



An intimate understanding of the physical make-up of the territory and subsoil is vital to our survival; that of our towns and cities, our business and industry and all the other forms of organized living within our ecosystems.

In every country, hence even more so in a densely populated one like Italy, this understanding is a fundamental pre-requisite to any form of land use management: it allows us to prevent or at least mitigate natural hazards and to use natural resources efficiently and responsibly. It is becoming increasingly evident that these resources, namely water, the soil, raw materials and energy sources are finite and precious; consequently their use must be governed by stringent criteria of sustainability.

The work carried out in recent years by Emilia-Romagna Region, thanks also to the painstaking efforts of the Geological Seismic and Soil Survey, allows us to tackle difficult issues like redressing the geo-environmental balance and that of sustainable development, spurred on by our awareness of the fact that the territory, in the sense of the physical land, is infrastructure's very own infrastructure.

Emilia-Romagna Region aims to share this wealth of information with the population at large, in order to create a culture founded on a notion of the environment as our collective heritage.

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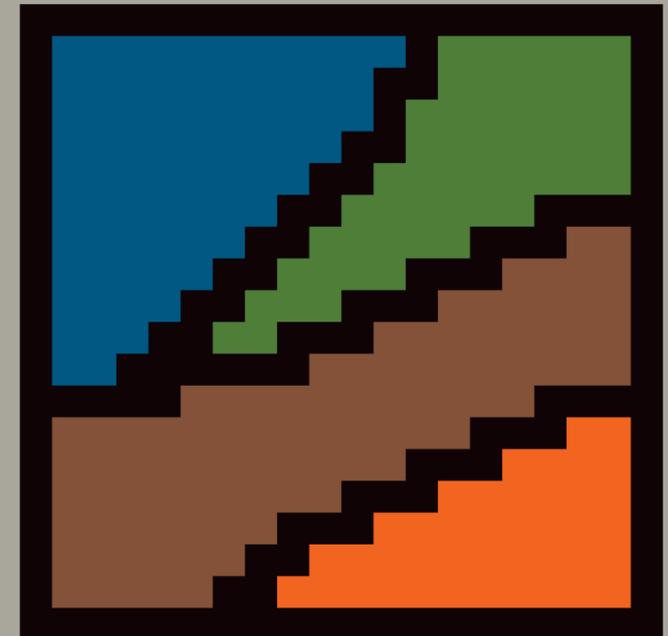
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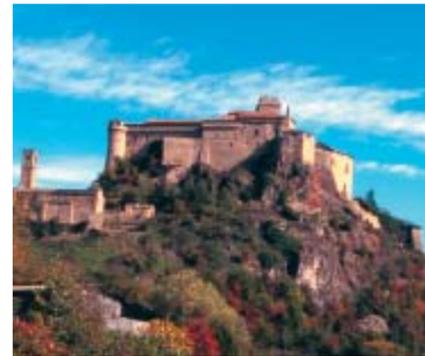
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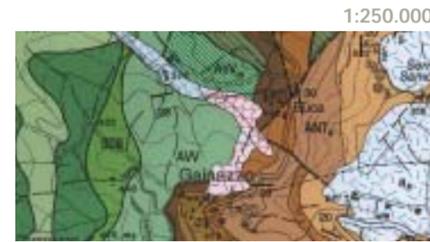
geological research and cartography

The geological structure of Emilia-Romagna is among the most complex in the world and for approximately 25 years has been studied in depth by the Geological, Seismic and Soil Survey (SGSS). Involving 50 young geologists, 7 universities and 2 institutes of Italy's National Research Council, the study began with the geo-



logical survey of the **hill and mountain areas** at 1:10.000 and proceeded with the survey of the plain at 1:25.000. The Emilia-Romagna Apennines are documented in 360 maps, (160 in print), whose content constitutes the **geological database to scale 1:10.000**. As part of the National Geological Cartography Project (CARG project) maps to scale 1:25.000 and 1:50.000 have been compiled, in addition to the CARG 1:25.000 database (all available by 2005). Approximately 80% of the **plain** has already been surveyed and the cartography for this area represents a pioneering technical-scientific document. Specific geognostic and archaeological databases have also been created to support mapping. Armed with this enormous mass of information, the SGSS has devel-

Emilia-Romagna has one of the most complex geological structures in the world, we've been working to get to know it for over 25 years

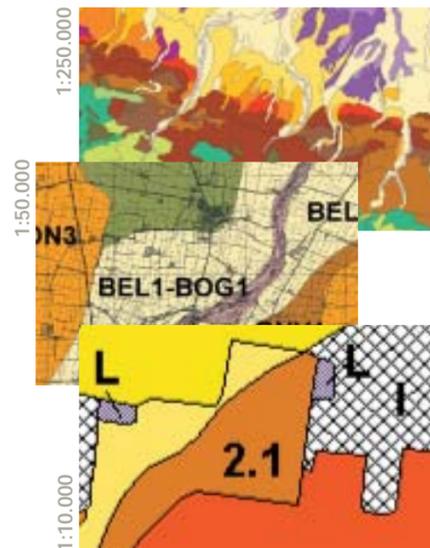


oped numerous applied research projects: landslide analysis (to scales 1:10.000 and 1:25.000); a map of Italian landslides (IFFI project); a landslide hazard map for civil protection purposes (scales 1:25.000 and 1:250.000), a Master Plan on Geo-environmental hazards (to scale 1:250.000), seismic micro-zonation and recent studies for the identification of materials for extraction purposes.

soils

The soil is a precious and largely non-renewable resource that is increasingly under pressure. It therefore needs to be protected, a fact acknowledged at European Union (179 COM 2002) and global level. In 1975 Emilia-Romagna regional authority launched a **soil survey campaign** covering the entire region with three levels of mapping: 1:250.000, 1:50.000 and 1:10.000 (the most detailed mapping for agricultural areas and conurbations). Maps are available both in printed and digital form and may be con-

sulted on the SGSS web site. On the website <http://www.gias.net> visitors can access descriptions of the main soil types of the Emilia-Romagna plain, their agronomic behaviour and some considerations on their agricultural use. As well as constantly updating these soil maps, the SGSS remit extends to several other activities, including: the National Pedological Map (1:250.000); the integration, at European and national level, of soil mapping survey methods and information systems definition criteria; the development of tools for analysis and forecast of soil erosion in hill and mountain areas; the definition of ground water resources and collaboration with other regions in activities coordinated by the European Soil Bureau (USB-JRC) aimed at harmonizing European pedological data.



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seismic risk

Compared to the Italian situation overall, Emilia-Romagna is affected by "average" seismicity, largely concentrated in Romagna where, in the past, the biggest earthquakes have occurred. One of the main duties of the SGSS, and one that is indispensable for proper land planning and management, is the development of specific analyses and methodologies to support seismic risk reduction measures. In order to put in place an effective prevention plan for any

the Geological, Seismic and Soil Survey strives to reduce seismic hazard

given area, one must first have detailed knowledge of all levels of interaction between **earthquake, soil and buildings**. SGSS thus focuses on the seismic hazards of the region, studying local effects and seismic microzonation; it and evaluates the vulnerability of buildings and infrastructure, working closely with a technical-scientific committee. In addition, the SGSS is also committed to a number of other projects, including: the "Seismotectonic map of Emilia-Romagna region" (scale 1:250.000); the implementation in Emilia-Romagna, in collaboration with the National Seismic Survey unit, of the National Accelerometric Network and that of the "Osservatorio Sismico delle Strutture", the seismic monitoring unit for structures. In addi-



tion, SGSS is involved in developing the regional evaluation centre for technical activities during seismic emergencies. Lastly, it also carried out various other training and instructive activities, using the Internet among other tools, for public administration technicians, professionals, agencies and the public at large.

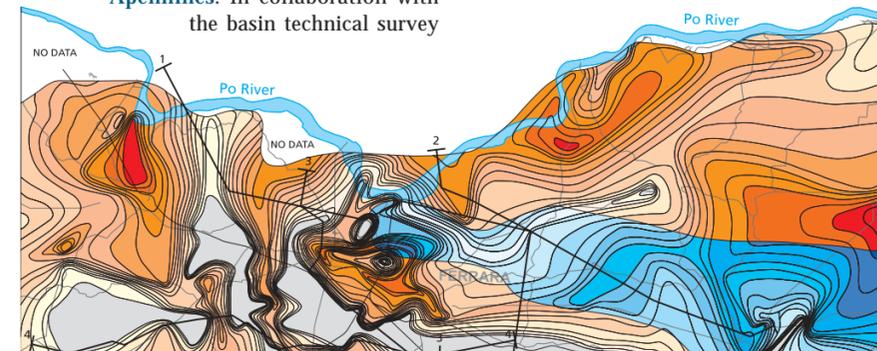
water resources



The rich water resources of Emilia-Romagna, consisting of surface and groundwater, represent an irreplaceable heritage. Correct management of these resources is one of the region's top priorities, and the SGSS plays its part by providing the knowledge base pertaining to the distribution and classification of aquifers. The geological data collected by SGSS has made it possible, first of all, to create a new 3-D model of the aquifers of the **Emilia-Romagna plain**. Based on this, numerous projects have been launched in partnership with both public and private bodies, including: the study of the alluvial fans of the Reno, Marecchia and

Taro rivers; the identification of alternative water resources; the study of the saline wedge

and monitoring of plain area subsurface aquifers (unconfined aquifers) from which plant roots draw water. For the first time at regional level, a framework has been established for the distribution of the main exploited aquifers in the **Emilia-Romagna Apennines**. In collaboration with the basin technical survey



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(Servizi Tecnici di Bacino), a regional census of springs has been set in motion to determine their distribution, as well as flow and water characteristics. The first results of this census, which will build up a database on the region's springs, have made it possible to compile detailed thematic maps for the identification and study of rock-reservoirs.

the coastal system

The coastal area is of strategic importance for Emilia Romagna, since it is home to one of the country's best developed tourist industries, not to mention many other industrial activities. The enormous pressure to which this physical system is subjected has exacerbated natural phenomena such as subsidence, erosion of beaches and flooding during stormy seas, endangering both residential and industrial areas. **Coastal defence** is one of Emilia-Romagna region's top priorities. In order to create a support tool for integrated management of coastal defence systems, the SGSS has collected all



data pertaining to the coastal area in a Geographic Information System, connected to a database that will be constantly updated and available on-line for all interested technical surveys. In collaboration with both public bodies and research institutes, the SGSS has also launched numerous projects, including: an analysis of historical evolu-

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tion of morphologies and the use of coastal land; a study of the impact of climatic changes; an experimental morphodynamic map; a geo-referenced catalogue of coastal defence systems and an experimental classification of coastal areas under threat from natural hazards. Moreover, in conjunction with the Cartographic Institute of Catalonia, remote sensing of the coastal area is being carried out using the "Lidar" system in order to create a high resolution Digital Terrain Model (DTM).

scientific information

To meet the growing demand from the public for information on geo-environmental matters, the SGSS has launched a comprehensive information plan to share the knowledge base it has built up in the field of Earth Sciences. The aim is to heighten society's awareness of the environment as a common heritage, to guide management choices and individual behaviour towards sustainable development of the land. The SGSS is committed to an information campaign, for both public administration technicians and professionals, on the use of geological and soil maps, thematic maps derived from these and their applications. The SGSS organizes numerous conferences and seminars which provide the public administration and



research bodies with a forum for comparison and discussion on Earth Science related matters, both at national and international level. The "European Congress on Geoscientific Cartography and Information Systems", organized in partnership with the Geological Surveys of Bavaria and Catalonia, has now reached its fifth edition and become an established international meeting. The SGSS strives to educate the public at large through its website and several other media, including: maps of geological-environmental itineraries, documen-

tary videocassettes on the soil and landslides and an educational CD called "Planet Earth". Other projects include a census of the geological patrimony, the creation of special trails aimed at educating the public on the most interesting geological aspects of Emilia-Romagna, and the publication of a series of books entitled "Water and Earth (Acqua e Terra)", on the main geo-environmental themes, plus a series of information leaflets on the work of the SGSS.



knowledge of the territory is OUR common heritage

[\[www.regione.emilia-romagna.it/geologia\]](http://www.regione.emilia-romagna.it/geologia)

