



Vandas, Stephen J., Winter, Thomas C., and Battaglin, William A., 2002, *Water and the Environment*: AGI Environmental Awareness Series, 5, American Geological Institute, USD 9.95, 64 p., ISBN 0-922152-63-2.

Water, the most important resource on Earth, is the theme of this informational slick magazine that is geared toward a nonscience audience interested in understanding more about hydrology and hydrogeology. The authors are Stephen J. Vandas and Thomas C. Winter, and William A. Battaglin of the United States Geological Survey (USGS), with a preface by Philippe LaMoreaux. The authors are experts in a broad spectrum of water-related disciplines, including water law, water resources, groundwater-surface water interactions, and water quality. The publication is very well written, with clear explanations of the basic processes controlling the movement, quantity, and quality of surface water and groundwater. The figures, many of which are full page, are laid out beautifully, and each is tightly focused on a theme that is treated in a comprehensive manner but described in simple, easy-to-understand terms.

The first half of this primer on water, chapters 1 and 2, addresses the fundamental aspects of the hydrologic cycle with a straightforward description of the connection between above- and below-ground water. Chapter 3 considers the myriad of effects that our water use has on the environment, from the impact that reservoirs have on river systems to groundwater use causing saltwater intrusion from oceans and deeper groundwater, land subsidence, and economic hardship on such heavy groundwater users as farmers. Our control of water, whether adding it (irrigation), removing it (draining wetlands), or channeling it (levees), changes how the land functions by deteriorating water quality of recharge, removing wetlands, preventing floodplain soil enrichment, reducing river flow (and thus affecting ecology) or exacerbating flooding. The effects of drought, which is not in our control, are also outlined, and, as with the other effects, the monetary cost or scale of impact is listed for specific, recent events. These are powerful weapons that can be used in making effective arguments for better water management. The last part of this chapter addresses issues of water quality, explaining the connections between actions (e.g., use of fertilizer) and consequences (fish kills). The nitrate contamination risk map provides the uninitiated with a quick perspective on regions of the conterminous United States that are most vulnerable to this problem. Some sobering information is provided, such the fact that almost every surface-water and fish sample and half of the groundwater samples collected during the National Water Quality Assessment Program (NAWQA) contained measurable amounts of at least one pesticide.

The final chapter addresses the future of water resources and actions that are being taken or could be taken to insure an adequate and clean supply. Issues of the management of water use (conservation and metering) and of management of potential contaminants are considered. If this chapter is read carefully, one can see the underlying specific recommendations that will result in a water-secure future for this country. Action should be taken on many levels, from policy-making and funding of water research and monitoring to the responsibility of the individual.

Included in the publication are a one-page glossary defining terms used in the text; a list of references, most of which could be obtained by someone interested in learning more; a page of government agencies and independent organizations involved in water-related work; a list of the state geological surveys; and a separate poster with a set of activities that appear to be geared to students at the middle-school level. It is unfortunate that, of the many URLs listed throughout the publication, a few are no longer active. In particular, three of the four Environmental Protection Agency (EPA)-related URLs no longer work, nor does the website to the Year of Clean Water (that occurred in 2002–2003), or the website link to the Association of American State Geologists (which is now www.stategeologists.org). This is a hazard of the dynamic worldwide web, although EPA should provide automatic transfers to updated web pages addressing the very important topics of watersheds, water quality standards, and water-related legislation. One other out-of-date piece of information is the amount of groundwater used in the United States—the 77 billion gallons (~292 billion liters) of groundwater per day used in 1995 has been updated by the USGS for the year 2000 to be 83.3 billion gallons (~315 billion liters) of groundwater per day. This means that either there has been an 8% increase in groundwater use in five years or that knowledge of groundwater withdrawal is very poor, requiring large error bars around numeric data. Either case supports the importance of elevating water management to a very high priority.

In summary, this is a nicely designed, reasonably priced publication that should be of interest to educators, policy makers, and the general public. It achieves its goal of presenting the most important environmental issues affected by water use and misuse in an accessible format.

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