Aldo Leopold

Thinking like a Mountain. Aldo Leopold and the Evolution of an Ecological Attitude toward Deer, Wolves, and Forests. SUSAN L. FLADER. University of Missouri Press, Columbia, 1974. xxvi, 284 pp., illus. $12.50.

This definitive, detailed, and exhaustive account of the development of Aldo Leopold's thinking about deer, predators, and the forest in which they all must live and with which man would like to live in so many different ways will be of great interest and value to the practical ecologist, forester, and game manager. Now and then we lose sight of the deer—and of Aldo Leopold—in the forest of details. Yet, as everyone who has been in that interface between science and public emotion knows, these matters cannot be explained in simple, brief statements, or reconciled to everyone's satisfaction in monosyllables. The professionals, therefore, will welcome this book, and for courses in biopolitics it will be a good text. Those of the much greater audience who have taken *Sand County Almanac* to their hearts as an ecological classic will find more details in it than they need, but it is excellent browsing, especially the first chapters. The lesson, implicit on every page, should not escape even the most casual scanner: a good man can learn from experience and can recognize when his ways or ideas are in error, and can change or adjust them as he grows in knowledge and wisdom.

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Celebration

Three Centuries of Scientific Hydrology. Papers from a conference, Paris, Sept. 1974. UNESCO, Paris, World Meteorological Organization, Geneva, and International Association of Hydrological Sciences, Paris, 1974 (U.S. distributor, Unipub, New York). 124 pp., illus. Paper, $8.25. A Contribution to the International Hydrological Decade.

In 1974 the International Hydrological Decade came to a close and an International Hydrological Programme was begun. That year was also the tercentenary of the publication of Pierre Perrault's *De l'origine des fontaines.* The eight papers in this volume (all but two in English and each accompanied by abstracts in English, French, Spanish, and Russian) stem from a conference marking these events. Some of the papers review the development of hydrology as a recognizable scientific discipline distinct from meteorology, hydraulics, physics, chemistry, and engineering, which are its main building blocks. Others try to look ahead.

The introduction to the book contains the following statement:

> The outstanding merit of Pierre Perrault was that, in ... *De l'origine des fontaines*, ... he demonstrated by means of quantitative evaluations that rainfall and snowfall are responsible for riverflow. ... This break-through justifies the decision to accept Perrault's work as the point of departure of scientific hydrology and to celebrate its Tercentenary in 1974.

Contributions by Mariotte and Hally, among others, followed soon after that of Perrault and mark "the beginning of quantitative assessments of the water cycle which were essential for the further development of hydrology."

The historical reviews give fascinating glimpses of the hydrology of the distant past—use of rain gages in China about 1000 B.C. and development of the concept of the hydrologic cycle in China about 900 B.C. and again in Greece in 500 B.C., and then oblivion for about 2000 years, in Europe with the authoritarianism of Aristotle and the advent of the Dark Ages, and in the Far East with the disappearance of scientific thought for other causes at about the same time. The gaging of the Nile flood in relation to assessment of taxes comes in for mention, as does the history of the current meter and its use not only to measure flow in streams but also, in early days, as a navigational aid toward determining longitude.

Through the historical accounts runs the theme of the development of quantitative methods prerequisite to a scientific discipline. The goal was not achieved, really, until the late 19th and early 20th centuries.

The pattern of modern hydrology has been shaped largely by conceptual models capable of manipulation, for some decades now with the help of computers, analog and especially digital. The growth of concern for the environment in recent years has led to extreme emphasis on water chemistry in relation to use as well as imposed esthetic constraints on water-management structures.

The future is seen in this book as holding further development of quantitative methods, increasing use of real-time data through the agency of the Geostationary Orbit Environmental Satellite (GOES) and other satellite data relays, development of other remote-sensing devices and methods for application to hydrology, and continuing emphasis on water quality in relation to public health and to recreation.

The last two papers in the volume both include the tantalizing statement that only 2 to 8 percent of the yearly global flux of fresh water is actually withdrawn for use by man. That idea accords poorly with the current concern worldwide about a water crisis, except in the context of concentrations of population, agriculture, and industry. The extent of such major use areas relative to the world total is not given. Unfortunately, neither paper develops the idea to a really useful degree.

Altogether, hydrologists and all others interested in water will find fascinating tidbits in this volume. None of the papers is profound or difficult to read. The papers are what they were intended to be—a celebration of growth in hydrologic thinking.

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Ecology from Russia

Schooling in the Ecology of Fish. D. V. RADAKOV. Translated from the Russian edition (Moscow, 1972) by H. Mills. Halsted (Wiley), New York, 1973. viii, 174 pp. illus. $19.75.

Soviet science as a whole is more mission-oriented and practical in intent than American science. The organization of fish schooling is an example of a relatively narrow topic that has received unusual attention within the U.S.S.R. because of its potential economic importance, in this case the development of techniques to increase the sustained yield of catches. For the student of animal behavior and ecology, therefore, Radakov's book provides an opportunity to examine the state of the art in a sector that has been relatively well supported financially. While not neglecting some of the key American and Western European literature, Radakov has concentrated heavily on Soviet contributions in an attempt to summarize them thoroughly. I believe the result can be fairly described as follows: strong on factual, descriptive accounts of free-living and laboratory schools, weak on physiology and basic behavior, and virtually lacking in basic ecology and population biology.

Radakov makes some good generalizations. His definition of a fish school is as sound as any hitherto devised: "a temporary group of individuals, usually of the same species, all of which are in the same