



Development of a geologic information system useful for urban planning and risk management: El Papiol case study (Barcelona Metropolitan Area)

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Studying urban geology is a key way to explore municipal issues involved with urban expansion, resource allocation, and hazard awareness where most people live. Over the past 10 years, one of the main lines of work of the Institut Cartogràfic i Geològic de Catalunya that represents the Geological Survey Organization of Catalonia has been the development of the 1:5.000 scale Urban Geological Map of Catalonia project. This is a very ambitious project focused on providing detailed geological information of the main urban areas of Catalonia (county capitals and towns with population larger than 10.000 inhabitants). In the framework of this project, geological and geotechnical information about 650 km² of urban areas has been compiled and 38 geological map sheets have been published during this period, which covers a surface of 400 km². Each map sheet is composed by a 1:5.000 scale main geological map and several complementary components.

The 1:5.000 Urban Geological Map of Catalonia represents a useful product for Earth Science professionals that require ground information of urban environments. The project entails the compilation and elaboration of a large volume of geological information that can facilitate the development of a large number of tasks carried out in urban areas. During the development of the project there have been interactions with numerous professionals responsible for the planning of the urban areas of Catalonia. In these meetings the importance of the geological information included in the maps it has become clear but also there is a demand to provide interpreted outputs of information in exactly the form required by the users. To meet this demand and to demonstrate the application of the geological information associated with the urban geological mapping project, a pilot project has been conducted in el Papiol municipality that belongs to the Barcelona Metropolitan Area. This municipality is located in a complex geological area that in recent decades has experienced different ground instabilities damaging several constructions. In this urban area a geological information system has been carried out encompassing 22 cartographic information layers related to the geological materials and structure (Outcrop information, Borehole information, Samples information, Quaternary deposits map, pre-Quaternary basement map, Artificial ground classification, 3D reconstruction of the main discontinuities) geological hazards (Inventory of ground instabilities, Landslide hazard zonation, Susceptibility of ground movements related to anthropogenic features), georesources and environmental concerns (Quarries and mineral resources, Geochemical reference compositions, Soil capability, Groundwater level, Groundwater vulnerability, Geological heritage) and geotechnical constrains (Geotechnical properties, Excavatability, Ground conditions for slope design, Ground conditions for earthworks, Geotechnical ground classification, Seismic ground types). This system is prepared to assess urban planning, risk management and several municipal operations. In this regard the geological information system has been used to stablish recommendations to take into account in the urban planning and management of el Papiol municipality.