## **BOOK REVIEW**

## Natural and Anthropogenic Hazards in Karst Areas

**Recognition, Analysis and Mitigation** 

Edited by M. Parise and J. Gunn



## Natural and Anthropogenic Hazards in Karst Areas: Recognition, Analysis and Mitigation

M. Parise and J. Gunn (eds.), 2007. London, The Geological Society, Special Publication 279, 202 p.,  $67_{/8} \times 10$  inches. ISBN 978-1-86239-224-3, hardbound, £70.00 / \$140.00 list, GSL member price £35.00 / \$70.00, AAPG/SEPM/GSA/RAS/EFG/PESGB member price £42.00 / \$84.00. Available in North America at gsl.orders@aidcvt. com or http://bookstore.aapg.org.

This is a collection of papers presented at the Second General Assembly of the European Geosciences Union in Vienna, Austria April 24–19, 2005. As the title of the book suggests, the emphasis is on natural hazards in karst terranes, which the cover brings home dramatically with a photo of sinkhole subsidence beneath a roadway and bridge caused by dewatering. The book is divided into three sections: Collapse and Subsidence Hazards, Hydrological Hazards, and Managing Karst.

The first paper begins with the only U.S. example, sinkhole distribution in Pinellas County, Florida, which

compares pre-development conditions in the urbanized area by examining two sets of aerial photographs (1926 and 1995). Significant features of each photograph were digitized to obtain a baseline (1926) and a post-urbanization distribution of natural sinkholes and man-made depressions (1995). The second paper is a somewhat theoretical assessment of natural and anthropogenic rock collapse over open caves. Most cavers will recognize these events to be relatively rare. However, the rarity of the occurrence is reduced as additional loading is imposed by engineering works directly above caves. This paper should be must reading for geotechnical engineering firms working in karst terranes. The next three papers include (1) an inventory and analysis of sinkholes in Italy, (2) assessment of cover-collapse sinkholes in Sardinia, Italy, (3) assessment of karst processes in the carbonate Apennines of Campania, Italy, and (4) magnetic prospecting for sinkhole detection in northern Spain. I have never been confident of the ability of geophysical methods to detect sinkholes, but the 4<sup>th</sup> paper in this section makes a convincing case for this somewhat overlooked method.

The section on Hydrological Hazards includes six papers. It begins with a discussion of risk to coastal karst geomorphosites (longshore bar and small backshore lagoon) from severe flooding in Sardinia. It is followed by a discussion of protection of karst aquifer recharge areas and mitigation of karst hazards, which stresses hydrogeologic mapping, hydrologic and hydrochemical observations, and tracer testing, the latter being the most important of the three. The next paper provides an assessment of rapid bypass flow in unsaturated chalk and its significance for contaminant transport. This paper emphasizes the value of tracer testing and modeling of breakthrough curves. Transport through unsaturated chalk can be very rapid and relatively unrestricted, which means that solute retardation and/or decay is minimal. The next paper focuses on stable isotopes in aqueous sulfate as tracers of natural and contaminant sulfate sources, with an emphasis on endemic tracers of various pollutant sulfate sources that are useful for tracing human-influenced releases such as from mining operations. The last two papers in this section address the intrinsic vulnerability of the Alburni karst system (southern Italy), which is another example of the European obsession with karst vulnerability mapping (something only minimally addressed in the U.S.), and an evaluation of the impact of quarrying on karst aquifers in southern Italy. This last paper also addresses karst vulnerability mapping, and, more significantly, it details the terrible concept of using abandoned quarries for landfills, both legal and illegal, into which solid and liquid wastes are repeatedly dumped with serious consequences to the underlying aquifer. (It has been illegal to dump liquids in hazardous waste landfills in the U.S. for over two decades.)

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The final section, Managing Karst, includes only two papers, perhaps because the concept seems strange. The first addresses natural and anthropogenic hazards in the karst of Jamaica and documents numerous examples. However, actions such as ecotourism and designation of protected areas are helping to reduce them (e.g., water quality). The last paper addresses biotic and abiotic calcite formation on prehistoric cave paintings in France and the need for protection, particularly because some of the calcite may be a result of human influences.

Overall this book is a highly recommended addition to the library of anyone working on environmental projects in karst terranes. It is printed on high-quality glossy paper and is carefully edited — I found only one typographical error — and with very high quality black and white photos and figures. It also includes an excellent index. However, it is somewhat expensive. The 8-point font size helped cut down the size and cost of the book but makes it a little difficult to read for some.

Reviewed by Malcolm Field, National Center for Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency, 1200 Pennsylvania Ave., NW, Washington, DC 20460-0001 (field.malcolm@epa.gov).