

Soil - Background information

Basic Principles

History of the development of the Soil Map of the EC

For many years, agronomical research was organised by DG VI in different Programme Committees with precise objectives, co-ordinated by the Permanent Committee of Agronomical Research (PCAR). The Programme Committee for Soil Science first was called "Land Use" and later became "Land and Water Use and Management". Between 1972 and 1985 it worked successively on the following points: 1. Inquiries in EC countries to define the main problems affecting land management; 2. Drafting of the EC Soil Map (scale 1: 1 000 000); 3. Organisation of "Workshops" where soil conservation took an increasingly important place; 4. Introduction of computerisation in data processing; 5. Research into land evaluation, land degradation and conservation.

Before dealing with the European Soil Geographic Database, a short historical description of the soil mapping effort is needed, the present 1: 1 000 000 scale EC Soil Map being the fruit of more than 30 years work.

1952 Studies are made of the different Soil classification systems in Europe, with a view to eventual harmonisation and common work.

1965 The first result was the publication of the FAO soil Map of Europe at scale 1: 2 500 000

1970s Work started under the auspices of FAO on the Soil Map of Europe at scale 1: 1 000 000. The legend was designed at the same time as that of the World Soil Map at scale 1: 5 000 000, which was published in 1975.

1974 Because of financial problems, the work was stopped by FAO and the map has never been published. However, the archives were stored until now.

1978 The CEC (DG VI) decided, with agreement of the FAO, to revive the work for the countries of the European Communities.

1985 Publication of the present Soil map of the EC at scale 1: 1 000 000. In 1986, the territories of Austria and Switzerland were added to the map at the initiative of Unesco and the International Soil Science Society. The CORINE programme resulted in the computerisation of the EC Soil Map in 1986, constituting the first spatialised soil database (Version 1.0). This work consisted in digitising contours and indicating, for each polygon, the number of the corresponding soil association and the nature of the possible phase. No more data were used than were drawn on the map.

Development of the database since 1989

To provide satisfactory answers to the problems as stated the database had to be improved. A ready source of additional data could be found in the archives (Table 1), stored at Ghent University (Belgium), which had not been used because of map harmonisation. Data on parent material and percentage of land-use were among the new attributes introduced, leading to an improved Version 2.0 of the soil database, whose main attributes were : FAO Soil Name; Topsoil texture class (1: coarse to 5: Very Fine); Slope (a: Level to d: Steep); Phase, Parent Material, Land Use; Surface percentage of STU in SMU.

Table 1: Example of the data available in the FAO archives

EC Soil Mapping Unit Number	Soil Typological Unit (FAO)	Composition (%)	Texture	Slope	Phase	Elevation (m)	Parent Material	Land Use
420	D-Bd	90						
	I	5	2	c	Stony lithic	300-600	Residual stony loam from schists	Forest, pasture, arable land
	Bgg	5						
57	Lgs	75						
	Lo	10	4	c	Stony lithic	250-400	Residual loamy clay of marl	Arable land, pasture, forest
	Be	10						
	I, Ge	5						
58	Qi	80						
	Lo	10	1	c	Stony lithic	300-450	Residual sand of sandstone	Forest, arable land
	Ph	10						
8	Lo	75	2	c	Stony	250-380	Residual stony loam	Pasture arable land
	Be	25	2	c				

The geographical database consists of three geographical "objects" : 1. Mapping polygons that show the geometry of soil units; 2. Soil Mapping Units (SMU) that contain polygons of the same soil type; 3. Soil Typological Units (STU) formed by the main soil types contained in the SMUs. SMUs and STUs are respectively described in two tables, showing horizontally the list of units and in columns the attributes describing such units.

The database as described above and managed by a Geographic Information System, was progressively created by a Support Group of the CEC called "Soil and GIS", organised by the MARS project. The participants were experts of different EC countries and the main objectives were :

- Selection of pedological factors that interfere with spatial and temporal yields variations.
- Discussion about the suitability of models in relation with data precision.

- Proposals for further work to complete the available information from soil maps and associated databases (new "attributes").

The database has been improved by adding new attributes that enable a better characterisation of the Mapping and the Typological Units (Version 3.0). These new attributes are:

- Depth to textural change (classes from 1: 20/40 cm, to 5: No change)
- Subsurface textural class (classes from 1: Coarse, to 5: Very Fine)
- Obstacle to roots (classes from 1: no obstacle, to 4: between 20 and 40 cm)
- Presence of an impermeable layer (classes from 1: absent, to 4: within 40 cm)
- Water regime (classes from Dry to Very Wet (10))
- Water management (10).

Main characteristics

Version 2.0 of the soil database is now available through GISCO. Additional information on the EC soil database, its concepts, development and perspectives can be found in the following publications:

- Buriel A. & King D., The soils database of the European Union, EUROCATO XI, Conference Proceedings, Swedish Cartographic Society, Gavle, December 1993
- Jamagne M., King D., Le Bas C., Daroussin J., Buriel A. & Vossen P., Creation and use of a European Soil Geographic Database, The International Society of Soil Science and The Mexican Society of Soil Science, 1994
- King D., Daroussin J. & Jamagne M., Proposal for a Spatial Organization Model in Soil Science (The Example of the European Communities Soil Map), Journal of the American Society for Information Science, 45(9), pp. 705 - 717, 1994
- King D., Daroussin J., & Tavernier R., Development of a soil geographic database from the Soil Map of the European Communities, Catena 21, pp 37 - 56, 1994