Local Government, Community, and Business

Working Group Draft Report

June 15, 1999

(Joy Harwood, Economic Research Service)

The main conclusions from most recent ERS-USDA "Managing Risk in Agriculture" report (www.econ.ag.gov/), which focuses on the farm-level income risks associated with natural disasters (such as drought), as well as some other thoughts, include:

The economic impacts of droughts and other natural disasters can be quite different depending on the supply and demand characteristics for different commodities. For major field crops grown in a wide variety of geographic areas (such as wheat), the impact of severe drought in specific locations (and hence, low supplies) on increasing prices (as well as price variability) tends to be less than for crops that are produced in narrower geographic areas and that have fewer substitutes (such as lettuce or apples).

In addition to government programs, farmers have many alternative strategies that they can use to manage the risks associated with droughts and other natural disasters. These include diversification, both across different geographic areas and across different types of commodities. A farmer who has both livestock and several crops is less likely to be severely affected by drought, for example, than a farmer who has a monoculture. Also, farmers can use various types of contracting, can hedge in futures markets, etc., to reduce the price risks associated with natural disasters. Cultural practices (such as irrigation and planting varieties with different maturity dates), can help mitigate the income risks associated with drought, and Government programs--such as crop insurance and NAP--are also important.

USDA's Agricultural Resource Management Study (ARMS) is a comprehensive annual survey that recently asked questions regarding risk management. The highest percentage of farms indicated that they would draw upon cash on hand to help mitigate the risks associated with droughts and other natural disasters. Producers in the smallest sales classes (<$50,000) are much less likely to use different tools and strategies (contracting, hedging, diversification) than are larger-scale farmers. This situation has implications for educating producers as to ways to mitigate the income-risk effects of drought--especially smaller-scale farmers. (It's also important to keep in mind that these small-scale farmers are also more likely to rely on off-farm income to a much larger extent than larger farms--which can also help reduce income risk in the face of disasters.)

The income risks associated with droughts and other natural disasters tend to be less in the major growing areas than in peripheral areas of production. In major growing areas (such as the Corn Belt for corn), low yields tend to be highly correlated with high prices, and vice versa. This relationship works as a *natural hedge* that helps stabilize income (calculated as price * yield) risk. In addition, major producing areas inherently tend to have lower yield risk. Thus, the *peripheral* producing areas tend to have higher inherent income risk, compounded by both higher yield variability and a weaker *natural hedge.* These areas are more likely to be adversely affected by drought, and to realize the greatest impact on farm-level income risk.

Bankers and other lenders are well aware of the risks of drought and the impacts on farm incomes. In risky situations, lenders use various strategies to protect their interests. Lenders

in higher-risk areas may charge higher interest rates, be quicker to limit loan amounts, charge special fees, etc. Situations in which government programs are known in advance regarding payouts in drought situations (e.g., crop insurance) are more likely to be more favorably viewed by lenders (and result in more favorable terms to farmers) than those that are ex post and are uncertain as to their implementation.

Research indicates that younger producers are more likely to participate in risk mgt. programs than are older farmers. In addition, participation tends to be positively associated with education, the percent of crop acres on the farm, total farm acres, and the degree of farm leverage.

Needless to say, extended droughts can have a major impact on rural communities. When producers have less money to spend in heavily agricultural-dependent areas, local businesses realize severe impacts in addition to the farmers themselves. This can have implications for not only businesses, but schools and other rural institutions.

4 (B) (1) RESPONSE: (DRAFT 6/23/99)

There is a universal need for a National Drought Policy, implemented on a Federal level, which seeks to eliminate the situational response to drought disaster, to define the Federal response, and to coordinate the available drought resources. It may also refine the Federal approach by addressing some of the problems that impede disaster response such as overlapping program authorities, unfunded or suspended programs, and differing program mandates.

There are many federal, state, and local programs that respond to drought problems. The greatest need is for a coordinated response mechanism that will implement a systematic and organized response. Such a formal mechanism (FEMA) is in place for other national disaster events such as floods or hurricanes, which are clearly defined and visible. However, no such response mechanism exists for drought emergencies, which unfold gradually and take place in a larger, more complex environment. Although drought response programs may exist in permanent form, their activation tends to be ad hoc, triggering events differ, and information is scattered. There is no single point of contact. Communities must discover assistance programs and navigate the various program requirements and constraints as best they can. The result is confusion and frustration in accessing the relevant programs.

In order to meet the needs of local communities, individual, and businesses, a unified approach is needed among federal, state, and local governments. The impact of drought on a community is often directly correlated to its impact on the community's economic base. While the greatest impact tends to be on the agricultural or recreation sectors, the impact of the drought creates a ripple effect throughout the local community. Certain needs that tend to be universally apparent in drought-affected communities include;

Social

- Public health problems, related to more concentrated airborne pollutants, cross-connection contamination, diminished sewage flow, and reduced fire-fighting capacity, must be addressed.
- Economic disruption caused by drought often results in a reduction of tax revenues to localities, often at a time when drought-response claims on local resources increase.
- Conflicts may arise among end-users of water resources, such as agricultural, business, environmental, and residential users. Communities need to have a strategy to resolve such conflicts.
- Increased transportation costs related to loss of river navigability may lead to increased costs for communities and residents.
- Communities that are heavily dependent on drought-stricken industries, such as agriculture and tourism, often suffer from population migration to urban areas or other agricultural regions. This causes both increased costs of dealing with the dislocation, as well as a decrease in the economic tax base.
- The impact of drought is often unequally distributed, falling most heavily on groups of people dependent on drought-stricken industries. The impact often falls heavily on individuals least able to deal with it, such as casual workers and their families. Communities need to develop methods of identifying and responding to the needs of these groups.

- Increased energy demand, often concurrent with increased costs of using more expensive energy sources in the absence of hydropower, result in distribution problems and higher costs to end-users.

Individuals and Families

- Unemployment often increases as a result of drought-related production declines and a resultant decrease in commercial activity.
- Consumers often must deal with higher food prices, shortages of certain food items, and higher utility costs.
- In addition to the health problems noted above, individuals must also deal with stress-related problems, such as anxiety, depression, and domestic violence, resulting from economic disruption.

Economic and Business Concerns

- In largely agricultural economies, the loss of income by farmers/ranchers affects the cash flow of both agriculture-dependent businesses such as implement or seed dealers, and "main street" businesses which are dependent on the buying power of the agricultural community.
- In non-agricultural economies, businesses which depend on water flow, such as marinas or water recreation businesses, may suffer adverse impact, as will businesses in the "green industries'—nurseries, landscapers, etc.
- With every drought-affected business, no matter the industry, the loss of revenues leads to working capital shortages, erosion of capital, and inability to meet normal operating expenses. Perhaps the greatest short-term need of such businesses is access to credit in the form of credit lines, working capital loans, or debt restructure.

- At the same time lenders, faced with increased non-performance rates in their lending portfolio, may be unable or unwilling to lend to businesses that are at increased risk due to drought-related economic conditions.
- Over the long-term perspective, the effect of prolonged drought on small business may be more serious. In areas in which reduced moisture may be a long-term reality, it may not be economically feasible for some businesses to remain in operation in their current form. These businesses may need technical assistance and access to capital to assist them to adapt to a business activity less reliant on water or a water-dependent economy.

Development of a National Drought Policy needs to be pursued in the context of a national water resources policy. It should encourage states, regions, and communities to depend on planning and mitigation rather than response, and should encourage communities to plan and act wisely in resource allocation and contingency planning.

In the context of a national drought policy, communities need assistance in developing a drought contingency plan in advance of the occurrence of a drought disaster. Community planning processes need to deal with all phases of a drought disaster, including preparedness, response, recovery, and mitigation. The plan should address both long- and short-range issues, and should establish the criteria for decision-making and prioritization. It should also include a public awareness and education component. In order to optimize resources, the community may find it useful to bundle drought planning into the process of water supply planning or community hazard planning. Some critical components of such a plan are:

- An emphasis on planning and mitigation rather than response
- An assessment of vulnerability to drought on a local and regional basis, including the economic and social impact of drought.

- An assessment of water availability, sources, distribution systems, demand, and use on a local and regional basis.
- An assessment of governmental and community resources available to assist in providing assistance and disseminating information.
- An evaluation of community development plans and the amount of new development sustainable given the available water supply.
- Coordination with other communities in developing preparedness, mitigation, and response plans.

In order to accomplish these tasks, communities need resources and support in developing such a plan. They need a coordinated source of information on what governmental programs are available, what triggers various programs, and how to access them. They also need assistance in coordinating state, regional, and local planning efforts. Additionally, such program information must have a source of continuity and updating, so that current information is available when it is needed and knowledgeable personnel is available to implement the programs.

SECTION 4 (B) (4)

Determine what differences exist between the needs of local communities, governments, and businesses affected by drought and the Federal laws and programs designed to mitigate the impacts of and respond to drought.

Summary. There are emergency, tactical and strategic drought response programs. Emergency measures are used in unexpected situation, and as a safety net when all other options have failed. Tactical responses are planned before droughts, within the context of existing laws and infrastructure, and are designed to meet anticipated problems. Tactical plans are tailored to specific regional drought problems and must be tested and updated regularly. Strategic responses such as new water supply projects, new water allocation laws or rulings, and landmark legislation set the context within which communities and businesses plan for drought. Strategic programs often address more than just drought issues. Changes in strategic programs are difficult and rare, by design.

For the most part, existing tactical drought response mechanisms, including Federal laws and programs, do a good job of minimizing drought impacts to communities and businesses (see exception in discussion of SBA program).

But these programs do not satisfactorily relieve the anxiety that droughts engender in communities. There are two primary reasons for this disparity. First, if bureaucracies take too long to "get up to speed" on their drought response, communities and businesses lose confidence that government can deal with the drought. It is not unusual for the startup of a drought response to be badly choreographed, since enough time passes between droughts that we are not practiced in the application of our own programs; drought plans become outdated and experienced staff move to new positions. Moreover, each agency's tentativeness is magnified because drought mitigation must be coordinated among agencies and communicated with stakeholders. Federal and State agencies often do not have a plan of coordination developed and tested prior to a drought. Each drought program has different eligibility criteria. Response times vary from one program to the next. Program triggering mechanisms may not be coordinated.

The second reason that concern outstrips impacts is that droughts stimulate public discussion of changes in strategic measures, such as subsidies and water rights. Taken together, these factors create conflict and headlines even if existing programs ultimately prevent economic trauma.

Thus, the primary shortcoming of existing Federal programs for tactical drought response is that they are not practiced, tested, and coordinated with non-Federal drought responses between droughts. Drought exercises or "virtual droughts", if properly designed can also reduce or manage fears about strategic institutional changes because they create a forum where "worst case" conditions can be explored and new policy options tested in a non-crisis atmosphere. In fact, the strategic changes that are feared by some may be beneficial to society as a whole. The primary examples of these long term policy changes are (1) the shift from government drought relief to drought preparedness and individual risk planning, and (2) change in water allocation, including water rights, to higher and better uses, meaning uses that provide greater economic or financial returns or greater environmental benefits.

Concern often outweighs drought impacts. Impacts of the drought on California stakeholders during the 1987-1992 drought were catalogued by the Corps as part of its National Drought Study. Economic impacts were surprisingly small. One study of residential economic impacts in the Los Angeles and San Francisco Bay areas indicated that per household economic costs were less than five dollars per week in the San Francisco Bay area and less than two-and-a-half dollars per week in the Los Angeles region. About 90%of the estimated costs result from replacing dead landscaping, purchasing irrigation water for landscape conservation, and xeriscaping. There are significant qualifications on these household economic impact estimates. Like most phenomena that occur during multi-year droughts, it is impossible

to determine the impact of the drought alone - what would the investment in conservation would have been during normal weather? Thus, these estimates are probably excessive. Second, there are errors inherent in the sampling. Third, adjustments to water scarcity, such as xeriscaping, may reduce future costs, and thus are really investments. These costs were small and must be compared to the prime alternatives, which are additional water supply (opposed in most cases because of the environmental costs) or more economically efficient water allocation. But efforts at reallocating California water supply set off legislative and court battles that continue to this day, so it cannot be considered an obviously superior solution.

Direct agricultural impacts included significant amounts of land left idle and increased water costs. Agriculture did not suffer substantial impacts until 1991, the fifth year of the drought. While California registered a record agricultural revenue of $18.3 billion in 1990, revenue declined in 1991. However, irrigated agriculture adapted to the drought and direct economic losses were limited to about $250 million in California in 1991, about 1-1/2 percent of the agricultural revenue for the state that year. Much of the reduction in California agricultural output caused by the drought was offset by increases in other regions of the country. A study that modeled the economic impacts (as signified by the sum of producer and consumer surplus) of drought on California and the nation in 1991 indicated that the total national impacts were less than 30 percent of the impacts in California ($80 million versus $276 million, respectively), for the crops modeled. The reluctance of farmers to buy all the water available in the California Water Bank indicates that the reduction in crops produced was a reasonable economic outcome, although it may have had dire financial consequences to individual farmers. The Corps did not track financial indicators, such as the number of bankruptcies.

Another industry affected by the drought was the "Green Industry" including landscaping and gardening. Drought-induced economic losses in 1991 were estimated to include the loss of about 5,630 full-time jobs, and a reduction of about $460 million in gross revenue from the 1990 total of $7 billion.

The lack of impacts in other industrial and commercial industries has been attributed to a number of factors, including exemptions for some industries from mandatory water allocation rules, implementation of new water conservation practices, and in a few cases, substitution of groundwater for surface water.

Although the environmental, agricultural, and urban sectors account for much of the adverse impacts of the drought, the drought also affected water quality and recreation. Total recreation days (a recreation day is the visit of one person to a recreation area for any part of one day) declined

by 20 percent between 1987 to 1991. The drought also had major impacts on tourist activities such as skiing in the Sierra Nevada, houseboating on reservoirs, and fishing for salmon and striped bass.

The impact to electric utilities is hard to define; they produced the same amount of power, replacing lost hydroelectricity with more expensive natural gas and out-of-state power purchases. The replacement costs were mostly passed down to consumers. These costs increased marginal electricity costs to consumers by approximately three cents per kilowatt-hour. Based on this estimated marginal cost increase, the drought cost state ratepayers an estimated $3.8 billion from 1987 to 1992 (calculated by multiplying estimated lost hydropower production by 3 cents per kilowatt-hour). This amounted to roughly $21 per person per year. The total revenue from all electricity sold to ultimate consumers exceeded $107 billion during this period. Hydropower production is bound to go down in severe droughts; the only issue is whether the losses can be efficiently reduced. Hydropower plant operators use sophisticated financial analyses that incorporate drought time operations, so cost effective internal modifications to improve production during drought will be made. Further gains generally require tradeoffs with other water uses.

While estimated economic losses in California were significant, they pale in comparison to the Gross State Product reported at $619.4 and $631 billion for the years 1990 and 1991 respectively (Economic Report of the Governor 1992).

Far beyond the impacts on the environment, agriculture, urban economies, and other sectors and activities, the drought also had a significant impact on the public's perception of water use, and the institutions that manage water in California. The human significance of the 1987-92 drought was highlighted by news coverage and political turmoil that persisted for years. Anxiety derived from these impacts was magnified by a number of issues, including: uncertainty about the duration and the anticipated quantum leap in impacts beyond the sixth year; clashes of social traditions and values associated with advocates of growth, environment, and agriculture; and connection with national debates on issues such as the Endangered Species Act and "jobs versus environment." The "Three-Way Process," - discussions between representatives from agricultural, urban, and environmental groups on water sharing - were going well before the drought, but collapsed during the drought

Examples of proscribed Federal programs. Most people associate FEMA with disaster assistance, but FEMA actually plays a small role in drought response. The Stafford Act circumscribes FEMA's authority to assisting State and local governments in lessening the loss of life, human suffering,

loss of income, and damage to improved property. The Stafford Act is not designed to address agricultural, cultural, or environmental losses. USDA, DOI, and USACE programs have the statutory authority to provide assistance for drought impacts on wildlands and rural communities. Even once drought spreads into urban centers, many other programs are authorized by SBA or covered by the State (such as unemployment insurance programs). Only when there is an unmet need - such as a food and water shortage for communities, individuals and families, has FEMA been able to provide assistance. For example, in 1998, extreme food and water shortages in the Federated States of Micronesia and Republic of the Marshall Islands resulted in a Presidential major disaster declaration. FEMA coordinated relief efforts with several other Federal agencies.

Similarly, under a disaster declaration by the Secretary of Agriculture, Small Business Administration (SBA) assistance is limited to those businesses which have suffered economic injury as a direct result of the declared agricultural disaster. For example, an implement dealer who suffered economic injury because of farmers' inability to purchase implements due to the impact of drought damage to their agricultural operations would be eligible. Other needs may be addressed through the regular Business Loan programs. SBA Disaster Assistance Program is excluded by statute from assisting agricultural enterprises, under a broad definition that excludes all farming and agriculture-related enterprises. The USDA inclusion is more narrowly defined. As a result, certain agriculture-related businesses, such as tree farms, maple syrup producers, stables, and aquaculturists, are not eligible under either program. We believe that the solution is to broaden the USDA inclusion to include such agriculture related businesses. While non-disaster SBA programs may offer assistance to small business concerns including agricultural enterprises, the statutory definition of a small business concern for an agricultural enterprise could be considered restrictive.

Possible shortcomings in strategic programs. Some have suggested that farmers and ranchers need to adopt a more self-reliant approach. Farmers are in a precarious position, with the viability of their way of life closely linked to government policies. The "Freedom to Farm" Act in 1995 increased farmers' vulnerability to fluctuations in the global marketplace - thereby decreasing the overall resilience of their operations to other hardships such as drought. If the past is an indicator of the future, when these farmers consequently face financial disasters because of drought, Congress will vote for relief funds. One strategic option is to create an agricultural policy that adequately buffers small farming operations from the worst weather and market fluctuations. Another approach would be for the government to acknowledge the risk inherent in farming, and to support a risk-management approach to farming, focusing on providing good information

to agricultural decision-makers, with criteria for "bailouts" clearly defined in advance. Australia is an example of a country that has taken this approach.

Federal agencies can act as technology transfer centers during drought exercises to ensure risk management tools are available to all farmers and ranchers to make them more self reliant. Drought exercises can also assure that farmers and ranchers are engaged in the policy making process, and that policy changes occur methodically, not in response to a crisis.

Farmers already have many alternative strategies that they can use to manage the risks associated with droughts and other natural disasters. These include diversification, both across different geographic areas and across different types of commodities. A farmer who has both livestock and several crops is less likely to be severely affected by drought, for example, than a farmer who has a monoculture. Also, farmers can use various types of contracting, can hedge in futures markets to reduce the price risks associated with natural disasters. Cultural practices (such as irrigation and planting varieties with different maturity dates), can help mitigate the income risks associated with drought, in tandem with Government programs--such as crop insurance and NAP (spell out?).

USDA's Agricultural Resource Management Study (ARMS) is a comprehensive annual survey that recently asked questions regarding risk management. The highest percentage of farms indicated that they would draw upon cash on hand to help mitigate the risks associated with droughts and other natural disasters. Producers in the smallest sales classes (annual revenues less than $50,000) are much less likely to use different tools and strategies (contracting, hedging, diversification) than are larger-scale farmers. This situation has implications for educating producers as to ways to mitigate the income-risk effects of drought--especially smaller-scale farmers. (It's also important to keep in mind that these small-scale farmers are also more likely to rely on off-farm income to a much larger extent than larger farms--which can also help reduce income risk in the face of disasters.)

The income risks associated with droughts and other natural disasters tend to be less in the major growing areas than in peripheral areas of production. In major growing areas (such as the Corn Belt for corn), low yields tend to be highly correlated with high prices, and vice versa. This relationship works as a "natural hedge" that helps stabilize income (calculated as price * yield) risk. In addition, major producing areas inherently tend to have lower yield risk. Thus, the "peripheral" producing areas tend to have higher inherent income risk, compounded by both higher yield variability and a weaker "natural hedge." These areas are more likely to be adversely affected by drought, and to realize the greatest impact on

farm-level income risk.

Bankers and other lenders are well aware of the risks of drought and the impacts on farm incomes. In risky situations, lenders use various strategies to protect their interests. Lenders in higher-risk areas may charge higher interest rates, be quicker to limit loan amounts, charge special fees, etc. Situations in which government programs are known in advance regarding payouts in drought situations (e.g., crop insurance) are more likely to be more favorably viewed by lenders (and result in more favorable terms to farmers) than those that are ex post and are uncertain as to their implementation.

Research indicates that younger producers are more likely to participate in risk management programs than are older farmers. In addition, participation tends to be positively associated with education, the percent of crop acres on the farm, total farm acres, and the degree of farm leverage.

Sec4 ***(b)(5) "collaborate with the Western Drought Coordination Council and other appropriate entities in. order to consider regional drought initiatives and the application of such initiatives at the national level. "***

Report from the United States Army Corps of Engineers will be submitted as will the report from the Western Drought Coordination Council for this question. Other material that may be submitted:

Introduction

Collaboration within regional drought planning strategies, response, and mitigation activities require a comprehensive understanding of the various factors that define drought and resources and services that may be employed. Understanding the complexity of resources that can be used to develop and support a national and state drought policy must consider the interaction of environmental, economic and social impact. Policy that defines, prepares, and can respond with the appropriate level of service and support in meeting the comprehensive local needs at any given point in time.

The National Drought Mitigation Center provides invaluable monitoring and scientific research to help local, state and national proactive planning and response strategies to drought. They continue to monitor state and international efforts of governments to clarify the role of policy and actions in drought prediction, planning and mitigation.

An Internet search regarding policy and programs in use area of drought reveals numerous efforts in state and local government in taking on the

challenge of planning and preparing for the agricultural and economic losses due to drought. The was acknowledgment by many groups of the need for integrating the three elements of environmental, economic and social aspects caused by drought but very few of the sites presented policy positions that provided for this integration, especially social needs. Thus, national policy that defines drought conditions relative to the level of impact in these three are as is needed. Definitions of drought conditions relative to a policy positions when certain threshold are met in economic, environmental and social would help the overall coordination of national, state and local level program and resources.

Agency Response
Comments centered around the following three key issues regarding regional drought initiatives and the role national policy might play in improving the coordination of local, state and federal governments in preparedness and response.

Preparedness/Planning

- Area-wide or regional planning organization can play a strong role in planning, interpreting data and information, and providing education and coordinate resources during but advance time is needed.

- Federal and State agencies need to work with local communities to design and provide incentives to plan and install water recycling/reuse practices.

- A regional drought information, monitoring and technology sharing program are needed.

- Policy should plainly spell out preparedness, response, and mitigation measures to be provided by each entity at a given point in time, for specific purposes.

Response

- Individual businesses and communities should play work towards recycling of gray water and other water conservation efforts before and during drought periods to conserve water supply.

- Develop a national drought policy or framework that integrates actions and responsibilities among all levels of government (federal, state, regional, and local).

- Understand the role and resources of various service providers in meeting the environmental, economic and social impacts of drought.

Mitigation/Direct aid (could use more information here)

- FEMA offers two types of non-disaster specific preparedness grants: Disaster Preparedness Improvement Grants and Emergency Management State and Local Assistance Grants. A similar initiative, designed specifically for drought activities and implemented at a national level, might be very helpful to States in mitigating the effects of drought. In the future, these two grants may be consolidated into one Emergency Management Performance Grant.

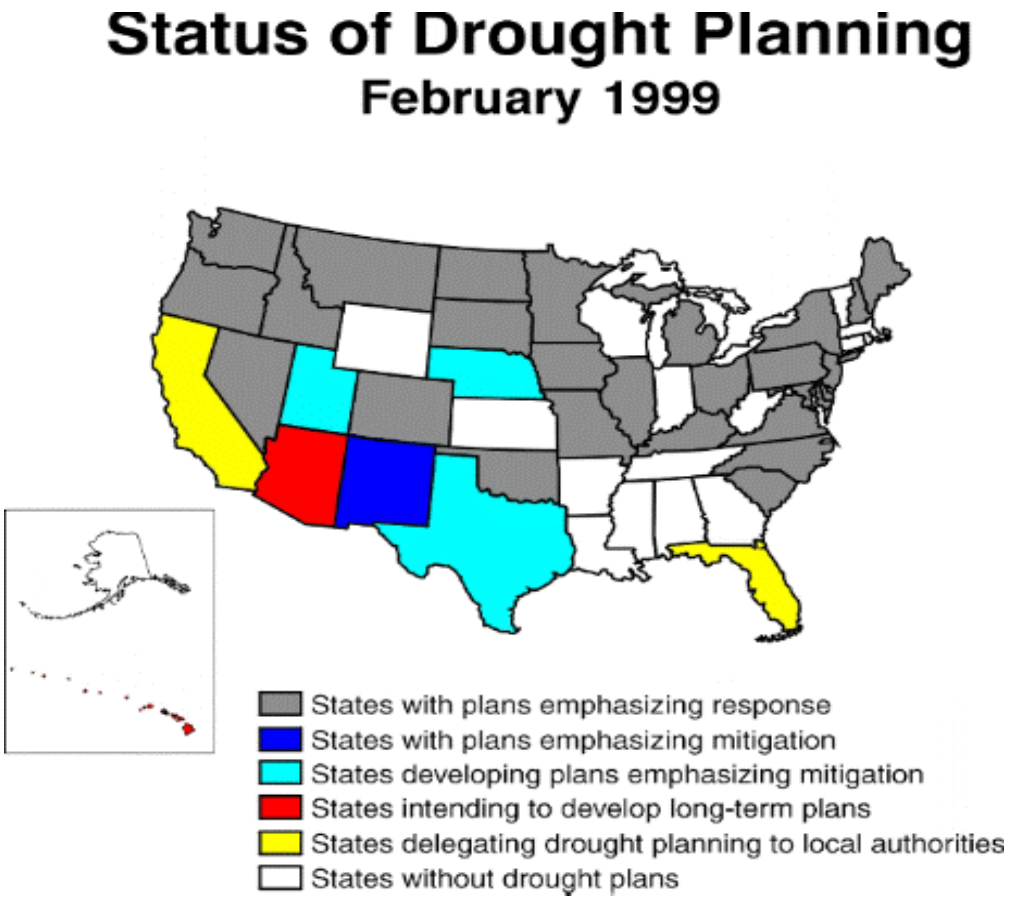
Brief examples of drought exercises currently underway as presented by the Federal Agencies.

- The Interstate Commission on the Potomac River Basin Commission holds an annual drought exercise to assure drought plans are up to date, and to train new staff to deal with events that may not occur for a decade.

- The Seattle district of the Corps of Engineers uses a " shared vision model" to help resolve potential dispute in the management of releases from Howard Hansen reservoir. The model was built with stakeholder participation, so there is a high degree of trust in its simulations.

- The Tarrant Regional Water District, Ft. Worth-Arlington, TX conducted a virtual drought two years ago. This was a collaborative effort using the Corps Section 22 Planning Assistance to States authority referenced in our "drought authorities".

- The national Drought Mitigation Center web site indicates that as of February 1999, 30 state ad drought plans, two delegated planning to local authorities instead of having a single state-level plan and two states' plans were in development. Map below taken from the web illustrates the innovative states.



Drought Assessment

A critical area of national support is in the financial support of local, state and federal agency's in assessing their planning, response and mitigation action after a drought event. Some examples that have added much to the shared knowledge of government and communities is the following:

- Huntington District of the Corps of Engineers led a successful drought study response to the 1988 drought in the Kanawha River Basin which will, it is believed, reduce impacts to the whitewater rafting industry by millions of dollars in future droughts, while also improving water quality. Additional details can be provided.

- "Drought Response Action Plan" by the Western Governors' Association, November 1996.

- "Drought of '96", Multi-State Drought Task Force Findings, FEMA, August, 1996

It is important for the Commission to appreciate the number of findings in drought management's limitation and strength over the past few years. Federal and State agencies have documented many of these areas. The National Drought Mitigation Center has captured this information and designed solutions into communication and education material used at the local and state level.

National Policy

An important role for the National Drought Policy Commission is to work with the States and Tribes to define the various levels of drought conditions. The three areas of environmental, economic and social should be designed as a matter of policy. Local, state and national programs can respond to a clear set of standard or conditions that define and predicate when their interest and resources can be applied to local problems. Australia's Drought Plan is worth review in this regard. In summary the three key objectives of their National Drought Policy are repeated here for consideration.

- Encourage primary producers and other sections of rural Australia to adopt self-reliant approaches to managing the risks stemming from climatic variability.

- Maintain and protect Australia's agricultural and environmental resource base during periods of extreme climate stress.

- Insure early recovery of agricultural and rural industries constant with long-term sustainable levels.

National policy of the US should be designed like a coiled spring that under ever-increasing load (drought conditions) the various levels of program resources, technical expertise and direct aid are systematically employed to provide an equivalent increase in resistance to negative aspects of drought. National policy could play an important role in recognizing and supporting the various levels of interest in responding to drought conditions. The point to the illustration below is that when economic and social impacts become stronger the demand of society on governments to respond becomes stronger also. Policy could recognize the role of existing programs and resources when mild environmental conditions exist. When negative economic and social impacts increase the response must change to a target approach and in worst cases directs aid or support.

Attachment – Material maybe added to text as part of supporting documentation or as findings to support a need for a national drought policy. This maybe covered in other ways already.

WGA comments

The recent population growth in several of the drought stricken states and associated increases in water demands *coupled with many states' lack of* experience in handling drought for the last 10 years-have exacerbated the crisis.

The last western regional response drought coordinated by WGA was the 1976-77 drought period, when WGA did an admirable job of representing the collective concerns of western states with the Congress and the Administration. Unfortunately, a structure and process to deal with future prolonged droughts and issue resolution were not put in place at that time. Therefore, it has taken several months for WGA to fully recognize the extent and impact of the Southwest's current drought on its member states, and begin addressing these states' collective concerns. WGA's actions were activated once the Federal Drought Task Force scheduled a meeting of impacted states, and *the State of* New Mexico focused Congressional and Executive Branch attention to the issue.

In most all cases, government agencies at all levels lack a standard policy for handling any drought-regardless of its duration or impacts-providing confusion and a lack of understanding of roles and responsibilities. The absence of management structures has also eroded the sustainability of policy development.

The lack of state-wide preplanning for some states, plus the absence of organizational structures and processes to identify and resolve issues, facilitate networking, and identify and promote partnerships also hinder reaction time and effectiveness.

At the federal level, droughts have historically been treated, as unique, separate events even though there have been frequent, significant droughts of national consequences over the years. Actions are taken mainly through special legislation and ad hoc action measures rather than through *a systematic and* permanent process, as occurs with other natural disasters. Frequently, adequate funding to assist states with related impacts is also unavailable.

To complicate matters, several federal agencies have a role in providing drought assistance, ranging from predicting, forecasting, and monitoring of conditions; providing planning and technical assistance; and dispensing financial aid and resource assistance. The absence of a lead agency to

handle drought--in addition to the lack of federal interagency coordination --has significantly reduced the federal government's ability to provide adequate support over the long term.

Perhaps the most untenable shortcoming at the federal level has been the lack of assistance for states to build capacity and emphasize long-term drought mitigation measures. Compounding this issue are modernization, downsizing, budget restrictions, and changing programs and authorities, making the process extremely frustrating for states, affected citizens, and businesses.

Recommendations

Develop a national drought policy or framework that integrates actions and responsibilities among ad] levels of government (federal, state, regional, and local). This policy should plainly spell out preparedness, response, and mitigation measures to be provided by each entity.

Ensure that each state develops a drought contingency plan that includes early detection, monitoring, decision-making criteria, short- and long-range planning, and mitigation. Programs addressing public awareness and education on drought and water conservation should a1so be included.

Establish a regional drought policy and coordinating council to develop sustainable policy, monitor drought conditions and state responses, identify impacts and -issues for resolution, facilitate interstate activities, and work m' partnership with the federal government to address need-s brought on by the drought. The council --consisting of policy makers and drought managers--would assist states in developing drought preparedness, response, and mitigation action plans. Finally, it could heighten awareness of drought and its impacts at both the Administration and congressional levels of government.

Establish a federal interagency coordinating group with a designated lead agency for drought coordination with states and regional agencies. This group should determine the federal government's role in drought response and mitigation. They should also seek to focus federal response and information so that states and local governments have access to "one-stop shopping."

Provide federal funding for the National Drought Mitigation Center to assist states with drought preparedness, planning, and mitigation. This center should serve as a clearinghouse for information on mitigation, planning, and preparedness activities; provide a regional/ national climate

monitoring system; and develop a national/regional database of state drought response resources.

Ensure that drought is an essential element in any national discussion of water policy. This is particularly true for western water policy, where water is critical to the region's sustainability. Drought must also be addressed as an integral part of the Western Water Policy Review Commission's assessment currently in progress.

First published: November 15, 1995

Understanding and Defining Drought

The Concept of Drought

Drought is a normal, recurrent feature of climate, although many erroneously consider it a rare and random event. It occurs in virtually all-climatic zones, although its characteristics vary significantly from one region to another. Drought is a temporary aberration and differs from aridity since the latter is restricted to low rainfall regions and is a permanent feature of climate.

Drought is an insidious hazard of nature. Although it has scores of definitions, it originates from a deficiency of precipitation over an extended period of time, usually a season or more. This deficiency results in a water shortage for some activity, group, or environmental sector. Drought should be considered relative to some long-term average condition of balance between precipitation and evapotranspiration (i.e., evaporation + transpiration) in a particular area, a condition often perceived as "normal." It is also related to the timing (i.e., principal season of occurrence, delays in the start of the rainy season, occurrence of rains in relation to principal crop growth stages) and the effectiveness of the rains (i.e., rainfall intensity, number of rainfall events). Other climatic factors such as high temperature, high wind, and low relative humidity are often associated with it in many regions of the world and can significantly aggravate its severity.

Drought should not be viewed as merely a physical phenomenon or natural event. Its impacts on society result from the interplay between a natural event (less precipitation than expected resulting from natural climatic variability) and the demand people place on water supply. Human beings often exacerbate the impact of drought. Recent droughts in both developing and developed countries and the resulting economic and environmental impacts and personal hardships have underscored the vulnerability of all societies to this "natural" hazard.

There are two main kinds of drought definitions: conceptual and operational.

Conceptual Definitions of Drought

Conceptual definitions, formulated in general terms, help people understand the concept of drought. For example:

Drought is a protracted period of deficient precipitation resulting in extensive damage to crops, resulting in loss of yield.

Conceptual definitions may also be philosophically important in establishing drought policy. For example, Australian drought policy incorporates an understanding of normal climate variability into its definition of drought. The country provides financial assistance to farmers only under "exceptional drought circumstances," when drought conditions are beyond those that could be considered as part of normal risk management. Declarations of exceptional drought are based on science-driven assessments. Previously, when drought was less well defined from a policy standpoint and less well understood by farmers, some farmers in the semiarid Australian climate claimed drought assistance every few years.

Operational Definitions of Drought

Operational definitions help people identify the beginning, end, and degree of severity of a drought. (A "lite" description of operational definitions is also available.)

To determine the beginning of drought, operational definitions specify the degree of departure from the average of precipitation or some other climatic variable over some time period. This is usually done by comparing the current situation to the historical average, often based on a 30-year period of record. The threshold identified as the beginning of a drought (e.g., 75% of average precipitation over a specified time period) is usually established somewhat arbitrarily, rather than on the basis of its precise relationship to specific impacts.

An operational definition for agriculture could compare daily precipitation values to evapotranspiration rates to determine the rate of soil moisture depletion, and express these relationships in terms of drought effects on plant behavior (i.e., growth and yield) at various stages of crop development. A definition such as this one could be used in an operational assessment of drought severity and impacts by tracking meteorological variables, soil moisture, and crop conditions during the growing season, continually reevaluating the potential impact of these conditions on final yield. Operational definitions can also be used to analyze drought frequency, severity, and duration for a given historical period. Such definitions, however, require weather data on hourly, daily, monthly, or other time scales and, possibly, impact data (e.g., crop yield), depending on the nature of the definition being applied. Developing a climatology of drought for a region provides a greater understanding of its characteristics and the probability of recurrence at various levels of severity. Information of this type is extremely beneficial in the development of response and mitigation strategies and preparedness plans.

Disciplinary Perspectives on Drought:
Meteorological, Hydrological, Agricultural and Socioeconomic

Meteorological Drought

Meteorological drought is defined usually on the basis of the degree of dryness (in comparison to some "normal" or average amount) and the duration of the dry period. Definitions of meteorological drought must be considered as region specific since the atmospheric conditions that result in deficiencies of precipitation are highly variable from

region to region. For example, some definitions of meteorological drought identify periods of drought on the basis of the number of days with precipitation less than some specified threshold. This measure is only appropriate for regions characterized by a year-round precipitation regime such as a tropical rainforest, humid subtropical climate, or humid mid-latitude climate. Locations such as Manaus, Brazil; New Orleans, Louisiana (U.S.A.); and London, England, are examples. Other climatic regimes are characterized by a seasonal rainfall pattern, such as the central United States, northeast Brazil, West Africa, and northern Australia. Extended periods without rainfall are common in Omaha, Nebraska (U.S.A.), Fortaleza, Ceará (Brazil), and Darwin, Northwest Territory (Australia); a definition based on the number of days with precipitation less than some specified threshold is unrealistic in these cases. Other definitions may relate actual precipitation departures to average amounts on monthly, seasonal, or annual time scales.

Agricultural Drought

Agricultural drought links various characteristics of meteorological (or hydrological) drought to agricultural impacts, focusing on precipitation shortages, differences between actual and potential evapotranspiration, soil water deficits, reduced ground water or reservoir levels, and so forth. Plant water demand depends on prevailing weather conditions, biological characteristics of the specific plant, its stage of growth, and the physical and biological properties of the soil. A good definition of agricultural drought should be able to account for the variable susceptibility of crops during different stages of crop development, from emergence to maturity. Deficient topsoil moisture at planting may hinder germination, leading to low plant populations per hectare and a reduction of final yield. However, if topsoil moisture is sufficient for early growth requirements, deficiencies in subsoil moisture at this early stage may not affect final yield if subsoil moisture is replenished as the growing season progresses or if rainfall meets plant water needs.

Hydrological Drought

Hydrological drought is associated with the effects of periods of precipitation (including snowfall) shortfalls on surface or subsurface water supply (i.e., stream flow, reservoir and lake levels, ground water). The frequency and severity of hydrological drought is often defined on a watershed or river basin scale. Although all droughts originate with a deficiency of precipitation, hydrologists are more concerned with how this deficiency plays out through the hydrologic system. Hydrological droughts are usually out of phase with or lag the occurrence of meteorological and agricultural droughts. It takes longer for precipitation deficiencies to show up in components of the hydrological system such as soil moisture, stream flow, and ground water and reservoir levels. As a result, impacts are out of phase with those in other economic sectors because different water use sectors depend on these sources for their water supply. For example, a precipitation deficiency may result in a rapid depletion of soil moisture that is almost immediately discernible to agriculturalists, but the impact of this deficiency on reservoir levels may not affect hydroelectric power production or recreational uses for many months. Also, water in hydrologic storage systems (e.g., reservoirs, rivers) is often used for multiple and competing purposes (e.g., flood control, irrigation, recreation, navigation, hydropower,

wildlife habitat), further complicating the sequence and quantification of impacts. Competition for water in these storage systems escalates during drought and conflicts between water users increase significantly.

Hydrological Drought and Land Use

Although climate is a primary contributor to hydrological drought, other factors such as changes in land use (e.g., deforestation), land degradation, and the construction of dams all affect the hydrological characteristics of the basin. Because regions are interconnected by hydrologic systems, the impact of meteorological drought may extend well beyond the borders of the precipitation deficient area. For example, meteorological drought may severely affect portions of the northern Rocky Mountains and northern Great Plains region of the United States. However, since the Missouri River and its tributaries drain this region to the south, there may be significant hydrologic impacts downstream. Similarly, changes in land use upstream may alter hydrologic characteristics such as infiltration and runoff rates, resulting in more variable stream flow and a higher incidence of hydrologic drought downstream. Bangladesh, for example, has shown an increased frequency of water shortages in recent years because land use changes have occurred within the country and in neighboring countries. Land use change is one of the ways human actions alter the frequency of water shortage even when no change in the frequency of meteorological drought has been observed.

Sequence of Drought Impacts

The sequence of impacts associated with meteorological, agricultural, and hydrological drought further emphasizes their differences. When drought begins, the agricultural sector is usually the first to be affected because of its heavy dependence on stored soil water. Soil water can be rapidly depleted during extended dry periods. If precipitation deficiencies continue, then people dependent on other sources of water will begin to feel the effects of the shortage. Those who rely on surface water (i.e., reservoirs and lakes) and subsurface water (i.e., ground water), for example, are usually the last to be affected. A short-term drought that persists for 3 to 6 months may have little impact on these sectors, depending on the characteristics of the hydrologic system and water use requirements.

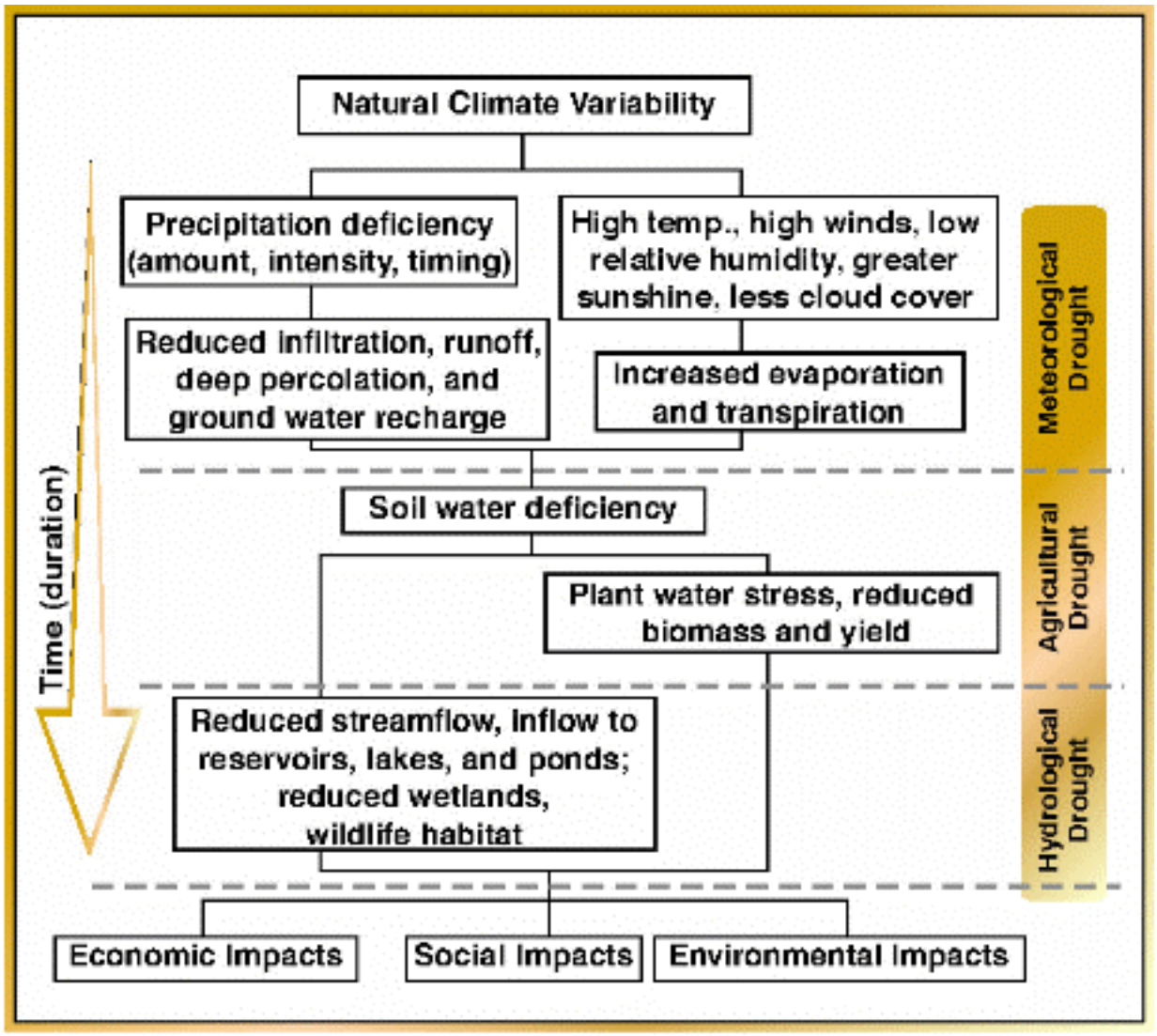
When precipitation returns to normal and meteorological drought conditions have abated, the sequence is repeated for the recovery of surface and subsurface water supplies. Soil water reserves arereplenished first, followed by stream flow, reservoirs and lakes, and ground water. Drought impacts may diminish rapidly in the agricultural sector because of its reliance on soil water, but linger for months or even years in other sectors dependent on stored surface or subsurface supplies. Ground water users, often the last to be affected by drought during its onset, may be last to experience a return to normal water levels. The length of the recovery period is a function of the intensity of the drought, its duration, and the quantity of precipitation received as the episode terminates.

Socioeconomic Drought

Socioeconomic definitions of drought associate the supply and demand of some economic good with elements of meteorological, hydrological, and agricultural drought. It differs

from the aforementioned types of drought because its occurrence depends on the time and space processes of supply and demand to identify or classify droughts. The supply of many economic goods, such as water, forage, food grains, fish, and hydroelectric power, depends on weather. Because of the natural variability of climate, water supply is ample in some years but unable to meet human and environmental needs in other years. Socioeconomic drought occurs when the demand for an economic good exceeds supply as a result of a weather-related shortfall in water supply. For example, in Uruguay in 1988-89, drought resulted in significantly reduced hydroelectric power production because power plants were dependent on stream flow rather than storage for power generation. Reducing hydroelectric power production required the government to convert to more expensive (imported) petroleum and stringent energy conservation measures to meet the nation's power needs.

In most instances, the demand for economic goods is increasing as a result of increasing population and per capita consumption. Supply may also increase because of improved production efficiency, technology, or the construction of reservoirs that increase surface water storage capacity. If both supply and demand are increasing, the critical factor is the relative rate of change. Is demand increasing more rapidly than supply? If so, vulnerability and the incidence of drought may increase in the future as supply and demand trends converge.



Updated: February 24, 1999

U.S. States as Policy Innovators

Because water shortfalls are first local and regional issues, and because of the lack of a cohesive U.S. water policy, states have emerged as important innovators in devising ways to reduce long-term vulnerability to drought. During the widespread U.S. drought of 1976-77, no state had a formal drought plan, and in 1982, only three states had drought plans. But as of February 1999, 30 states had drought plans (states in gray and blue on the map), two delegated planning to local authorities instead of having a single state-level plan, 16 did not have formal drought plans, and two states' plans were in development.

Research has shown that the frequency of drought in a state does not fully explain how committed a state is to drought planning. Most but not all of the more drought-prone western states are committed to drought planning, as are many states in the east, where drought is a less obvious feature of the climate. Trends in federal-state relations in the 1980s, as well as the drought of 1987-88, may be responsible for the surge in drought planning. During the 1980s, states' capabilities increased in conjunction with the Reagan administration's New Federalism and concurrent mandates to state and local governments; states were concerned about federal intrusion into state-level water resource planning and water rights; and there was friction between states and the Federal Emergency Management Agency (FEMA) in FEMA's early days. Innovations in water management, such as ground water management policies and water use permits in riparian states, may also have spurred drought planning. (For more on why states do and don't plan for drought, please refer to "State-level Drought Planning in the United States: Factors Influencing Plan Development," by Donald A. Wilhite and Steven L. Rhodes, in *Water International*, Vol. 19, No. 1.)
An NDMC survey of U.S. states' drought mitigation activities yielded a variety of ideas, demonstrating that drought mitigation can be addressed in many ways.

The Drought Planning Process
Developing a drought plan is a critical part of drought mitigation. The complexity of drought impacts requires a preventive, anticipatory approach to vulnerability reduction. How can governments reduce vulnerability to drought? The first steps involve the formulation of a drought policy with clearly stated objectives and the development of a preparedness plan that lays out a strategy to achieve these objectives.
Drought preparedness plans promote a more preventive, risk management approach to drought management. They reduce vulnerability to drought and dependence on emergency assistance from governments and international organizations. The process of developing a plan will identify vulnerable areas, population groups, and economic and environmental sectors. The process also seeks to identify data and informational gaps and research and institutional needs. Ultimately, preparedness plans will improve coordination within and between levels of government, procedures for monitoring, assessing, and responding to water shortages; information flow to primary users; and efficiency of resource allocation. The goals of these plans are to reduce the impacts of water shortages, personal hardships, and conflicts between water and other natural resource users. These plans should promote self-reliance by systematically addressing issues of principal concern to the region or nation in question. To be successful, drought preparedness plans must be integrated between levels of government and with other national plans or strategies, such as those to ensure food security and combat desertification.
Australia's drought policy reflects a risk-management approach rather than a crisis-management approach.
Drought preparedness plans contain three critical components: (1) a comprehensive early warning system; (2) vulnerability and impact assessment procedures; and (3) response and mitigation strategies. These components complement one another and represent an

integrated institutional approach that addresses both short- and long-term management and mitigation issues.
The 10-step process described in the Drought Planner's Handbook for developing a national or provincial drought preparedness plan has been used by many governments, with appropriate modifications. The process emphasizes strengthening existing institutions rather than developing new ones.

Drought Mitigation Tools for States

The following grab-bag of drought mitigation tools for state governments is based on two surveys of states, one published in 1993 and one that is ongoing. Tools (that is, initiatives) are listed two ways: by category, and then by state or river basin commission. In other words, the list of "legislation and public policy" drought mitigation tools includes suggestions from several different states, but the "California" list is made up of many different steps taken by California's Department of Water Resources. Many ideas naturally fit into more than one category, but are only listed once, so it probably wouldn't hurt to look over the whole list to find ideas that would work in your area.
The 1993 survey was undertaken as part of a cooperative agreement with the U.S. Soil Conservation Service (now the Natural Resource Conservation Service). Its objectives were to identify primary state, federal and regional players in U.S. drought planning, to identify and describe the drought prediction, assessment and mitigation strategies in use, to analyze the role of the SCS in drought planning, and to identify top priorities for federal drought planners.
The current survey is part of the NDMC's ongoing communication with drought planners around the country. We recently asked state governors to identify the primary drought planner in their state, and then contacted the planners to ask how the NDMC could be of most assistance, what drought-related concerns states face, and what they are doing in response to those concerns.
Caution: The following ideas are the results of a survey of what states have done. They are not necessarily recommendations. Not all ideas are appropriate in all cases. Many of the ideas are more in the realm of short-term emergency response, or crisis management, rather than long-term mitigation, or risk management. Emergency response is an important component of drought planning, but it should not be the end of drought planning. We'll soon be adding a Lessons Learned section that will include more information about what has and hasn't worked well in drought mitigation.

State Drought Mitigation Tools

* Assessment
* Legislation and Public Policy
* Increasing Water Supply

* Public Awareness and Education Programs
* Technical Assistance
* Conservation
* Emergency Response
* Conflict Resolution
* Drought Contingency Plans

Selected Overviews
* California
* Illinois
* Delaware River Basin Commission

Assessment
* Developed criteria -- "triggers" -- for drought-related actions
* Developed early warning system
* Inventoried data
* Inventoried water bank contracts to find new water supplies for drought-stricken areas
* Evaluated use of ground water
* Established new data collection networks
* Studied public willingness to pay more for more reliable water supplies
* Studied effectiveness of conservation measures
* Monitored vulnerable public water suppliers

Legislation and Public Policy
* Prepared position papers for legislature on public policy issues
* Examined statutes governing water rights for possible modification during water shortages
* Established a state water bank
* Passed legislation to protect instream flows
* Passed legislation to protect and manage groundwater
* Passed legislation providing guaranteed low-interest loans to farmers
* Imposed limits on urban development
* Developed a state water plan
* Passed legislation requiring water agencies to develop contingency plans
* Enacted legislation to facilitate water recycling

Increasing Water Supply/Supply Augmentation
* Issued emergency permits for water use
* Provided pumps and pipes for distribution
* Proposed and implemented program to rehabilitate reservoirs to operate at design capacity

* Undertook water supply vulnerability assessments
* Inventoried self-supplied industrial water users for possible use of their supplies for emergency public water supplies
* Inventoried and reviewed reservoir operation plans
* Provided funds for water recycling projects

Public Education

* Organized drought information meetings for the public and the media
* Implemented water conservation awareness programs
* Published and distributed pamphlets on water conservation techniques and drought management strategies
* Organized workshops on special drought-related topics
* Prepared sample ordinances on water conservation
* Established a drought information center
* Set up a demonstration of on-site treatment technology at visitor center
* Included media in state drought plan

Technical Assistance

* Advised people on potential sources of water
* Evaluated water quantity and quality from new sources
* Advised water suppliers on assessing vulnerability of existing supply systems
* Recommended adopting water conservation measures
* Helped water agencies develop contingency plans
* Formed a drought information center and distributed real-time weather data
* Conducted workshops on crop survival during drought
* Developed training materials in Spanish for agricultural and landscape irrigators
* Conducted workshops on design and implementation of water rationing programs
* Developed and marketed innovative technologies such as irrigation system improvements, waterless urinals, and monitoring technologies
* Developed and distributed software for irrigators and urban water suppliers

Conservation/Demand Reduction

* Established stronger economic incentives for private investment in water conservation
* Encouraged voluntary water conservation
* Required water users to decrease reliance on ground water and implement conservation measures

* Improved water use and conveyance efficiencies
* Implemented water metering and leak detection programs
* Supported local development of conservation programs
* Established standards for safe residential use of gray water

Emergency Response

* Established alert procedures for water quality problems
* Stockpiled pumps, pipes, water filters, and other equipment
* Established water hauling programs for livestock
* Listed livestock watering spots
* Established hay hotline and provided emergency shipments
* Funded water system improvements, new systems, and new wells
* Funded drought recovery program
* Lowered well intakes on reservoirs for rural water supplies
* Extended boat ramps and docks for recreation
* Issued emergency irrigation permits for using state waters for irrigation
* Created low-interest loan and aid programs for agriculture
* Created drought property tax credit program for farmers
* Established tuition assistance so farmers could enroll in farm management classes

Told farmers about sources of federal assistance

Conflict Resolution

* Resolved emerging water use conflicts
* Investigated complaints of irrigation wells interfering with domestic wells
* Negotiated with irrigators to gain voluntary restrictions on irrigation in areas where domestic wells were likely to be affected
* Clarified state law regarding sale of water
* Clarified state law on changes in water rights
* Suspended water use permits in watersheds with low water levels
* Worked with community-based organizations to promote public participation in conservation programs

Drought Contingency Plans

* Adopted an emergency water allocation strategy to be implemented during severe drought
* Recommended water suppliers develop drought plans
* Evaluated worst-case drought scenarios for possible further actions
* Established natural hazard mitigation council

SECTION 4 (B) (6)

Make recommendations on how Federal drought laws and programs can be better integrated with ongoing State, local, and tribal programs into a comprehensive

national policy to mitigate the impacts of and respond to drought emergencies without diminishing the rights of States to control water through State law and considering the need for protection of the environment."

Drought must be an essential element of any national discussion of water policy. This is true not only for western water policy where water is critical to the region's sustainability, but also to other parts of the country that are accustomed to an abundant supply of water where a drought can mean utter disaster and risk to life.

Experience of federal agencies in helping State and local units of government recover from major disasters indicates that State, local, and tribal organizations fare better when they have developed a comprehensive all-hazard mitigation plan. This helps agencies to provide and target funding to states after major disaster declarations. The same can be done for pre-disaster situations to develop hazard mitigation projects.

The Commission may want to consider a federal policy initiative that encourages local, state, federal and tribal governments to focus on watersheds as a unit of resource management. Matching institutional authority and political will to physical reality helps eliminate institutional gaps and builds community. (Water in the West, the report of the Western Water Policy Review Advisory Commission http://www.den.doi.gov/wwprac/reports/west.htm; and "Watershed Management: It's Not Just a Job, It's a Way of Life," by Janet L. Bowers, Water Resources Impact, Volume 1, Number 1). Building community -- increasing social capital, connections between people - increases resilience during drought and other catastrophes.

Integration is best achieved through testing in drought exercises or virtual droughts, that allow stakeholders and agencies to understand what a drought will be like before it happens. Mismatches in authorities or services and increased or diversified water needs can be identified and mitigation steps taken before the drought occurs.

Drought mitigation policies can be designed to support state and local units of government, community and business groups. Factors to be considered in designing drought mitigation plans that have been successfully proven include the following:

Designate one federal agency to take the leadership role for the federal agencies and collaborate with the local community. The lead agency should establish regional response teams by working with other partners including federal, state and local governments and the private sector.

Include ground water recharge as a purpose for purchasing conservation easements for the Farmland Protection Program and other land conservation easements programs in ground water recharge areas.

Work with communities to assist community residents and businesses to "re-landscape" yards, open spaces, parking lots and roof tops to use native species that conserve water,

resist evaporation, are drought resistant. Assist communities develop specifications for building and vegetation management codes and enforce vegetation management programs.

Use constructed/natural wetlands to have an additional purpose of drought mitigation as well as wildlife preservation.

Strengthen community programs so that community, local government, and business abilities to plan for drought mitigation and their ability to react and address drought situations are recognized or given preference when applying for grants, loans and general assistance to enhance their community.

Develop, and in some places, mandate the use of a physical or chemically altered soil surface to reduce evapo-transpiration.

Develop public education programs that stress drought management and mitigation. (fire danger signs; pens and magnets; educational materials for children, etc.)

Drought mitigation projects should provide a long-term solutions and be cost-effective. Building code development, nonflammable structure enhancement placement, and the establishment of community rules for vegetation placement are examples of mitigation projects.

Joy Harwood ----I have been reading various published sources that I thought might be useful, and found some interesting information in Australia's *National Drought Policy* report of 1990. (I also read a number of pieces that were very helpful background--such as the *National Study of Water Management During the Drought*--authored by one of our work group members.) I thought that the Australia report was very interesting in that it had various recommendations (which we might view as *options* for *filling in the gaps,* with both pros and cons) that would address local government and community interests (as well as agriculture) that have not yet been discussed. Also, the Australia report had very much a tone of improving competitiveness, sustainability, etc. Given that we are about to enter the next round of WTO negotiations, approaches that focus more on risk management, rather than crisis management, would likely be more readily accepted. Here are some of ideas for options:

1. Favorable tax treatment on drought-mitigation investments--Provide tax relief for: a) investments in structural improvements for the storage of grain or hay, and/or b) expenditures on structural improvements for the purposes of conserving or conveying water.

2. Integrated approach to education--Encouraging state extension and advisory services to develop whole-farm based financial decision support packages that would provide useful planning information in situations of drought, as well as other natural disasters.

3. Rural counseling--Providing appropriate support for rural conselling where there is a demonstrated need for this service at the community level (remember recent NYTimes article.)

4. Scientific research on drought-resistant crops--Increased research into the use of perennial crops and drought resistant species, including grasses, etc.

5. Favorable tax treatment on income--Consider the feasibility of extended income smoothing provisions to farmers, ranchers, and non-farm businesses.

I thought it was also interesting that the Australian report differentiated between policies providing incentives to effective farm management, and those providing industry relief. We might want to delineate the types of options that we discuss within some such type of framework.

SECTION 4(B) (7)
"Make recommendations on improving public awareness of the need for drought mitigation, and prevention, and response; and on developing a coordinated approach to mitigation, and prevention, and response by governmental and non-governmental entities, including academic, private, and non-profit interests."*

* Please note: I "fixed" the above-quoted portion of the National Drought Policy Act. I think the punctuation in the Act got messed up – it has the first semicolon after prevention, and since mitigation, prevention and response go together, and since the second half makes no sense if it starts "and response on developing ..." I'm taking the liberty of addressing what it means instead of what it says. Please clue me in ASAP if I've misconstrued the meaning.

Public Awareness of the Need for Drought Mitigation, Prevention & Response

Public awareness of drought mitigation, prevention and response could be part of a broad, strategic effort to bring about long-term changes in how we conceive of our ability to manipulate natural resources. Many of drought's effects on local government, communities and businesses are the result of large-scale systematic factors that create vulnerability.

Where to connect with current public discourse:

"Drought mitigation" is a fairly abstract concept, and realistically, would probably have to be part of at least two separate education and awareness programs, one stressing an understanding of humans in ecosystems, particularly as related to water, and another stressing risk management versus crisis management, helping people mentally reclassify drought from "a random act of God that you can't do anything about" to "something you can't control but should prepare for."

Fortunately, these themes are current in mainstream media. For example:

It's likely that land use will be an issue in the 2000 presidential campaign, as politicians capitalize on people's growing discontent with suburban sprawl.

The National Science Foundation on May 19 released the results of a five-year study on natural hazards, saying that short-sighted development policies have increased vulnerability to natural hazards. People have too much faith in technological fixes and overestimate community resilience, the study found.

Many communities are adopting the principles of sustainable development, which stresses a balance of economic well-being, social justice and environmental conservation. Although the physical effects of drought happen in the environment -- including the managed environment, such as farm fields -- its indirect effects are social and economic, so building resilience in all three of those areas will reduce vulnerability to drought.

Key Concepts

1. The hydrological cycle is nature's water delivery system, and how much water gets delivered varies considerably from one year to the next. History shows us that droughts and floods happen over and over again. (This may sound obvious, but a lot of people still think of droughts and floods as random, once-in-a-lifetime acts of God.)

2. Natural systems have limits. When we push the limits and rely on techno-fixes and emergency bailouts, we increase vulnerability to drought.

3. Know your watershed.
For children: Activities such as River of Words, a program by the International Rivers Network that gets children to write about their place in a watershed, and outdoor activities that increase awareness and knowledge of natural systems.
For adults: GIS maps, tours, and activities that increase awareness and knowledge of natural systems.

Coordinated Approach to Mitigation, Prevention & Response, by Government, Research and Education, Private, Non-Profit and Other Interests

Many agencies and organizations are doing a good job of creating and disseminating information that can be used to mitigation drought. However, there could be more coordination, including at the community and regional level. For instance:

The NRCS' regional guidelines on soil management for ag producers and ranchers are a key component of drought mitigation. Taking good care of the soil all the time increases resilience when drought happens. The NRCS could also develop and disseminate guidelines for soil and resource management during drought.

The Cooperative Extension Service, in some states, has put together excellent fact sheets for agricultural producers on special concerns and issues that surface during drought. States could share this information more systematically.

The Council on Environmental Education has produced Project Wet, a curriculum and activity guide for educators, which includes some excellent lessons on water and natural disasters, including drought. A K-12 curriculum panel could survey what's being taught in schools and attempt to find ways to work greater drought awareness into available curricula.

Drought planning should be part of community and regional natural resources and natural hazards planning. Wherever federal programs intersect with planning processes are potential opportunities to provide assistance and incentives for drought planning. FEMA's Project Impact, which provides a template for community hazard planning, is an excellent example. If a community incorporated drought planning into Project Impact or a similar process, it might choose to build "farm ponds" and detention basins as emergency storage measures that could be tied in to the drought emergency plan and used for ground water recharge. These could have multiple functions including serving as neighborhood wetland educational areas or parks.

The U.S. Army Corps of Engineers' research on the 1987-1992 drought in California showed that the general public generally responded well to calls for short term water use curtailment. It may be government agencies themselves that need greater awareness. Because droughts may not occur for years, even decades, agency staff may have little experience with droughts and may not be aware of the vast amount of research and practical experience available. "Dry runs" of drought plans, or virtual droughts, like fire drills, let everyone practice their roles in preparation for the real thing.

A Non-Governmental Coordinating/Awareness Clearinghouse: In tandem with the greater federal coordination of drought response that the NDPC is considering, the FSA has recommended that federal funding be provided to the National Drought Mitigation Center to assist states with drought preparedness, planning, and mitigation. This center should serve as a clearinghouse for information on mitigation, planning, and preparedness activities; provide a regional/national climate monitoring system; and develop a national/regional database of state drought response resources. Permanent federal funding for the NDMC has also been recommended by the Western Governors' Association and by FEMA in their reports on the Drought of '96.

Institutional gap: An institutional gap exists in preparing for drought, in that drought mitigation is truly an interdisciplinary field. Research has been concentrated in the physical sciences, such as climatology. But social science has much to offer in detecting opportunities to reduce vulnerability to drought. For example, it would be useful to have a matching set of socio-economic or environmental data when using climatological data to establish triggers for various degrees of drought response. As of now, there's quite a bit of guesswork in determining, for example, how governments and people should react to a -2 SPI value.

In fact, beyond drought, there is a strong need for interdisciplinary research that meshes human behavior and ecosystems; and for college-level curriculum that emphasizes consensus-building and conflict resolution related to natural resources. The University of Michigan School of Natural Resources & Environment is a leader in this area (http://www.snre.umich.edu/).
Joy Harwood----I have been reading various published sources that I thought might be useful, and found some interesting information in Australia's *National Drought Policy* report of 1990. (I also read a number of pieces that were very helpful background--such as the *National Study of Water Management During the Drought*--authored by one of our work group members.) I thought that the Australia report was very interesting in that it had various recommendations (which we might view as *options* for *filling in the gaps,* with both pros and cons) that would address local government and community interests (as well as agriculture) that have not yet been discussed. Also, the Australia report had very much a tone of improving competitiveness, sustainability, etc. Given that we are about to enter the next round of WTO negotiations, approaches that focus more on risk management, rather than crisis management, would likely be more readily accepted. Here are some of ideas for options:

1. Favorable tax treatment on drought-mitigation investments--Provide tax relief for: a) investments in structural improvements for the storage of grain or hay, and/or b) expenditures on structural improvements for the purposes of conserving or conveying water.

2. Integrated approach to education--Encouraging state extension and advisory services to develop whole-farm based financial decision support packages that would provide useful planning information in situations of drought, as well as other natural disasters.

3. Rural counseling--Providing appropriate support for rural conselling where there is a demonstrated need for this service at the community level (remember recent NYTimes article.)

4. Scientific research on drought-resistant crops--Increased research into the use of perennial crops and drought resistant species, including grasses, etc.

5. Favorable tax treatment on income--Consider the feasibility of extended income smoothing provisions to farmers, ranchers, and non-farm businesses.

I thought it was also interesting that the Australian report differentiated between policies providing incentives to effective farm management, and those providing industry relief. We might want to delineate the types of options that we discuss within some such type of framework.

<u>SECTION 4 (B) (8)</u> include a recommendation on whether all Federal drought preparation and response programs should be consolidated under one existing

Federal agency and, if so, identify such agency.

The Local Government Community Business Working Group developed three possible options in answer to this question.

Option #1: Single Federal Agency

- It is practical to designate one Federal agency with the coordination of drought preparation and response similar to FEMA's role in coordinating Federal disaster relief.

    - The lead Federal agency would be responsible for assessing drought impact and guiding States to the appropriate aid programs available.

    - In order to function as the lead Federal agency, an agency would need to be knowledgeable of the various interagency drought-related programs, however; interagency compacts could be entered into to reflect the triggering authorities and responsibilities of the lead Federal agency and other involved Federal agencies.

- USDA has been suggested to serve as the lead Federal agency responsible for the coordination of drought preparation and response given its variety of programs and the fact that the first effects of drought often appear in the agricultural sector and firefighting efforts. USDA also has an extensive local presence nationwide making it an appropriate vehicle for the facilitation of drought assistance.

Option #2: Interagency Task Force/Virtual Team

- An interagency task force or virtual team composed of interagency representatives could be established to focus on drought-related problems and solutions and to strengthen the role of local leadership in drought.

    - The interagency task force or virtual team would work more efficiently to handle drought than having all drought preparation and response programs consolidated under a single Federal agency since:

        - Drought preparation and response activities must draw upon a broad range of skills and knowledge including, but not limited to: weather, agriculture, hydrology, water management, economics, public affairs, and water treatment.

        - The Federal programs that address these issues are frequently subsets of other established programs rather than independently functioning programs and would be difficult to extricate from their respective legislative, regulatory, and funding authorities for consolidation.

- By taking the drought-related components of these programs out of their intended context, the consolidated components may not function as effectively as before, diminishing overall preparation and response activities.

- A virtual team may be more effective than an interagency task force since virtual teams are designed for problem solving and interagency task forces are more informational.

Option #3: Clearinghouse

- A central clearinghouse for the Federal government could be established to gather and maintain information related to Federal drought assistance programs.

- The clearinghouse would reside with a single Federal agency, but would be an interagency initiative.

- The single Federal agency designated with the responsibility of maintaining the clearinghouse would be required to continuously update its information and would serve as the point of contact to other Federal agencies and State and local governments seeking information on the Federal government's drought programs.