

ACTIVITIES OF THE EUROPEAN TOPIC CENTRE ON SOILS: THE SPANISH INFORMATION SYSTEM ON SOILS

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Abstract

Within the general activities of the ETC on soils one of the tasks is the development of the Spanish Information System on Soils. This activity is being developed under the agreement between the Spanish Ministry of Environment (MIMAM) and the Spanish High Council for Research (CSIC). This presentation focuses on the development of a database on soil hydraulic properties within the framework of the mentioned agreement MIMAM-CSIC. The database try to compile all existing data of hydraulic properties of the spanish soils. For the development of such a database we have taken into account the existing database of hydraulic properties of european soils (HYPRES) in which the IRNAS (CSIC) of Seville was a contributor. The spanish database on soil hydraulic properties includes detailed references of other soil properties, and the temporal variability of hydraulic properties due to the different soil use and management. This database can be an useful tool in the study of desertification processes, erosion and transport of contaminant.

1. Activities of the European Topic Centre (ETC) on Soil

The main tasks of the ETC on Soil during 1999 are the following:

Task 1. ETC management and co-ordination

Task 2. The soil aspects of European Environment Information and Observation Network (EIONET)

Task 3. Ad hoc technical support to the European Environment Agency (EEA)

Task 4. Proposal for an European soil assessment and monitoring framework

Task 5. Methodologies for inventories of contaminated sites

Task 6. Information and reporting on environmental issues related to soil

The main products for 1999 will be:

- Environmental signals report: DPSIR (Driving force, Pressure, State, Impact and Response) framework and indicators
- EIONET workshop proceedings
- Proposal for an European assessment and monitoring framework
- Boreal soils report
- Web site, CIRCLE IG, newsletter
- Technical workshop proceedings

2. The MIMAM (Spanish Ministry of Environment) – CSIC (Spanish High Council for Research) Agreement as a task for the ETC on Soil

This agreement covers the period 1998-2000 with a budget of approximately 750000 Euro. The main tasks of this project are the following:

A. Soil Information System: Design and development

B. Soil Degradation: Erosion model

C. Contaminated Sites: Guideline

This project for the spanish case can be considered as a pilot project that can serve as an example to be extended to the other european countries.

The task A includes the following information levels:

- Information level 1: First approach to the soils
- Information level 2: Maps of the region soils
- Information level 3: Soil databases of soils on-line

Within the Information level 3, we are developing a detailed database of soil hydraulic properties for Spain. In a second step it is planned to extend this database to the rest of European countries participating in the ETC.

3. Database of soil hydraulic properties

3.1. General remarks

The protection of land resources is of prime importance in many regions of the world. The effects of agricultural and climate changes on the degradation of land resources are characterised not only by long-term perspectives, but also by large geographic areas impacted. The protection of these resources, mainly soil and water, depends on the correct prediction of such effects.

Presently, there is no reliable framework in the Mediterranean region for the protection of soil and water resources from erosion processes and contamination by agrochemical compounds. In spatial and temporal terms, the modelling of erosion processes and water and solute movement in the soil is relatively well advanced at local scale, but extrapolation to a regional scale is still a major priority. This extrapolation can be made i) by scaling-up techniques, developing a linkage between the controlling variables included in the erosion and or contamination process models and information contained in spatial databases; or ii) by land evaluation techniques, combining expert knowledge on these processes and spatial database information.

At the same time, the increase of process modelling of soil erosion, water and solute transport in the soil, and the use of expert systems has imposed a demand of accurate measurements of hydraulic properties of soils. For given climatic conditions and soil type, tillage methods and irrigation practices are the main factors that can alter the soil structure of top layers and consequently the hydraulic properties (Messing and Jarvis, 1993; Somaratne and Smettem, 1993; Moreno et al., 1997). For cultivated soils, the transport properties of the soil surface can change during the growing season (Angulo-Jaramillo, et al., 1997). However, in modelling the processes mentioned above, it is usually assumed that the characteristics of the soil remain temporally without changes.

Although increasing consideration is being given to agricultural diversification and to lower input agriculture, it is still important to identify optimum land use systems for resource sustainability and environmental quality. Land evaluation makes it possible to use according to its potential. During the last few years, increasing application of information technology to land evaluation procedures has led to the development of land evaluation information systems. The MicroLEIS system developed by De la Rosa et al. (1992) is a good example of such systems. MicroLEIS represents an interactive and user-friendly system for optimal allocation of land use and management systems under Mediterranean agro-forestry conditions.

Land evaluation procedures, as defined by FAO (1976, 1983), have been applied to provide a rational basis for making land use decisions based on relations between land use and land qualities (Davidson et al., 1994). However, these production-oriented applications can also be focused on land degradation or vulnerability predictions (De la Rosa et al., 1995). In this sense, it is interesting to test the applicability of the land evaluation techniques for predicting land vulnerability risk. The fundamental purpose of land evaluation is to predict the positive or negative consequences of change. Hydrological changes in Mediterranean regions, produced by extensification / intensification character of agricultural systems and by periods of drought, will have important effects on the behaviour of land degradation processes. Simulation models and land evaluation expert systems can be useful prediction techniques if we can improve the databases, particularly those referring to soil hydraulic properties, and the integration of different soil databases.

3.2. The basic framework of the database

The database is written in C language and use tables of dbase IV. The database includes the following sheets:

Principal menu (content, search, soil layer generator, graphic presentation, ...)

Site description:

page 1 (location, co-ordinates, topography, land use,...)

page 2 (parent material, erosion, drainage, water table depth,....)

page 3 (photographs)

Horizons (description of the horizons)

Standard analytical data (depth of the horizon, chemical properties, texture,)

Soluble salts data

General physical data (bulk density, particle density, total porosity,)

Water retention (soil water content at different suctions)

Unsaturated hydraulic conductivity (hydraulic conductivity at several water contents)

In all sheets are referenced the methods used in the determination of the different parameters.

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