

Drought Assessment, Management, and Planning

NATURAL RESOURCE MANAGEMENT AND POLICY

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EDITORIAL STATEMENT

There is a growing awareness to the role that natural resources such as water, land, forests and environmental amenities play in our lives. There are many competing uses for natural resources, and society is challenged to manage them for improving social well being. Furthermore, there may be dire consequences to natural resources mismanagement. Renewable resources such as water, land and the environment are linked, and decisions made with regard to one may affect the others. Policy and management of natural resources now require interdisciplinary approach including natural and social sciences to correctly address our society preferences.

This series provides a collection of works containing most recent findings on economics, management and policy of renewable biological resources such as water, land, crop protection, sustainable agriculture, technology, and environmental health. It incorporates modern thinking and techniques of economics and management. Books in this series will incorporate knowledge and models of natural phenomena with economics and managerial decision frameworks to assess alternative options for managing natural resources and environment.

This book is a timely collection of theory and case studies addressing drought assessment, management and planning. The book includes up-to-date techniques used to cope with drought at local, regional and national levels. The book includes also case studies from countries which have a long-standing history of drought, and have accumulated drought experience over time. This experience is shared with the reader for a better understanding of future drought awareness.

The Series Editors

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Drought Assessment, Management, and Planning:

Theory and Case Studies

**edited by
Donald A. Wilhite**



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Printed on acid-free paper.

To my wife, Myra

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Preface

Drought is an insidious hazard of nature. It originates from a deficiency of precipitation that results in a water shortage for some activity or some group. Africa has suffered the most dramatic impacts from drought during the past several decades—the recent droughts in the southern and eastern portions of the continent are testimony to that fact. However, the vulnerability of all nations to extended periods of water shortage has been underscored again and again during this same time period. In the past decade alone, droughts have occurred with considerable frequency and severity in most of the developed and developing world. Significant parts of North and South America, Australia, Europe, and Asia have been plagued recently by extended periods of severe drought, often resulting in far-reaching economic, social, and environmental consequences. In the western United States, for example, vast areas are facing the prospects of a sixth or seventh consecutive year of drought in 1993.

Concern by members of the scientific and policy communities about the inability of governments to respond in an effective and timely manner to drought and its associated impacts exists worldwide. Numerous “calls for action” for improved drought planning and management have been issued by national governments, professional organizations, intergovernmental organizations, nongovernmental organizations, and others. The United Nations’ International Decade for Natural Disaster Reduction (IDNDR) is yet another example of an international call for action to reduce the impacts that result from drought and other natural hazards. However, the task of altering the perception of policy makers and scientists about drought and educating them about alternative management approaches is a formidable challenge. Governments typically treat drought as a rare and random event that is inherently unpredictable; they are unprepared to respond effectively when it occurs. Effective drought response requires long-range planning, a difficult assignment for most governments.

Many scientists and policy makers now have an improved understanding of drought and its economic, social, and environmental impacts. Although impediments to drought planning exist, recent progress has created a sense of cautious optimism that society is steadily moving toward a higher level of preparedness. Also, technologies and information are available that would enable countries to more effectively mitigate the effects of drought through the development of a more proactive and systematic risk management approach.¹

¹ For example, see D. A. Wilhite and W. E. Easterling, eds. 1987. *Planning for Drought: Toward a Reduction of Societal Vulnerability*. Westview Press, Boulder, Colorado, U.S.A.

Awareness, understanding, and appreciation of drought and its effects within the scientific and policy communities has been enhanced in the past decade through a series of notable events. First, the occurrence of severe drought worldwide during and following the extreme El Niño/Southern Oscillation (ENSO) event of 1982-83 captured the attention of governments by highlighting the vulnerability of all nations. The drought of 1988 in the United States, for example, resulted in costs and losses of nearly \$40 billion.² Second, it appears that societal vulnerability to drought is increasing, largely because of population growth and society's increasing demand and competition for limited water and other natural resources. Population growth is putting added pressure on fragile lands. Third, many governments now have a better appreciation of the costs associated with drought. These costs include not only the direct impacts of drought but also the indirect costs (i.e., personal hardship, relief costs, retardation of economic development, and accelerated environmental degradation). Nations can no longer afford to allocate scarce financial resources to often short-sighted response programs that do little to mitigate, and may in fact exacerbate, the effects of future drought.

Given society's increasing vulnerability to drought and the uncertainties about future changes in climate, including the possible increased frequency and severity of extreme climatic events, improving the level of preparedness for the recurrence of drought represents an important step forward. Walter Orr Roberts, president emeritus of the National Center for Atmospheric Research in Boulder, Colorado, recently stated, "One logical approach, even in the face of great uncertainty about future climate, is to improve our ability to manage current climate extremes. Unlike global control of greenhouse gas emissions, international cooperation is not needed for many such adjustments to succeed; thus nations or regions that instigate them will be rewarded unilaterally."³

This book is dedicated to furthering scientific understanding of drought assessment and management and the policy issues associated with drought preparedness worldwide. The authors invited to contribute to this volume are uniquely qualified to address their respective topics. The book is divided into two parts. Part One emphasizes theoretical aspects of drought assessment, management, and preparedness; it also includes a discussion of the concept of drought. These chapters are aimed at improving

² A case study of the 1987-89 drought in the United States was completed recently (1990) by W. E. Riebsame, S. A. Changnon, and T. R. Karl, *Drought and Natural Resources Management in the United States* (Westview Press, Boulder, Colorado, U.S.A.).

³ Roberts, W. O. 1990. Global climate change as a hazard [editorial]. *National Hazards Observer* 13(6):1-2. Natural Hazards Research and Applications Information Center, University of Colorado, Boulder, Colorado, U.S.A.

the reader's understanding and awareness of drought; appropriate technologies to monitor drought's onset, development, and termination; emerging methodologies to estimate impacts; adjustment strategies to alleviate drought effects; and a methodology for countries to follow in the development of a national drought policy and plan. Part One concludes with an insightful examination of how changes in climate may alter climatic variability and the frequency and intensity of extreme events, particularly drought.

The successes and failures of previous assessment and response efforts are highlighted in Part Two through case studies of Israel, India, Brazil, South Africa, Australia, the United States, and China. Several of these case studies provide insights into the difficulties inherent in the provision of timely and effective drought assistance by government in both a developed and developing country setting. The lessons learned in these instances provide both an extraordinary opportunity and challenge to other drought-prone nations to learn from these experiences and avoid some of the mistakes of the past. Some of the case studies in Part Two illustrate remarkable progress in drought preparedness and are examples for other nations to follow.

If society is to diminish vulnerability to future episodes of drought, then we must be better prepared for its inevitable recurrence and implement policies and plans that promote the minimization of risk in agricultural and other weather-sensitive industries. It is only through this effort that society will be able to reduce vulnerability to drought.

Donald A. Wilhite

Acknowledgments

The task of editing a book is a formidable one. In this case, the task was made much easier as a result of the cooperation of those authors selected to contribute to this volume. All of the authors enthusiastically accepted my invitation to participate in this project and completed their assigned chapters on schedule. I gratefully acknowledge their time and effort.

I am also indebted to my very capable editorial assistant, Deborah A. Wood. She is to be commended for her outstanding editorial skills and ability to manage and complete complex and difficult projects. Deborah has worked with me for more than ten years and her outstanding contributions to my research program are appreciated sincerely.

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