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Drought and Water Crises

*Science, Technology,
and Management Issues*

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Drought and Water Crises

*Science, Technology,
and Management Issues*

Edited by
Donald A. Wilhite



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*To Myra, Addison, Shannon, Suzanne,
Benjamin, and my grandson, Gabriel*

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Editor's Preface

When I began my professional career at the University of Nebraska–Lincoln in 1979, I intended to direct my research and outreach program at the emerging field of climate impact science. It was fortuitous that a large portion of the United States, including the Great Plains, Upper Midwest, and Pacific Northwest, had recently come out of an intense but somewhat short-lived drought during 1976–1977. This drought spawned a research-oriented workshop held at the University of Nebraska in 1979 that focused on drought impacts and the development of agricultural drought strategies for that area and similar regions. I was given the opportunity to work with the project team to design the workshop content and develop pre-workshop materials. Although I had focused my graduate studies on climate variability and the climatology of drought, my intent was for drought to be only one of several climate-related subject areas I would address in my career. The workshop led to two follow-up drought projects directed at an evaluation of governmental drought response policies.

Twenty-five years later, I am still researching and writing about drought. There must be something fascinating about this subject to capture my imagination for the past quarter century. As I became

more engaged in the subject, both as a climate scientist and a geographer, I became more and more intrigued by its complexity and the challenges of detecting, responding to, and preparing for this “natural” hazard. Why was drought such a poorly understood concept? What was the role of the science community in addressing this issue? Why were governments so poorly prepared for drought? Why were governmental policies for dealing with drought nonexistent? From both a scientific and a policy perspective, we have made considerable progress in addressing many of the issues associated with improving how society manages drought. Much remains to be done, however; especially with drought’s interconnections to issues of integrated water management, sustainable development, climate change, water scarcity, environmental degradation, transboundary water conflicts, population growth, and poverty, to name just a few.

Drought and Water Crises: Science, Technology, and Management Issues is an attempt to explain the complexities of drought and the role of science, technology, and management in resolving many of the perplexing issues associated with drought management and the world’s expanding water crises. Tremendous advances have been made in the past decade in our ability to monitor and detect drought and communicate this information to decision makers at all levels. Why are decision makers not fully using this information for risk mitigation? Better planning and mitigation tools are also available today to help governments and other groups develop drought mitigation plans. How can we make these methodologies more readily available and adaptable? In the agricultural and urban sectors, new water-conserving technologies are being applied that allow more efficient use of water. How can we promote more widespread adoption of these technologies and their use during non-drought periods? Progress is being made on improving the reliability of seasonal drought forecasts to better serve decision makers in the management of water and other natural resources. How can these seasonal forecasts be made more reliable and expressed in ways to better meet the needs of end users? These and other questions are addressed by the contributors to this volume. The information herein will better equip the reader with the knowledge necessary to take action to reduce societal vulnerability to drought.

In the past, most regions possessed a buffer in their water supply so periods of drought were not necessarily associated with water shortages, although impacts were often quite severe. The crisis management approach to drought management, although ineffective in reducing societal vulnerability, allowed societies to muddle

through to the next drought episode. That buffer no longer exists for most locations. Water shortages are widespread in both developing and developed countries and in more humid as well as arid climates—even in years with relatively normal precipitation. Drought only serves to exacerbate these water shortages and conflicts between users. Droughts of lesser magnitude are also resulting in greater impacts—a clear sign that more people and sectors are at greater risk today than in the past. When societies are faced with a long-term drought, such as has been occurring in the western United States over the past 6 years, governments are desperate to identify longer term solutions. Unfortunately, this interest often quickly wanes when precipitation returns to normal—a return to the “hydro-illogical” mentality.

All drought-prone nations should adopt a more risk-based, proactive policy for drought management. To make progress, we must first recognize that drought has both a natural and a social dimension. Second, we must involve natural, biological, and social scientists in the formulation and implementation of drought preparedness plans and policies. This book collates considerable information from diverse disciplines with the goal of furthering drought preparedness planning and reducing societal vulnerability to drought.