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Robert K. Kuzelka, project manager; Charles A. Flowerday, editor;
Robert Manley, contributing editor/consulting historian; Bradley C.
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Flat Water: A History of Nebraska and its Water. Robert K. Kuzelka, project manager; Charles A. Flowerday, editor; Robert Manley, contributing editor/consulting historian; Bradley C. Rundquist, editorial associate. Resource report/Conservation and Survey Division, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln; No. 12, 1993. 291 pp. Maps, photos, and references. \$20.00.

Flat Water: A History of Nebraska and Its Water contains, as the title suggests, a detailed and intriguing account of the history of water development and use and of the leading figures in this process. The title is a bit misleading because this book goes beyond providing a simple historical account of the development of water resources in Nebraska. Appropriately, the book begins with a summary of the evidence of occupation by Native Americans during the last 11,000 years and their uses of water, which range from construction of boiling pits for the preparation of food to diversion of stream waters for irrigation.

The historical discussion of Nebraska's water history commences with brief accounts of the efforts of the men and women who argued the merits of irrigation during the 1890s and early 1900s. Nebraska's climate and hydrol-

ogy are described next. A minor distraction is evident here because the reader must shift back and forth between this chapter, containing the primary discussion of climate and hydrology, and the Introduction, which presents the maps of precipitation distribution, major rivers, irrigation well distribution, rises and declines in groundwater levels, and streamflow. The short review of climate and the review of Nebraska hydrology, which incorporates discussions of how geologic conditions controls the distribution of aquifers and flow through aquifers, are excellent. Brief, but important discussions of damaging floods and the potential impacts of global climatic change are included. The section on hydrology and climate ends with a short history of the Conservation and Survey Division of the Nebraska Institute of Agriculture and Natural Resources, its predecessor the Nebraska Geological Survey, and with biographies of the surveys' directors and of N. H. Darton, R. H. Willis, and Wesley Sell.

The development of water resources in Nebraska has led to the development of water related industries such as the manufacture of windmills, production of ice, and the rise of recreational sport fishing, described in middle sections of this history. The development of irrigation technology from early row flooding techniques to the development of center pivot and related irrigation systems are thoroughly discussed. The later chapters describe the economics and management of irrigation, education and attempts to inform Nebraskan's of the state's water resources, and how best to husband these resources. Other sections include environmental quality, ecosystem change, and the need for conservation and environmental protection. Detailed accounts of groundwater contamination by nitrate resulting from the application of fertilizers, destabilization of parts of the Sand Hills by overgrazing, and the loss of wetlands and biodiversity are provided as evidence for the need for conservation and environmental protection. The final sections describe Nebraska politics and water policy, future controls of water resources, and futures uses of water resources.

Flat Water provides an exceptionally interesting history of Nebraska and its water. The authors intersperse detailed discussions of such technical subjects as climate, industry, technology, environmental quality and protection, politics and policy, global climatic change, the 1935 Republican River Flood, and the development of Dempster Industries with short biographies of Nebraskans who were leading players in the development of the state and its water resources. This approach results in a thoroughly readable narrative. Although focused on the history of Nebraska, the book should attract readers from other plains states and Canadian provinces because these areas have

faced similar water problems, sought similar solutions, and generally experienced similar histories over the past century. **Thomas C. Gustavson**, *Bureau of Economic Geology, University of Texas at Austin*.