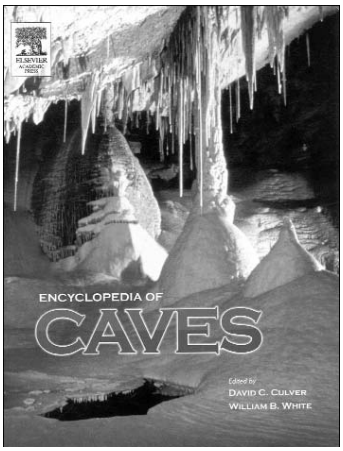

ENCYCLOPEDIA OF CAVES

Culver, David C., and White, William B. (eds.), 2005, Burlington, MA, Elsevier, Academic Press, 654 p. Hardbound (8.5 x 11 inches). ISBN 0-12-406061-7. $99.95. Order on-line at http://www.books.elsevier.com/ default.asp?.

Encyclopedia of Caves is one of two such books devoted to caves, both published less than a year apart. The other, *Encyclopedia of Caves and Karst Science*, edited by John Gunn, was reviewed in the August 2004 issue of this journal. The idea for each encyclopedia was suggested by the publishers, while the editors chose the topics and authors.

The Culver and White volume contains 107 individual articles, which cover geology, biology, physics, chemistry, anthropology, geomorphology, hydrology, speleology, exploration, and several well-known cave systems. The editors intended the articles to be useful not only to scientists but to a diverse readership. Most of the scientific articles are clearly technical, but there are also sections on subjects such as cave rescue, equipment, underground camping, and cave stewardship, which will appeal to non-scientific readers. There are hundreds of photos and figures, both in color and in black and white. Photo reproduction is very good but not exceptional. The use of color has greatly enhanced the clarity of some of the maps and diagrams. Altogether it is a very attractive volume, which invites the reader to browse.

This encyclopedia covers the most up-to-date topics about caves, such as cave-related geomicrobiology and dating caves with cosmogenic radionuclides. Special emphasis is given to biology, to which at least a third of the book is devoted. This depth of coverage is shown by a perusal of the section titles (e.g., "Worms"). However, there is no specific entry on paleoclimatology as recorded in speleothems, which is a topic of great interest today.

The alphabetical listing in an encyclopedia is not ideal for a specialized subject like caves, in which the topics cannot be identified neatly by single-word headings. For example, in the Culver and White volume, the topic "Speleothems" is divided into two essays: "Speleothem Deposition" and "Speleothems: Helictites and Related Forms," while other speleothem topics are covered elsewhere under different titles. Cave dating is covered under two topics, cosmogenic isotopes and the paleomagnetic record in cave sediments, with no overall synthesis. It would appear to be easy to find a subject because of the two tables of contents (one alphabetical and the other by subject) and a subject index at the end. However, if we look up "dating" in the subject index, we are led to two entries that mention dating, but we are not led to either of the two main articles representing dating (cosmogenic isotopes and the paleomagnetic record in cave sediments). This arrangement thwarts the purpose of the alphabetical listing. But within the formidable constraints of the encyclopedia format, the editors and authors have done a fine job of presenting the excitement and diversity of caves.

Some topics proposed by the editors did not materialize. For example, the original list included alpine karst, which was intended to complement "Solution caves in regions of moderate relief." Alone, the latter seems an odd topic. Even with alpine karst as a separate heading, the two would have been at opposite ends of the book, with no clear link. Links between sections are given, but these are tucked away at the ends of each entry and do not yield to quick perusal.

The Gunn encyclopedia provides more numerous but shorter entries. The Culver and White encyclopedia covers fewer topics, but each is allotted a lengthy essay. The science is intermixed with topics related to exploration. Descriptions of major caves in the US are given mainly by explorers rather than scientists. This is a valid approach, because the scientific aspect of these caves has been covered amply in other books, including the Gunn encyclopedia and the NSS volume "Speleogenesis" (Klimchouk *et. al* 2000). There is some unavoidable overlap between the two encyclopedias, even to the extent that some topics are covered in both volumes by the same authors. The Gunn volume describes a much wider range of karst areas from all over the world and has a more internationally diverse group of authors. As a result the two encyclopedias are unique and complementary.

For those who wonder which encyclopedia to buy, both are appropriate as reference books for scientists with an interest in caves. There is also some appeal to cavers and the general public. The Culver and White volume will probably be preferred by those interested in cave biology, a US orientation, or exploration. The Gunn volume has greater international appeal and a more geological slant. The Gunn volume costs about twice as much but is about 30% longer. Both are great achievements, especially given the fact that each was carried through from inception to publication in only a few years.

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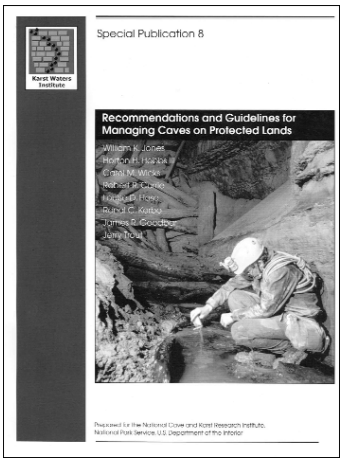

RECOMMENDATIONS AND GUIDELINES FOR MANAGING CAVES ON PROTECTED LANDS

Jones, W.K., Hobbs, H.H., Wicks, C.M., Currie, R.R., Hose, L.D., Kerbo, R.C., Goodbar, J.R. and Trout, J., eds., 2003, Karst Waters Institute, Special Publication 8, 95 p. Softbound, 8.5 x 11 inches. ISBN 0-9640258-7-6. $16.00 plus shipping. Order on-line at http://www.karstwaters.org or from Publication Sales, c/o E.L. White, 4538 Miller Rd., Petersburg, PA 16669-9211 (publications@karst-waters.org).

The stated intent of this publication is to provide federal land managers with guidelines for the development of cave-management plans and policies based upon the Federal Cave Resources Protection Act (FCRPA). It is a useful introduction to cave management (more appropriately, cave stewardship) in the United States but is far from the definitive text on the subject. While the intent is excellent, the execution has some weaknesses.

The manual is divided into three parts: Part one describes the features to be protected and gives an overview of the science behind management guidelines. Part two describes typical problems in protecting karst. Part three, which is relatively short, outlines management and investigative methods. In all, these three sections comprise a total of 52 pages, of which 32 are devoted to the first section, which gives the impression that the science is more important than the recommendations and guidelines. The manual concludes with a two-page summary, references, a glossary of terms, and six appendices totaling 18 pages. The appendices outline the Federal Cave Resources Protection Act of 1988 (FCRPA), cave management resources, the National Park Service's criteria for significant cave designation, NPS management policies, regulations and legislation related to NPS cave resources management, and the Bureau of Land Management Cave and Karst circular.

Perhaps because of multiple authors, Part 1 contains some lapses and contradictions. It gives the impression that cave management (more appropriately cave stewardship) deals only with physical cave resources, as it does not discuss the human dimension. After a statement that the goal of the FCRPA is to protect caves and their resources, there is a comment that the FCRPA should not only be applied to "proper caves," but also to other natural geologic features including natural bridges and arches, which is not in the scope of the legislation. A separate section on limitations of the Act and how to address them would have been useful. Citations are lacking for much of the information presented, a curious fact considering the emphasis on scientific backing for management plans. Part 1 includes many black-and-white photos, which are clear and well printed. Some show karst features in countries other than America, which may not be appropriate for a book whose focus is on federal land stewardship.

Parts 2 and 3 could have used more attention and space. For example, the book would have benefited from examples of cave management plans. The preface indicates that such plans are included in an appendix, but none are given. Although citations are given for what I consider some of the best texts on cave stewardship, they do not do justice to the full value they offer to cave stewards. It would have been useful to summarize guiding principles and concepts, and to provide an annotated list of recommended readings for each subject category. The book does not mention the National Cave and Karst Management Symposia, a valuable resource in the constantly evolving field of cave and karst stewardship. It would also have been nice to see something from the US Fish and Wildlife Service regarding their cave management plans and policies.

With such a large number of authors, more careful editing would have been helpful in avoiding overlaps and contradictions. However, this is still a valuable reference for those federal land managers who know little about the stewardship of caves and karst. I certainly recommend it as a useful introduction to the subject and hope that an expanded and more detailed volume will be forthcoming.

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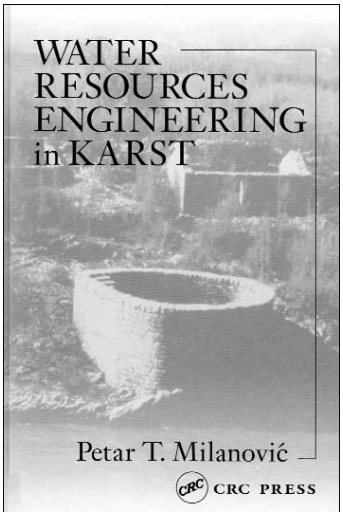

WATER RESOURCES ENGINEERING IN KARST

Milanovic, Petar T., 2004, Boca Raton, Florida, CRC Press, 312 p. Hardbound, 6.4 x 9.5 inches. ISBN 1-56670-671-8. $129.95. Order on-line at http://www.crcpress.com.

This book is third in a series by one of the world's authorities on engineering in karst. Its stated goal is to guide engineers in the "geotechnical improvement of karstfied rock masses at dam sites, around tunnels, and along river banks." His previous books, *Karst Hydrogeology* (1981) and *Geological Engineering in Karst* (2000), cover similar ground but with different emphasis.

His third, the subject of this review, concerns water supply, dams, reservoirs, and tunneling in karst. A lengthy first chapter sets the stage with a broad introduction to karst geomorphology and hydrology. The main chapters are aimed at practical applications, with case studies that draw heavily on the author's field experience in the Balkan karst as a consultant and university professor. Many other examples are drawn from around the world. More than 70 pages are devoted to field examples of dams and reservoirs alone. The last few chapters are short reviews of groundwater protection zoning, water tracing, and geophysical field methods.

Detailed instructions are given for such topics as grouting, construction of cutoff walls, determining local hydraulic conductivity with packer tests, and detecting the presence of conduits. Among the most unusual and interesting techniques are the use of PVC foil liners on reservoir bottoms, which rise and burst where underwater springs are present, and the "geobomb," which is set to explode during its travel through a water-filled cave so that its whereabouts can be detected seismically. Only brief descriptions of tracing and geophysics are given, and many of the techniques are out of date. For example, there is no discussion of quantititative dye tracing. The book is well illustrated with diagrams and maps, most of them to support the case studies. Some diagrams could have used more labeling. Grayscale photographs show specialized techniques and some impressive effects of land and structural failures in karst.

To the engineer, caves are mainly threats to structural integrity, and this book provides an important background that is often lacking. Those who view karst aesthetically may be taken aback by the many descriptions of how caves can be filled with rubble, cement, or asphalt. This is not a book for the cave enthusiast, although it describes examples where "speleologists" are called in–rather like ghost-busters–to help with projects.

The presentation stays at a general and somewhat nonquantitative level. This largely descriptive approach is appropriate because it avoids the impression that karst problems can be solved from behind a desk. There is no mention of numerical analysis or computer applications, and there are few of the equations, graphs, and tables that pepper the typical engineering book. One exception, carried over from previous volumes, is a curious equation for "karstification vs. depth" based on permeability tests (p. 10). The karstification factor has no units and yet includes a coefficient with six significant figures.

Some case studies are included mainly for the sake of completeness, as they provide sketchy details and little new insight. A few references are so incomplete that their sources are difficult to track down. Outside the engineering realm a few facts have gone astray. The "deepest known shaft" is identified as Gouffre Mirolda (France) at "-1773 m," a statement that is wrong on all counts.

There are also some idiosyncrasies in wording, as is understandable when an author writes in a language not his own. Some are distracting but not difficult to decipher, such as "overabstraction of aquifer," "momentarily actual base of erosion" (i.e., present base level), "molted asphalt," and use of the word "dip" for water-table gradient. Some are puzzling, such as the statement that "caves are less frequent than shafts." But we are fortunate that the author has overcome the language barrier to share his insight. Still, more careful editing at the American end would have been appropriate.

This book is best suited for the engineer who knows little about karst but is forced to deal with it at the professional level. The main overlap is with the several books emanating from the Multidisciplinary Conferences on Sinkholes and the Engineering and Environmental Impacts of Karst, which are offered biennially in the US. These volumes include more detail on a broader range of subjects, but they do not focus so exclusively on hydrologic problems, as the Milanovic book does.

General readers may find this book expensive for its size, but the cost is typical for a technical book written for specialists. Those who own one or both of the earlier Milanovic books will find the new one to have considerable overlap but different emphasis. The first (1981) deals mainly with water supply and the hydrologic function of karst and is a good complement to the third volume. The second (2000) covers many of the same topics as the third, and they do not make as versatile a pairing.

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