Ecological Function and Biodiversity Indicators in European Soils

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Soils provide numerous essential ecosystem services such as: primary production (including agricultural and forestry products); regulation of biogeochemical cycles (with consequences for the climate); water filtration; resistance to diseases and pests; and regulation of above-ground biodiversity.

The European Commission aims to define a policy for the sustainable management of soils with a view to adopting a legally binding Soil Framework Directive. Scientific and technological knowledge on soil biodiversity and functioning is required to reach this goal.

Soils host a huge biodiversity (microbes and fauna) of which our understanding remains very limited due to the small size of the soilborne organisms; their immense diversity; the difficulty in isolating them; and the great heterogeneity of their habitats.

The EU FP7 project EcoFINDERS (**Eco**logical **F**unction and Biodiversity **Ind**icators in **E**u**r**opean **S**oils) (project period 2011-2014) will result in:

- increased knowledge of soil biodiversity and its role in ecosystem services
- standardization of methods and operating procedures for characterizing soil biodiversity and functioning, and the development of bioindicators
- assessment of the added value brought by cost-effective bioindicators, and of cost effectiveness of alternative ecosystem service maintenance policies.

The soil biodiversity studied includes microbes (archaea, bacteria, fungi) and fauna (protozoa, microarthropods, nematodes, oligochaeta), and their relation with above-ground biodiversity.

The corresponding research combines three approaches:

- description of soil biodiversity and of the relations between soil biodiversity, soil functions and ecosystem services, in long term observatories representative of soil types, climates and land uses across Europe,
- experiments to test the biodiversity patterns and bioindicators identified, and hypotheses related to connections between soil biodiversity and functions,
- metadata analyses to raise a biodiversity database at the European level,
- modeling to decipher relations between soil biodiversity and functions,
- putting a value on ecosystem services.