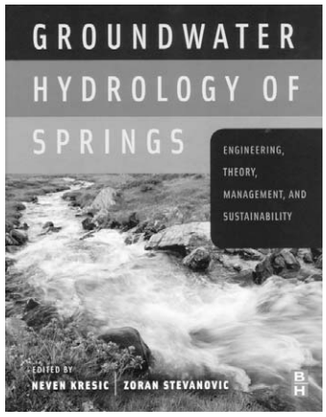
BOOK REVIEW



Groundwater Hydrology of Springs: Theory, Management, and Sustainability

Neven Kresic and Zoran Stevanovich (eds.), 2010. Burlington, Mass., Butterworth-Heinemann (imprint of Elsevier), 573 p., 7⅝ × 9½ inches, ISBN 978-1-85617-502-9, hardbound, $130.00.

Spring flow and quality are important groundwater issues, particularly in karst. Many textbooks address groundwater hydrology, but to my knowledge this is the first book that specifically addresses the hydrology of springs. All kinds of springs and in all kinds of terranes are considered, as well as their relation to surface hydrology. Karst receives special attention, however, because spring-flow is such an important aspect of karst aquifers, and karst is the main specialty of the editors and the majority of the authors. Authors were selected by the editors based on recognized expertise and geographic distribution. The editors also contributed material to the book.

The book includes a general discussion of springs, technical aspects and methods, and specific examples. The discussion begins with a chapter on the sustainability and management of springs that incorporates large excerpts from previous reports. It is a good general discussion of the use and management of springs and covers much material on hydraulic systems (man-made structures) at springs in the U.S. and in foreign countries. Chapter 2 is a discussion of spring types and their classification, both karstic and non-karstic (it even briefly mentions geysers and fumaroles). Many photos are provided for clarification.

Chapter 3 begins the technical section of the book with a discussion of recharge to springs. Basic principles are introduced, as well as methods for quantifying recharge (e.g., via artificial and environmental tracers). Mathematical and chemical principles are mentioned, but, as is appropriate for a book of this type, not in great detail, as this is already available in textbooks. Chapter 4 provides a fairly comprehensive discussion of spring-hydrograph analysis. Quantitative techniques are presented in a style that is relatively easy, useful, and clear. It is possible to obtain much of this information from books on surface-water hydrology, but these rarely discuss spring flow.

Chapters 5 and 6 address hydrologic modeling and geochemistry. They are clear and informative summaries of vast topics, and those who wish further information can consult specialized textbooks. It would have been handy if these chapters included references and links to relevant software.

Chapter 7 concerns water-quality treatment of springs to acceptable drinking-water standards. It includes several case studies that fit better here than in a separate chapter of their own. Chapter 8 describes the delineation of spring-recharge zones and strategies for protection. This concept has recently received much attention in Europe, but less so in the U.S. It is a brief discussion of a subject that is continually being revised within individual European countries and includes recommendations in the research of Ravbar (2007). Many useful references are included.

Chapter 9 addresses the utilization and regulation of spring flow. The historical development of capturing and protecting spring waters is described, and several case studies are provided. This topic is rarely considered in the U.S., but it probably should be. This chapter could provide guidance.

Chapter 10 is a collection of case studies. This is the longest chapter in the book (176 pages) and consists of ten sections. Included are detailed descriptions of springs used for water supply in southeastern Europe, Austria, Romania, Turkey, Iran, Texas (Edwards Aquifer), and China. Topics include geology, hydrogeology, water quality, exploitation, protection, and regional distribution of springs. Again, this chapter may be especially useful in the U.S. if communities begin to utilize spring waters more than they currently do.

This book is worth purchasing by any groundwater hydrologist who works with spring waters. It is not cheap, but its large amount of material and good-quality back-and-white figures make the price reasonable. There are inevitably a few typographic and formatting errors, but these are minor (except for some faulty references). The topics flow smoothly from chapter to chapter, reflecting the care in preparation and editing. I might have recommended including a chapter on spring biota (e.g., that in Gibert et al., 1994), which, among other things, can be a measure of the long-term health of the spring and its water source. I expect to keep this book close at hand as a guide to my own work.

References

Gibert, J., Danielopol, D.L., and Stanford, J.A., eds., 1994, Groundwater ecology: San Diego, Academic Press, 571 p.

Ravbar, N., 2007, The protection of karst waters: A comprehensive Slovene approach to vulnerability and contamination risk mapping: Ljubljana, Slovenia, Založba ZRC (ZRC Publishing), 256 p.

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DOI: 10.4311/jcks2010br0135

Journal of Cave and Karst Studies cave-72-03-08.3d 26/1/11 13:19:23 44 Cust # 2010BR0135