ratios. The good quality, healthy soil is as important and as valuable as clean air or clean water for a sustainable future economics (agriculture in particular).

Soil degradation, therefore, is a serious threat, which the European Union is facing. In addition, the level of threat is continuously increasing due to global warming, inappropriate land use (e.g. overgrazing, over-exploitation, over-irrigation, etc.) and river regulations.

However the knowledge on the functions performed by soil biota is still very limited. In order to preserve good quality, healthy soils whilst maintaining economic profit, experts need to

know when, where and how they should interfere in negative processes. For a successful interaction, it is necessary to have up-to-date, good quality data on large-scale. European Union (*6th Environment Action Programme's Thematic Strategy for Soil*) and national environmental policies for soil protection need precise and accurate data on field or landscape level to monitor environmental status and performance. For example, mapping polluted areas, or following changes in soil quality are main tasks in environmental protection. However, recently there is not any cost-effective and reliable method for assessing soil quality (health and biological activity) on large scale. None of the methods used today is able to provide such set of data because they are whether time-consuming, expensive or unreliable.

MEDAPHON'S AIM AND EDAPHOLOG'S IMPORTANCE

The aim of the **MEDAPHON LIFE** programme is to build and test the prototype of a new soil environmental monitoring tool, called **EDAPHOLOG System**. **EDAPHOLOG System** will be constructed for measuring parameters of the soil biota to assess primarily soil biological and microbiological activity, soil ecological degradation and soil biodiversity from field to landscape level. Data from **EDAPHOLOG System** help land users from agriculture to urban development to use and manage soil efficiently, which means to maximise efficiently and sustainably services provided by the soil ecosystem. Through this technological advance monitoring and spatial delineation of soil biological degradation and contamination, ecological control of agricultural land-use practice, or detection of soil biodiversity hot spots will become feasible in such extent that is unavailable at present. **EDAPHOLOG System** will make possible to prepare very detailed and large-scale mapping of soil quality in a very cost-efficient, fast way. In addition, therefore, detailed and large scale long-term monitoring of soils can be implemented – a need that has not yet been satisfied anywhere in the world.

The **EDAPHOLOG System** covers the whole methodological process of the biological monitoring of soils: sampling (automatic abundance and individual body-mass estimation of soil mesofauna, automatic detection and estimation of the activity of the microorganisms, automatic measurements of soil moisture, temperature, etc.), data collecting and handling, data evaluation, data publication. It is composed of an **innovative sampling tool** designed to spatially and temporally sequential sampling schemes and a **novel detecting system** consisting of different electronic detecting sensors, an **own logging system** for GSM remote data-transmitting and data storage and an applied evaluation procedure for estimating **soil biological activity, ecological state and soil biodiversity**.

For **resource-efficiency**, **EDAPHOLOG System** will be able to help in realizing the best possible sustainable use of fertile soils. This can aid in achieving maximum economic output with minimal environmental impact by providing a cost-efficient way of soil environmental monitoring (soil health and quality in particular).

MOMENTS FROM GREEN WEEK

