

Water Science and Policy: A Citizen's Reading Guide

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Effective citizen participation in water resource decisions requires basic knowledge of what scientists have discovered about that most unusual liquid, water, and the policies and that are in place --- or should be in place --- for sustainable management. This handout is a preliminary version of a citizen's reading and Internet guide on water resources that will appear on the Hudson River Water Alliance web site.

Choices of books included in this short list meet two criteria: 1) they're **affordable**, as opposed to some excellent undergraduate texts that carry high cover prices; 2) they're **eminently readable** by people who had good high school science courses, and who pay attention to current politics.

I'm also guided by a career spent in rural development, where social science training necessarily includes core courses in soil science, agronomy and the like. Minus that core, one cannot effectively propose strategies for rural resource use. And a big part of our work is figuring out how to communicate scientific innovations to rural citizens so that they can understand them and consider whether to adopt them or not. This has also been an exercise in humility, since my profession, during the first three-quarters of the twentieth century, was instrumental in getting farmers to adopt technologies that have become problems rather than solutions for the intelligent use of rural resources.

Two Essential Books

Life's Matrix: A Biography of Water (University of California Press, 2001) by Philip Ball is the best departure for learning why water is such an exceptional and eccentric liquid, and how it shapes our biophysical environment. Ball became an editor at Nature magazine via training in chemistry at Oxford and then a doctorate in physics. Understanding "Why Water is the Weirdest Liquid" is his scientific passion. That passion is complemented by smashingly good prose and evident fluency in philosophy, literature, and history.

Ball proceeds in four stages: 1) the cosmology and earth science of water; 2) the physics and chemistry of water presented via the history of science since the fifteenth century; 3) water as the matrix of life processes; 4) the global politics of water.

Life's Matrix is such a good read that it would be a page-turner for someone who was interested in science in general rather than water per se. And, by the last page, he or she would henceforth pay particular attention to water issues.

Water, Rivers and Creeks (University Science Books, 1997) is a pithy presentation of the principles of hydrology, and their implications for water resource management, by one of the grand old men of hydro-geology, Luna B. Leopold (1915-2006). Leopold became the Chief Hydrologist of the U.S. Geological Survey, where he transformed its Water Resources Division from a data collection agency into a prime center of water science research. He then became a prize catch for the Geology Department at U.C.-Berkeley. His work on the hydraulic geometry of stream channels generated a key concept in the field of fluvial morphology.

This update of Leopold's *Water: A Primer* (W.H. Freeman, 1974) is permeated by a prototypical American conviction that "the truth shall make you free." Leopold's objective was to get current hydrological knowledge into the hands of the citizenry and decision-makers. Once they understood, they would act differently. One wonders whether Leopold, looking at the actions and inactions of our current national government, would still harbor this optimistic premise.

Leopold was also an early adopter of a holistic environmental framework for putting hydrological cycles in their necessary context. While he sticks to the hydrological knitting in this slim book, Leopold underlines that what he spent his life studying must be grasped within the context of earth science in general, and that earth science must be placed in the context of the global ecosystem.

Next Steps

Following up on Leopold's comments about water resources being put in the context of earth science, two recent books provide an enjoyable and rapid entry point. Mark A. s. McMenamin's *Geology* (Collins, 2007) is part of the new Smithsonian *Science 101* series. A good complement in terms seeing landscapes geologically is *The Field Guide to*

Geology (Facts On File, 2nd edition, 2007) by David Lambert and The Diagram Group. *Written in Stone: A Geological History of the Northeastern United States* (Black Dome, 2001) brings geological principles closer to home.

Evaluating the state of fresh water resources across the planet can be efficiently tracked via a biennially published reference book, *The World's Water 2006-2007: The Biennial Report on Freshwater Resources* (Island Press, 2006), by Pieter Gleick, Heather Cooley, David Katz, and Emily Lee. This book tracks every dimension of water resource issues – scientific, economic, and political. For an introduction to how the state of freshwater resources can be measured in the United States, see the relevant chapters of *The State of the Nation's Ecosystems* (Cambridge University Press, 2002), which was produced by the Heinz Center for Science, Economics and the Environment.

The Political Economy of Water

Water scarcity as a driving force in twenty-first century world politics is the theme of dozens of books and articles. Fred Pearce, a former editor at *The New Scientist*, does a yeoman's job in pulling all the issues – and potential for wars – together in his *When the Rivers Run Dry: Water – The Defining Crisis of the Twenty-First Century*. (Beacon, 2006) Pearce calls for a new ethics of water that will require us "... to store water without wrecking the environment, of restoring water to rivers and refilling lakes and wetlands without leaving people thirsty, and of sharing waters rather than fighting over them. It requires us to go with the flow. And to do it before the rivers finally run dry."

Water Follies: Groundwater After Pumping and the Fate of America's Fresh Water, by the invited plenary speaker at HRWA's 2006 conference, Robert Glennon, focuses on the same issues within the United States. And to make it clear that northern wet regions can squander their water supplies and water quality just as heartily as the more visible Sun Belt states, he takes a look at Maine and Minnesota. Glennon's proposals for a water rights market as an essential part of the solution generated lively debate that continued for some hours after the HRWA conference wrapped up, and then reconvened at a local brewpub.

New York State and the Hudson River

The Encyclopedia of New York State (Syracuse University Press, 2005), edited by Peter Eisenstadt and Laura-Eve Moss, is an efficient introduction to water issues close to home. It's also one of the best book bargains per pound, since this hefty tome is being remaindered by Barnes and Noble for the grand sum of \$20. Start with the entries on Water and Hydrology, and the Hudson River, respectively, and then follow through to their citation of other entries, and one gains a fine overview of New York water issues in the space of an afternoon.

For Hudson River issues, the natural starting point is, of course, the new edition of *The Hudson: An Illustrated Guide to the Living River* (Rutgers University Press/Hudson Sloop Clearwater, 2007) by Stephen Stanne, Roger Panetta, and Brain Forest.