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Donald A. Wilhite

University of Nebraska - Lincoln, dwilhite2@unl.edu

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The Enigma of Drought: Management and Policy Issues for the 1990s

Donald A. Wilhite

International Drought Information Center, Department of Agricultural Meteorology, University of
Nebraska, Lincoln, Nebraska 68583-0728

Abstract

Drought affects more people than any other hazard, in both developed and developing countries, yet few governments have taken steps to prepare for it. This situation stems partly from the complex nature of drought, which affects various sectors of society in different ways, and partly from an inability or unwillingness of governments to accept drought as a normal part of climate, not as an extreme random event. Scientific and policy communities have become increasingly concerned about the inability of governments to respond to drought in an effective and timely manner, and some have called for improved drought planning and management. This paper discusses planning as a means to reduce societal vulnerability to drought and outlines an approach that governments and international organizations can follow to prepare for severe drought. The basis of this approach is a ten-step planning process created from recommendations made at the 1986 International Symposium and Workshop on Drought. The status of drought planning worldwide is also discussed.

Keywords: drought, planning, policy, impacts

Drought is the most complex and least understood of all natural hazards, affecting more people than any other hazard.¹ This paper will provide an overview of drought that will attempt to explain this apparent contradiction. If drought affects more people than any other natural hazard, it is logical to assume that it is a well-studied and well-understood phenomenon. A recent report estimates that more than 40 million people in Africa alone were affected by drought during the decade of the 1980s,² a huge increase over previous decades. The same study estimated that 24.4 million people were affected by drought worldwide during the 1970s.

Although droughts of the 1980s in Africa, China, South and Southeast Asia, and South America demonstrated the vulnerability of developing nations to the ravages of drought, recent droughts in the United States, Australia, and Canada have demonstrated the continuing vulnerability of all nations to this extreme climatic event. The cost of the impacts of the 1988 drought in the United States, for example, has been estimated at \$40 billion.³ With increasing recognition of the potential impacts and policy implications of climate change and the likelihood that severe meteorological events such as drought may increase in frequency and intensity, policy makers and others have become concerned about the current inability of all nations to prepare for and respond effectively to this hazard of nature.

The impact of drought is often exacerbated by human beings. The earth's rapidly expanding population is placing an ever-increasing demand on our limited water resources and accelerating environmental degradation. Droughts of moderate intensity that formerly caused only minor impacts may now result in serious economic consequences and environmental impacts. Thus, it may be difficult to determine whether it is the frequency of drought that is increasing, or simply our vulnerability to it.

Following an overview of drought and its principal characteristics, this paper discusses planning as a means to reduce societal vulnerability to drought and outlines an approach that governments and international organizations can follow to prepare for severe drought. Although planning for drought is not a new concept,^{4,5} it is one that has received little attention in the scientific literature and even less attention from policy makers worldwide. If progress is to be made in society's ability to effectively respond to drought, government must first accept it as a normal part of climate and not an extreme and random event. Governments should accept drought as a policy issue, one in which intervention (planning) will reduce impacts, lessen vulnerability, and, ultimately, increase society's coping capacity.

Drought: An Overview

Drought occurs in high- as well as low-rainfall areas. It is a condition relative to some long-term average balance between rainfall and evapotranspiration in a particular area, a balance often perceived as "normal." For this reason it is sometimes difficult for many to visualize the occurrence of "drought" in southeast Asia, Brazil, the southeastern United States, or other humid areas. Drought is related not only to the amount of precipitation but also to the timing (i.e., seasonality, delays in the start of the rainy season, occurrence of rains in relation to the principal phenological stages of crop growth) and the effectiveness of the rains (i.e., rainfall intensity, number of rainfall events). Also, average rainfall is not an adequate statistical measure of the rainfall characteristics in a given region, especially in drier areas. That is one reason the Australian approach to tracking rainfall deficiency areas nationwide relies on the decile approach.^{6,7} This statistical technique is based on the median, a better measure of the distribution of precipitation amounts.

Drought is a "creeping phenomenon,"⁸ making an accurate prediction of either its onset or end a difficult task. To most observers it seems to start with the delay or failure of the rains. Others suggest it can be identified only in retrospect. Tannehill,¹⁹ for example, noted:

We have no good definition of drought . We may say truthfully that we scarcely know a drought when we see one. We welcome the first clear day after a rainy spell. Rainless days continue for a time and we are pleased to have a long spell of such fine weather. It keeps on and we are a little worried. A few days more and we are really in trouble. The first rainless day in a spell of fine weather contributes as much to the drought as the last, but no one knows how serious it will be until the last dry day is gone and the rains have come again . . . we are not sure about it until the crops have withered and died.

Drought severity, too , is difficult to determine. It is dependent not only on the duration, intensity, and geographical extent of a specific episode but also on the demands made by human activities and by the vegetation on a region's water supplies. Of course, these demands change with time and thus impacts must be viewed as dynamic.

Drought's characteristics along with its far-reaching impacts make its effects on society, economy, and environment difficult, though not impossible, to identify and quantify. The significance of drought should not be divorced from its societal context. Although it may be confined to a single season, it may also extend for several seasons or for several years. Regardless of its duration, however, its impacts on society may linger for many years after the event has terminated. Also, the impact of a drought depends largely on society's vulnerability at that particular moment. Subsequent droughts in the same region will probably have different effects, even if identical in intensity, duration, and spatial characteristics.

Common to all types of drought is the fact that they originate from a deficiency of precipitation that results in water shortage for some economic activity or vulnerable population group. Clearly, many natural and human factors may ultimately affect the availability of water to society. Sometimes this shortage coincides with periods of high temperature, low humidity, and/or high wind speed. Water shortages related to drought, however, must be considered a relative, rather than absolute, condition.

Defining Drought

Because drought affects so many economic and social sectors, scores of definitions have been developed by a variety of disciplines. In addition, because drought occurs with varying frequency in nearly all regions of the globe, in all types of economic systems (socialist and capitalist), and in developed and developing countries alike, the approaches taken to define it also reflect regional differences as well as differences in ideological perspectives.¹⁰⁻¹² Impacts also differ from one location to the next depending on the societal context in which drought is occurring. Therefore, a universal definition of drought is an unrealistic expectation, except possibly in the most general terms.

Definitions of drought have been categorized as either conceptual or operational.¹² Conceptual definitions generally define the boundaries of the concept of drought and thus are very generic in their description of the phenomenon. These dictionary-type definitions express drought as "a long period with no rain, especially during a planting season."¹³ Operational definitions attempt to identify the onset, severity, and termination of drought

episodes. Definitions of this type are often used in an “operational” mode but can also be used to analyze drought frequency, severity, and duration for a given historical period. An operational definition might be one that compares daily precipitation values to evapotranspiration (ET) rates to determine the rate of soil water depletion, and expresses these relationships in terms of drought effects on plant behavior at various stages of crop development. The effects of these meteorological conditions on plant growth would be reevaluated continuously by agricultural scientists as the growing season progresses.

There are many disciplinary perspectives of drought, each defining it in terms of different physical, biological, and/or social factors. Wilhite and Glantz¹² have grouped definitions into four disciplinary perspectives on the basis of an analysis of more than 150 definitions:¹³ meteorological, agricultural, hydrologic, and socioeconomic. Meteorological definitions were found to be the most prevalent, defining drought solely on the basis of the degree of dryness (often in comparison to some normal amount) and the duration of the dry period. These definitions are highly region specific since the meteorological conditions that result in drought are highly variable around the world. Agricultural drought definitions link various characteristics of meteorological drought to agricultural impacts, focusing on precipitation shortages, differences between actual and potential evapotranspiration, soil water deficits, and so forth. Hydrologic drought definitions are concerned more with the effects of dry spells on surface or subsurface water supply, rather than with the meteorological explanation of the event. They are often out of phase with both meteorological and agricultural droughts.¹⁴ Finally, socioeconomic drought definitions can contain elements of all other definitions in association with the supply and demand of some economic good. Yevjevich¹⁵ has suggested that the time and space processes of supply and demand are the two basic processes that should be considered for an objective definition of drought. Heathcote,¹⁶ for example, defined agricultural drought as a “shortage of water harmful to man’s agricultural activities. It occurs as an interaction between agricultural activity (i.e., demand) and natural events (i.e., supply), which results in a water volume or quality inadequate for plant and/or animal needs.”

It is clear that the many disciplinary views of drought have generated scores of definitions. Because of these numerous and diverse disciplinary views, considerable confusion often exists over exactly what constitutes a drought. It has been noted that the lack of a precise and objective definition in specific situations has been an obstacle to understanding drought, which has led to indecision and/or inaction on the part of managers, policy makers, and others.¹² It must be accepted that the importance of drought lies in its impacts. Thus definitions should be impact and region specific in order to be used in an operational mode by decision makers.

Drought Impacts

The impacts of drought are diverse and often ripple through the economy. Thus, impacts are often referred to as direct or indirect or are assigned an order of propagation (i.e., first-, second-, or third-order). Conceptually speaking, the more removed the impact from the cause, the more complex the link to the cause. In other words, a loss of yield resulting from drought is a direct or first-order impact of drought. However, the consequences of that

impact (e.g., loss of income, farm foreclosures, outmigration, government relief programs) are secondary or tertiary impacts. As noted by Kates et al.,¹⁷ first-order impacts are usually of a biophysical nature, while higher-order impacts are usually associated with socioeconomic valuation, adjustment responses, and long-term "change." Yevjevich et al.¹⁸ have suggested that the study of drought problems would be facilitated if drought was considered in a systems context (i.e., relating the complex interrelationships and feedbacks between physical, social, and environmental systems). A model illustrating a systems view of drought is shown in figure 1.

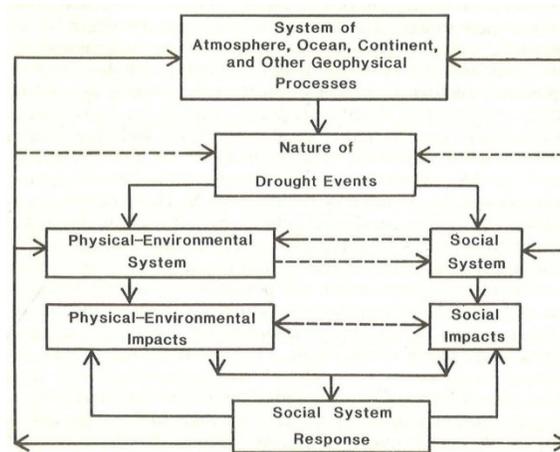


Figure 1. Drought viewed in a systems context.¹⁸

The study of the first-order or direct impacts of drought and other climate-related events has the best-developed methodology. Good examples of this methodology are studies of the relationships between weather and crop yield.^{19,20} Kates et al.¹⁷ have suggested that the most common second-order impacts studied are those of hunger and malnutrition and economic disruption. Good examples of studies of the third-order impacts of drought are those that have evaluated responses to drought by government and others.²¹⁻²⁴

Responding to Drought: A Plan of Action

There is global concern within the scientific and policy communities about the inability of governments to respond to drought in an effective and timely manner. In the past decade, numerous "calls for action" for improved drought planning and management have been issued by national governments, professional organizations, international organizations, and others.²⁵⁻²⁷ As a result a few governments have begun to develop and implement drought plans. The key questions now are: (1) How can society capitalize on the progress to date? and (2) How should governments proceed to develop drought plans?

1. Drought Policy vs. Drought Planning: Terminology

The objectives of a drought *policy* differ from those of a drought *plan*. There must be a clear distinction of these differences at the outset of the planning process. A drought policy will be broadly stated and should express the purpose of government involvement in drought assessment, mitigation, and assistance programs. Drought plan objectives are more specific and action-oriented. Typically, the objectives of drought policy have **not** been stated explicitly by government. What generally exists is a *de facto policy*, one defined by the most pressing needs of the moment. Ironically, under these circumstances, it is the specific instruments of that policy (such as assistance measures, including grants and low-interest loans, and so forth), particularly at the federal level, that define the objectives of the policy.

Without clearly stated drought policy objectives, the effectiveness of assessment and response activities is difficult to evaluate. The objectives of drought policy will differ considerably between state and national levels of government and regional alliances of states. Three objectives of a national and/or state drought policy have been proposed.³⁰ First, assistance should encourage or provide incentives for agricultural producers, municipalities, and other water-dependent sectors or groups to adopt appropriate and efficient management practices that help to alleviate the effects of drought. Past relief measures have, at times, discouraged the adoption of appropriate management techniques. This objective emphasizes the importance of preparing for or managing drought risks as a routine course of business. Second, assistance should be provided in an equitable, consistent, and predictable manner to all without regard to economic circumstances, industry, or geographic region. Assistance can be provided in the form of technical aid or relief measures. Whatever the form, those at risk would know what to expect from government during drought and thus would be better prepared to manage risks. Third, the importance of protecting the natural and agricultural resource base must be recognized. Like the first objective, this one emphasizes the importance of long-term, far-sighted solutions. In many countries, drought relief measures included under the second objective pertain mainly to the federal government because states or provinces generally do not have the financial resources available to provide more than a minimum level of financial assistance during emergencies. However, many states, as well as the federal government, provide technical assistance in times of emergency.

What is drought planning? For the purpose of this paper, drought planning is defined as actions taken by individual citizens, industry, government, and others in advance of drought for the purpose of mitigating some of the impacts and conflicts associated with its occurrence. From an institutional perspective, drought planning should include, but is not limited to, the following activities:

- a) A monitoring/early warning system to provide decision makers at all levels with information about the onset, continuation, and termination of drought conditions and their severity.
- b) Operational assessment programs to reliably determine the likely impact of the drought event in a timely manner.

- c) An institutional structure for coordinating governmental actions, including information flow within and between levels of government, and drought declaration and revocation criteria and procedures.
- d) Appropriate drought assistance programs (both technical and relief) with predetermined eligibility and implementation criteria.
- e) Financial resources to maintain operational programs and to initiate research required to support drought assessment and response activities.
- f) Educational and public awareness programs designed to promote an understanding and adoption of appropriate drought mitigation and water conservation strategies among the various economic sectors most affected by drought.

To be successful, drought planning must be integrated between levels of government.

Governments are advised to develop drought policy objectives in advance of a drought plan. The objectives of drought policy can be achieved only if they are formulated at the initiation of the planning process. The entire planning process can then be structured around these basic themes. At the initiation of this process, government officials should consider many questions to help them define an appropriate drought policy, including

- What is the purpose and role of government in drought mitigation efforts?
- What will be the scope of the plan (i.e., agricultural, municipal, multi-impact)?
- What are the most drought-prone areas?
- Who are the most vulnerable population groups?
- What are the most vulnerable sectors of the economy?
- Will a drought plan provide assistance to resolve conflict between water users during periods of shortage? If so, how will resolution be achieved?
- What resources (human and economic) is government willing to commit to the planning process and in support of the plan once it is completed?
- What are the legal and social implications of the plan?
- What are the principal environmental concerns associated with drought?

Answers to these and other questions should help to determine the objectives of drought policy and, therefore, focus the drought planning process.

2. Planning for Drought: How to Proceed

A key part of the planning process is the initial stimulus that leads to the development of a drought plan. The stimulus may be the occurrence of severe drought and concomitant impacts that significantly affect the economy of the state, region, or nation. The recent significant increase in the number of drought plans in the southeastern United States, for example, was largely the result of the dry period extending from the fall of 1985 through 1988. In other cases, the predominant stimulus has been the presence of a particular person, such as a politician, agency head, or scientist, sometimes in combination with the occurrence of drought. For example, in 1981 Colorado's governor Richard D. Lamm, following

the dry conditions of 1976–77 and 1980, recommended the development of a drought plan. Experience, the expectation of future droughts, and the desire to improve Colorado's response effort were key factors in his decision.

Identifying the principal obstacles or impediments to drought planning may be the first step in any attempt to initiate the development of a drought plan. Wilhite and Easterling²⁹ have listed impediments identified by participants at an international workshop on drought planning. These impediments include an inadequate understanding of drought, uncertainty about the economics of preparedness, lack of skill in drought prediction, variability in societal vulnerability to drought, information gaps and insufficient human resources, inadequate scientific base for water management, and difficulties in identifying drought impact sensitivities and adaptations.

The key factors inhibiting drought planning actions at the state level in the United States are most likely an inadequate understanding of drought and the uncertainty about the economics of preparedness. Drought is often viewed by policy makers and bureaucrats as an extreme event and, implicitly, rare and of random occurrence. Thus, drought may be viewed as an act of nature, something that is outside of government control. However, if drought continues to be perceived by policy makers as a quirk of nature—one for which there can be no planning—there will be no planning. The benefits of drought planning must be demonstrated to decision makers in precise terms.

Policy makers and bureaucrats should understand that droughts, like floods, are a normal feature of climate. Their recurrence is inevitable. Drought manifests itself in ways that span the jurisdiction of numerous bureaucratic organizations (e.g., agricultural, water resources, health, and so forth) and levels of government (e.g., federal, state, and local). Competing interests, institutional rivalry, and "turf protection" impede the development of concise drought assessment and response initiatives. To solve these problems, policy makers and bureaucrats, as well as the general public, must be educated about the consequences of drought and the advantages of preparedness. Drought planning requires input by several disciplines, and decision makers must play an integral role in this process.

The development of a drought plan is a positive step that demonstrates governmental concern about the effects of a potentially hazardous and recurring phenomenon. Planning, if undertaken properly and implemented during nondrought periods, can improve governmental ability to respond in a timely and effective manner during periods of crisis. Thus, planning can mitigate and, in some cases, prevent some impacts while reducing physical and emotional hardship. This, in turn, could improve the constituents' perception of government. Planning should also be a dynamic process that reflects socioeconomic, agricultural, and political trends.

It is sometimes difficult to determine the benefits of drought planning versus the costs of drought. There is little doubt that drought preparedness requires financial and human resources that are, at times, scarce. This cost has been and will continue to be an impediment to the development of drought plans. Preparedness costs are fixed and occur now while drought costs are uncertain and will occur later. Further complicating this issue is the fact that the costs of drought are not solely economic. They must also be stated in terms of human suffering and the degradation of the physical environment, items whose values are inherently difficult to estimate.

Post-drought evaluations have shown assessment and response efforts of state and federal governments with a low level of preparedness to be largely ineffective, poorly coordinated, untimely, and economically inefficient.^{22,23,25,31} Unanticipated expenditures for drought relief programs can also be devastating to state and national budgets. For example, during the droughts of the mid-1970s in the United States, specifically 1974, 1976, and 1977, the federal government spent more than \$7 billion on drought relief programs.²² As a result of the drought of 1988, the federal government spent \$3.9 billion on drought relief programs and \$2.5 billion on farm credit programs. A disaster relief package of nearly \$1 billion was also passed by the U.S. Congress in August 1989 in response to a continuation of drought conditions. Between 1970 and 1984 state and federal government in Australia expended more than A\$925 million on drought relief under the Natural Disaster Relief Arrangements.³⁰ The Republic of South Africa has spent R2.5 billion for drought relief in the past decade.²⁴ When compared to these expenditures, a small investment in mitigation programs in advance of drought would seem to be a sound economic decision.

It is important to remind decision makers and policy officials that, in most instances, drought planning efforts will use *existing* political and institutional structures at appropriate levels of government, thus minimizing startup and maintenance costs. It is also quite likely that some savings may be realized as a result of improved coordination and the elimination of some duplication of effort. Also, drought plans should be incorporated into general natural disaster and/or water management plans wherever possible. This would reduce the cost of drought preparedness substantially. Politicians and many other decision makers simply must be better informed about drought, its impacts, and alternative management approaches and how existing information and technology can be used more effectively to reduce the impact of drought at a relatively modest cost.

3. A Planning Process for Government

In 1986 the International Symposium and Workshop on Drought was held at the University of Nebraska.²⁹ The symposium was organized to review and assess our current knowledge of drought and to determine what research and information was needed to improve national and international capacity to cope with drought. The workshop's purpose was to draw attention to drought as a policy issue, one that can be managed more effectively through an interdisciplinary and cooperative effort from the scientific and policy communities. The ultimate goal of the workshop was to establish the rudiments for a "plan of action" to facilitate drought preparedness on a global scale. The results of these discussions were summarized in a ten-step planning process that government at various levels could follow in the development of a drought plan.³²

This planning process has continued to evolve since its inception in 1986. A model drought planning process for state government in the United States, based on the ten steps, is currently under development.³³ The primary purpose of this model will be to facilitate the preparation of drought contingency plans by state government decision makers. What is proposed is a process, with accompanying rationale, that government decision makers can follow to develop and implement plans to improve drought mitigation efforts through more timely, effective, and efficient assessment and response activities. The framework presents the principal steps in the planning process in order for government to best address

their drought-related concerns. However, the process is intended to be flexible, and governments can add or delete steps as necessary.

The intent here is not to present a detailed discussion of each of these steps. What is included is a very brief description of the purpose and elements of each step as it relates to the overall planning process.

Step 1. Appointment of National/State Drought Committee

The drought committee should be appointed by the president or governor and should include representatives from all relevant departments of government. This committee will be composed of senior policy makers. The committee will supervise and coordinate the development of the plan.

Step 2. Statement of Drought Policy and Planning Objectives

Drought policy objectives will express the purpose of government involvement in assessment, mitigation, and assistance programs. Drought plan objectives will be more specific and action-oriented and will outline a means to obtain the policy objectives.

Step 3. Resolving Conflict between Environmental and Economic Sectors

Actions should be taken by the drought committee to incorporate the input of all important environmental and economic sectors early in the planning process so that conflict will be reduced during periods of drought.

Step 4. Inventory of Natural, Biological, and Human Resources and Financial and Legal Constraints

This inventory will reveal the assets and liabilities that might enhance or inhibit fulfillment of the objectives of the planning process.

Step 5. Development of the Drought Plan

The drought plan will have three primary organizational components: monitoring and early warning; assessment of impact; and response. These committees will be composed of technical representatives of the primary federal and/or state agencies. Formal linkages must exist between each of these components. The monitoring committee must track all principal indicators of water availability and meet frequently to determine geographical areas of principal concern. The impact assessment committee must determine the likely impacts of water deficiencies. The response committee's responsibility is to identify and evaluate potential response options (short- and long-term) to mitigate the effects of drought. A flow chart of the organizational structure of the drought plan is shown in figure 2.

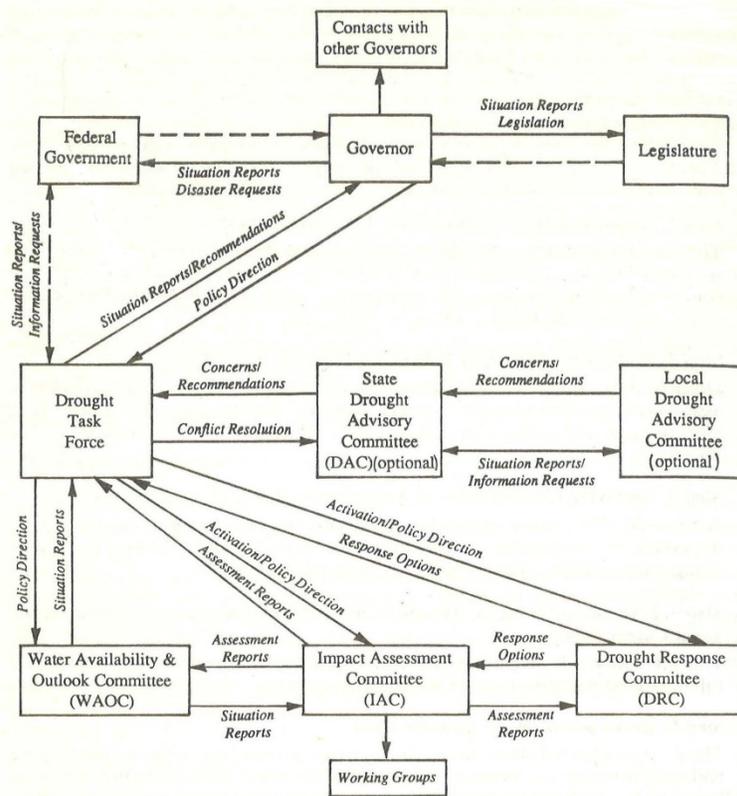


Figure 2. A drought plan flow chart.³³

Step 6. Identification of Research Needs and Information Gaps

The purpose of this step is to identify research needed in support of the objectives of the drought plan and to recommend research necessary to remove deficiencies that may exist. The research needs and information gaps will be identified by the monitoring, impact assessment, and response committees. These committees will make recommendations to the national/state drought committee for further action.

Step 7. Synthesis of Scientific and Policy Issues

Direct and extensive contact is required between scientists and policy makers to distinguish what is feasible from what is desirable. Typically little contact between these two groups takes place. The purpose of this step is to identify ways to break down the barriers that exist between disciplines and between scientists and policy makers.

Step 8. Implementation of Drought Plan

The drought plan should be implemented by the national/state committee to give maximum visibility to the program and to give credit to the government departments that have a leadership role in its operation.

Step 9. Development of Multilevel Educational and Training Programs

Educational and training programs must be long-term in design, concentrating on a broad audience ranging from policy makers to extension personnel to individual citizens.

Step 10. Development of Drought Plan Evaluation Procedures

The drought plan must be evaluated and revised periodically to remain responsive to the needs of each country. Two modes of evaluation are recommended. The first is a continuous (every one to two years) evaluation and revision to adjust the plan in light of political, economic, and social changes. The second mode of evaluation follows an episode of severe drought in which the plan was activated. A post-drought evaluation of the plan should be undertaken by a nongovernmental organization to ensure an unbiased appraisal of the assessment and response actions.

4. Status of Drought Planning

Governments worldwide have shown increased interest in drought planning since the early 1980s. Several factors have contributed to this interest. First, the widespread occurrence of severe drought over the past several decades and, specifically, the years during and following the extreme ENSO event of 1982–83 have focused attention on the vulnerability of all nations to drought. Second, the costs associated with drought are now better understood by government. These costs include not only the direct impacts of drought but also the indirect costs (i.e., personal hardship, the costs of response programs, and accelerated environmental degradation). Nations can no longer afford to allocate scarce financial resources to short-sighted response programs that do nothing to mitigate the effects of future droughts. Finally, increased awareness of climate change coupled with the prospects that the intensity and frequency of extreme meteorological events such as drought will increase have highlighted the importance of preparing now for both of these climatic uncertainties. From an institutional point of view, learning today to deal more effectively with climatic events such as drought may serve us well in preparing proper response strategies to long-term climate-related issues.

Two examples are given to illustrate recent governmental interest in and progress toward drought planning. The first example is from the United States; the second from southern Africa. In the United States, state government has become the major policy innovator in the field of drought planning. In 1975, there was not a single state with a formal drought plan in place. South Dakota developed the first drought plan in 1977,³⁴ largely in response to the severe 1976–77 water shortages that affected most of the western United States. In 1982, two additional states were added to the list: Colorado and New York. At present, twenty states have drought plans and another ten states are in various stages of plan development (fig. 3). These plans differ considerably in their structure and comprehensiveness, but at least many states have taken a first step to address the unique assessment and response problems associated with drought.

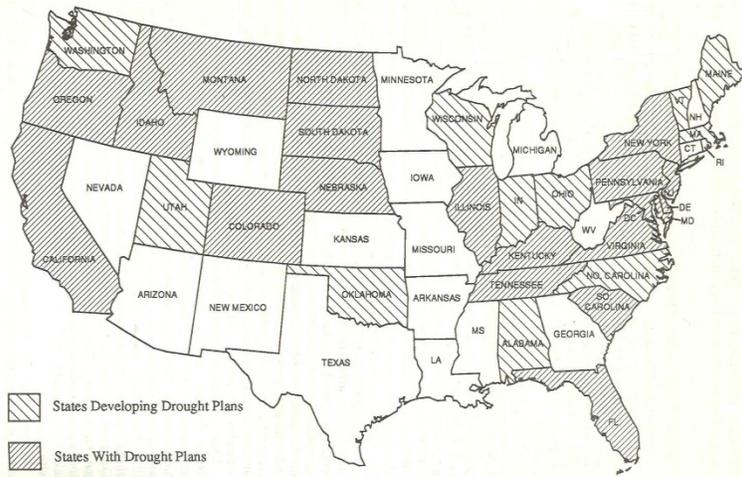


Figure 3. Status of drought planning in the United States, June 1989 (based on a survey of states).

In southern Africa, the Southern African Regional Commission for the Conservation and Utilization of Soils (SARCCUS) recently organized a series of workshops to address the issues of drought prediction, impact assessment, and planning from a regional perspective. SARCCUS is composed of six countries in southern Africa: Botswana, South Africa, Lesotho, Swaziland, Malawi, and Namibia/South West Africa. Their goal is to develop a regional plan to help mitigate the impacts of drought. SARCCUS is recommending that each of its member nations develop a drought plan along the guidelines of the ten-step planning process previously discussed. The preparation of a regional plan will then be facilitated by the existence of national plans with a similar organizational structure.

A recent training seminar on drought preparedness in Botswana for the countries of southern and eastern Africa is further evidence of progress in the region. The purpose of this seminar was to improve the ability of governments to plan for and cope with drought. The principal audience for this seminar was senior-level policy officials. The World Meteorological Organization (WMO) and the International Affairs Division of the US National Oceanic and Atmospheric Administration (NOAA) is organizing a series of these seminars as a follow-up to a 1986 call for the development of national drought response plans.²⁷ These seminars are a spinoff of the 1986 International Symposium and Workshop on Drought²⁹ that the WMO and NOAA helped to sponsor. Similar seminars are scheduled for Brazil, South America, and South and Southeast Asia.

The challenge of changing the perception of policy makers and scientists worldwide about drought is a formidable one. The typical mode of operation for government is crisis management. It is indeed a difficult task for government to engage in long-range planning. However, the progress made toward planning in recent years demonstrates a new awareness and improved understanding of drought and its impacts on individual citizens, economic development, and the environment.

Conclusions: Where Do We Go from Here?

Developing a drought policy and plan is recommended as an effective means of improving the assessment and response capacity of government. The objectives of drought policy indicate the purpose of government involvement in assessment, mitigation, and relief programs. Drought planning, on the other hand, was defined as actions taken by individual citizens, industry, government, and others in advance of drought for the purpose of mitigating some of the impacts and conflicts associated with its occurrence. The terms are congruous; however, the objectives of a drought plan are more specific and action-oriented. The development of a drought plan must be supported and initiated at the highest levels of government to be successful.

Recent droughts have given governments in developed and developing countries a new appreciation of their vulnerabilities to this natural hazard. Historically, interest in preparing for the next drought has quickly waned when the rains returned. Did recent droughts teach governments a valuable lesson about the need for planning? Or will they simply return to their old ways when the rains have come again, apathetic about drought's inevitable recurrence and poorly prepared to deal effectively with its impacts? One can argue that although some degree of apathy is unavoidable, the issue of drought planning will remain an important agenda item for many governments worldwide.

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