Project SOILPRO

Monitoring for soil protection

soil degradation | desertification | forest fires | loss of organic matter | hydrogeological risk | sviluppo rurale

PROJECT DESCRIPTION

The **SOILPRO** Project was born with the ambitious goal of halting soil degradation in line with the EU's *Thematic Strategy for Soil Protection* (COM (2006) 231). This purpose was pursued by encouraging cooperation, in an international context, between local and regional authorities and research centers involved in the project for the development and application of monitoring methods and spatial management of degradation risks based on innovative web-GIS techniques and on environmental modeling. In most EU Member States the responsible bodies for the soil protection policy are the local and regional authorities, who are thus involved also in developing new methods and specific measures. A mechanism based on the knowledge of historical data, combined with a monitoring system based on remote sensing and GIS can be a valid aid in assessing the risk of soil degradation and in the development of adequate protection measures.

OBJECTIVES

The project aimed to achieve the following specific objectives:

- **develop** a Soil Monitoring Software (SMS) consisting of a web-GIS application to support local and regional authorities in monitoring soil degradation risks, identifying areas at risk and assessing the effectiveness of the adopted protection measures;
- **increase** the capacity of local, regional and other stakeholders to monitor and protect the soil;
- **increase** collective awareness of the risks associated with soil degradation and promote best practices on effective protection actions implemented in areas at risk of degradation identified with SMS.

The **software** was implemented and tested in the two pilot areas of the project, South-Western Sicily (Italy) and Corinth, Peloponnese (Greece), with the ultimate goal of being applied in the future also in other Mediterranean regions.

PROJECT PHASES

The main project phases were three:

- **development** of the SMS based on the modeling indicated by the Research Center for Agrobiology and Pedology of Florence, Council for Research and Experimentation (CRA-ABP) and its application in the pilot areas of Sicily and the Peloponnese. In this first phase the areas at risk of degradation were also identified where the soil protection measures could be implemented and training activities for potential users could be started;
- **application** of the protection measures promoted by the project in the two pilot areas;
- **monitoring,** through SMS, of the protection measures promoted in the two project areas to assess their effectiveness.

PROJECT RESULTS

The heart of the initiative was the development of the ***web-GIS SoilPro-SMS*** based on soil degradation risk monitoring models with which it is possible to archive and display, in cartographic form, both raster (digital) and vector (geometric) data. The SMS is based on the GRASS (Geographic Resources Analysis Support System) and has the function to manage the archived data, in particular, the raster calculations necessary for the activation of models for soil degradation risks monitoring.
The developed software allows to locate the most appropriate monitoring network for each risk via the web and to insert data from monitoring findings into its nodes. **The implemented models also allow to evaluate future scenarios on the state of the soil** based on different hypotheses of change of the dynamic variables, consisting essentially of anthropic and climatic action. The degradation processes that can be monitored are erosion, degradation of organic matter, salinization, compaction, drought, aridity, landslides. Thanks to the identification of specific risk areas, for each degradation process special soil protection measures can be developed, that can be included in regional and local policy plans.

The outputs of the first project phase were:

- **two databases**, developed by CRA-ABP and a project partner, the University of Athens (EKPA), collecting **information on the soil** and other related elements, both in Sicily and in the Peloponnese. The databases were subsequently used in the SMS to produce kind of "snapshots" of the land conditions before the application of the soil protection measures in the risk areas of the two regions;
- a **Manual on the use and application of the web-GIS SoilPro-SMS**, complete with all the operating procedures and aimed at the application of the SMS even in EU regions different from the pilot areas of the project;
- an ***e-learning platform*** with courses in English, Italian and Greek, having the objectives of encouraging the use of the web-GIS SoilPro-SMS through demonstration videos on its operation and examples of application of models with pre-loaded test data. Thanks to the course, users can adapt the use of the SMS to their needs and their information background; can train themselves controllare ITA on the theory and the adopted scientific methodology, namely that of *Risk Area Identification (RAI) controllare ITA e ENG;* and can gain deep understanding of the importance of soil protection through examples of best practices on soil management and conservation.

Subsequently, thanks to the application of the web-GIS SoilPro-SMS and, in particular, of the RAI methodology:

- **areas at risk of soil degradation of different risk categories and forms were identified** in Sicily and the Peloponnese. For Sicily the "**Card of soil erosion risks**" was drawn up (officially approved by the Region of Sicily with decree n. 1835 of 22 December 2011), while for the Peloponnese "**Soil erosion and soil salinization risk maps**" were produced.

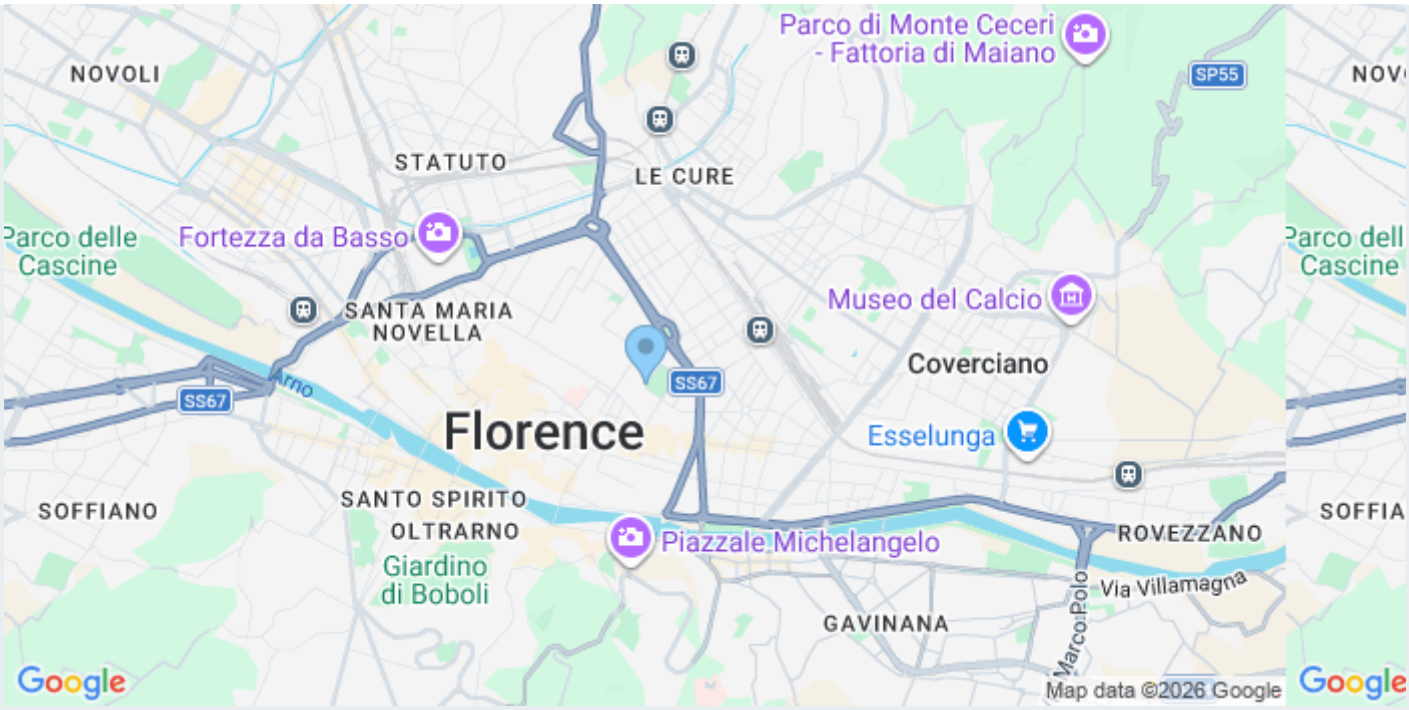
- **soil protection measures** have been developed **for the areas at risk** of the two pilot areas then included in the regional legislation (specifically in the Rural Development Plans - RDP, financed by the European Agricultural Fund for Rural Development - EAFRD); in particular, for Sicily the "Card of soil erosion risks" was used to elaborate two new RDP 2007-2013 measures: **Measure 214/1G** *"Contrast to the phenomena of hydrogeological instability and recovery of the traditional agricultural landscape"*, elaborated for the territory of Messina (deeply affected by the risk of soil erosion and hydrogeological instability) and **Measure 216, Action A2** *"Non-productive investments in agricultural holdings associated with Measure 214 - action 1G"* - included in the Program in June 2012 following a public consultation involving more than 1.500 farmers. These measures were then **applied in the areas at risk in Sicily** and they decisively supported about **1.650 between agricultural and livestock companies** that have undertaken to carry out their activities with respect for the environment and the landscape by adopting more sustainable agricultural management methods, aimed essentially at countering water-caused soil erosion, and favoring the conservation and possible increase of organic matter. For the Peloponnese **9 protection measures** promoted by the project have been approved, one of which has been successfully **applied** in the forest areas of the region damaged by fire.
- it was possible to **estimate**, thanks to the periodic sampling of soil (5 monitoring campaigns carried out, 2 in Sicily and 3 in the Peloponnese with 22 sites monitored in the first case and 57 in the second), the **environmental benefits** of the protection measures applied in the pilot areas as well as to identify the best conservation practices that have formed the basis for the preparation **of two final soil monitoring reports**, one for each region. For Sicily it was estimated that, thanks to Measure 214/1G of the 2007-2013 RDP promoted by the project, there was a reduction in soil erosion of about 1.500 tons/year. Two **Manuals of best practices against soil degradation processes** were also produced. The one prepared by the Region of Sicily, in collaboration with the University of Palermo, is available both in Italian and in English; the one produced by the Peloponnese Region is available only in Greek.

Thanks to the SOILPRO project, the Department of Agriculture, Rural Development and Mediterranean Fishing of the Region of Sicily has been able to improve the approach concerning the implementation of measures for soil protection already present in the 2007-2013 programming and has acquired the know-how and capacity to provide a scientific basis for the new measures

foreseen in the RDP 2014-2020 Sicily.

In particular, 3 of them, included in the "Payments for agro-climatic-environmental commitments", make explicit reference to the SOILPRO project: "Management methods of eco-sustainable companies", "Management of terraced areas for the protection of landscape and contrast to erosion and hydrogeological instability "(which represents the extension to the entire Sicilian territory of the measures 214/1G and 216/1A of the RDP 2007-2013), and “Adoption of conservation agriculture techniques" (a measure so far never adopted in Sicily - consisting of a set of complementary agricultural practices, including no-till farming - thanks to which it is expected an environmental benefit related to the storage of an estimated 840 thousand tons of organic carbon in the Sicilian agricultural soils in the 2014-2020 period, with a spin-off effect for the climate change mitigation).

Finally, as a parallel result of the LIFE SOILPRO and SOILCONSWEB projects, the issue of soil protection was included in a recent Italian legislative proposal.



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Acronym
SOILPRO

Number of reference
LIFE08 ENV/IT/000428

Reference Programme
LIFE

Beneficiary Coordinator
Centro di Ricerca per l’Agrobiologia e la Pedologia di Firenze, Consiglio per la Ricerca e la Sperimentazione (CRA-ABP)

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722.583,00

Call Year
2008

Start Year
2010

End Year
2014

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Region
Toscana

Description

Sicilia (Italia) e Peloponneso (Grecia)