

Food Prices

The drought is still expected to add up to one percentage point to food prices in 1988. Annual average food prices in 1988 are projected to be 3-5 percent higher than in 1987, although monthly food prices later this year could be more than 5 percent above year-ago levels.

Record red meat and poultry production in 1988, bolstered by some distress marketings because of the drought, are tempering food prices while prices of some fruits and vegetables are higher due to drought losses. This year's drought may add up to two percentage points to food prices in 1989 which are expected to increase moderately.

LESSONS LEARNED FROM THE 1986 DROUGHT

Bill Johnson and Mike Deas*

Introduction

Drought is a natural hazard; occurrence is infrequent and the full impact may not be realized for many months. The relatively gradual onset of a drought, as compared to *floods*, provides an opportunity for establishing plans and policies which can minimize detrimental effects, particularly to water supplies.

Unfortunately, the infrequent nature of drought causes many plans and policies to be ad-hoc in nature, predominantly based on the vague memories of the last major drought-induced water shortage. Successes and failures can be realized from these policies; however, they are often lost because of a failure to perform a post-drought analysis to evaluate their effectiveness.

This failure to conduct ex poste analyses was the impetus for the U.S. Army Corps of Engineers Institute for Water Resources to evaluate Corp drought policies as they were applied during the 1985-86 drought in the southeastern United States. This study was conducted by the Corps' Hydrologic Engineering Center. Its purpose was to determine whether there is a need to modify current Corps' drought policy based upon lessons during the 1985-86 drought. The following summarizes these lessons and identifies nine subject areas essential in a successful drought contingency plan.

Method of Investigation

Research on the 1986 drought in the southeastern United States utilized information from a variety of sources. Information was drawn from field trips, existing drought plans, interviews, correspondence and published literature.

An initial visit was made to the South Atlantic Division (SAD) office, Atlanta, to speak firsthand with engineers directly involved in the drought. In addition, division and district correspondence and documentation on the Corps' role during the water shortage were reviewed. As part of the initial information gathering trip, a drought contingency planning workshop for Corp's districts was attended in Cincinnati, Ohio. These visits provided the initial information for this study.

A meeting with the Federal Emergency Management Agency (FEMA), Atlanta Regional Office, was also arranged to determine their role as emergency assistance during the drought. Additionally the Atlanta Regional Commission (ARC), which regulates the water supply for the city of Atlanta and surrounding communities, and the state of Georgia's Environmental Protection Division (Water Resources Unit) were visited to understand state involvement in the drought.

* Bill Johnson and Mike Deas are both of the Hydrologic Engineering Center (FIEC), U.S. Army Corps of Engineers Davis, California.

Visits to faculty members at Colorado State University and the University of Nebraska provided information on drought and drought contingency planning research. This was complemented with library research at the University of California at Davis, and Berkeley.

Finally, federal, state and regional offices were contacted for drought plans. The plans in conjunction with the lessons learned from the interviews and correspondences, allowed for the identification of the necessary components of a drought plan. In all, ten state, one regional, and three Corps drought plans were obtained.

By gathering information from a variety of agencies and interests, a comprehensive view of the 1986 drought was gained. Major lessons learned are summarized below.

Lessons Learned from the 1986 Drought

During the 1986 drought in the southeast, many lessons on drought management and response were learned. These lessons were arrived at following the field visits and a review of correspondence and documentation. The latter information includes monthly water control management reports, drought status reports from districts, the minutes of drought management meetings, drought bulletins and other literature.

The lessons addressed include:

- (1) Need for a drought contingency plan
- (2) Importance of a drought management committee
- (3) Value of water supply and use data
- (4) Have up-to-date water control manuals and reservoir rule curves for low flow operations
- (5) Use a simulation model for assessing impacts
- (6) Open communication and public information

- (7) Develop memoranda of agreement between Corps and other institutions
- (8) Have a drought monitoring and response plan
- (9) Value of division and district drought coordination

Need for a Drought Contingency Plan: It was found that having a drought contingency plan in hand before the onset of such an event was invaluable. Often plans were available; however they were not well defined. Detailed drought management plans that address current conditions and serve as a baseline for future situations are needed. Periodic updates of the plan are also critical.

Importance of a Drought Management

Committee: A drought management committee consisting of representatives from the affected states and the Corps was effective in balancing water needs and minimizing disputes among project users. This assured all users that their concerns were considered and provided increased support for operation decisions.

Value of Water Supply and Use Data: Information available on water supply and use was inadequate during the 1986 drought. Among the recognized needs were: an accurate inventory of users, their water supply intake locations and elevations, their water requirements, and instream flow needs and low river profiles and discharges. This information is important for effectively managing water control projects.

Have Up-to-date Water Control Manuals and Reservoir Rule Curves for Low-Flow

Operations: The 1986 drought reaffirmed the importance of having up-to-date water control manuals, and drought responsive reservoir rule curves and water control plans. Included should be information on methods to conserve water during drought and alternative low-flow release schedules. As of October, 1987, manuals available for Corp-operated reservoirs in the Apalachicola-Chattahoochee-Flint basin dated from August 1958 to May 1975.

Use a Simulation Model for Assessing Impacts:

The drought identified a need for a simulation model to assess impacts on users of alternative operating plans. A model can assist in the development of water control management strategies for drought operations, as well as for real-time hydropower capabilities.

Open Communication and Public Information:

Public affairs participation was important in drought management. Open and frank communications with the news media, river and lake users, and the general public resulted in excellent public relations for the Corps, and minimized “second guessing” of Corps decisions.

Develop Memoranda of Agreement Between Corps and other Institutions:

The prior establishment of agreements between institutions, which describes action to be taken, enables both parties to reach an understanding in an atmosphere of less pressure and urgency. The memoranda should include: the purpose of the agreement, the terms of the agreement, and the responsibilities of each party involved.

Have a Drought Monitoring and Response Plan:

The 1986 drought illustrated the need for reliable and accurate monitoring measures to determine the beginning, severity, and end of the event. In addition, the identification of the appropriate response to different severities of drought are needed.

Value of Division and District Drought

Coordination: Coordination between the district and division, within districts, and between districts is essential for an effective drought management plan. Weekly published summaries from all five districts, periodic meetings, and constant contact by telephone helped to develop and maintain good communication channels.

Content of a Drought Contingency Plan

The previous lessons learned from the 1986 drought can be combined with a review of the 14 states, Corps, and

regional drought plans to identify the following nine subjects essential to a successful contingency drought plan. The first five subjects were previously discussed in the lessons learned. The last four subjects are unique to the review of drought contingency plans and will be addressed individually in brief.

- (1) Drought Management Committee
- (2) Drought Monitoring and Response
- (3) Public Information Program
- (4) Water Supply and Use Data
- (5) Memoranda of Agreement
- (6) Impact Evaluations
- (7) Legal and Institutional Supply Requirements
- (8) Emergency Drought Assistance
- (9) Agency Responsibilities and Contacts

Impact Evaluation: Multiple-purpose reservoirs involve a wide variety of users. During drought periods, tradeoffs between water control project users may require evaluation. Providing a timely and systematic tool for assessing drought impacts and corresponding impacts due to Corps operations is necessary to assist users in drought management decision making. The previously mentioned drought management committee should include people with technical expertise in the area of impact evaluation. Table 1 identifies possible impact categories.

**TABLE 1.
IMPACT CATEGORIES EVALUATED**

Category	Factors to be Evaluated
water supply hydropower	- reservoir and river supplies - capacity available and energy production; loss of revenue
environment	- stream and reservoir water quality; wildlife refuges and fishery losses
recreation	- marina visitation; lake and river safety; facility closures; boat launching ramps
navigation	-towing companies; shippers flow requirements
engineering	- structural integrity of dams, locks, turbines

Legal and Institutional Supply Requirements:

Because of constitutional commitments and the variety of public interests in multiple purpose reservoirs, legal and institutional supply requirements must be addressed. Possible conflicts should be anticipated and resolved, and the range of legal authority for management decisions in the public interest clarified.

Emergency Drought Assistance: Drought often occurs over an extended period of time and its severity is not perceived until conditions reach the disaster/emergency level. It is important therefore, to address emergency drought assistance in a drought contingency plan. Emergency actions should be distinguished from operations management and other actions which are taken during the course of a drought. Emergency actions are taken when a more severe level is reached. Included in the plan should be provisions to update the agencies involved in emergency assistance so that they are familiar with conditions should their assistance become necessary.

Agency Responsibilities and Contacts: The lead agency in water management, as the Corps is often perceived, should have contact information on federal, state and local agencies, and water users. A list of available agencies, their responsibilities, and a contact person is essential for a drought contingency plan. Contacting individuals and agencies prior to the water shortage condition allows them to become familiar with their role and opens channels for communication.

Conclusion

This paper summarizes the lessons learned by the Army Corps of Engineers Institute of Water Resources following the 1985-86 drought of the southeastern United States. These lessons, in conjunction with the review of 14 state, regional and corps drought contingency plans, allowed for the identification of nine subject areas essential for

inclusion into a successful drought plan.

A post-drought analysis, as performed in this study, to identify strengths and weaknesses of present policies, is essential to the avoidance of past errors and the duplication of past successes. Drought occurs infrequently and its onset is gradual, thus creating the potential for well developed plans and policies to diminish detrimental impacts. An effective drought contingency plan must evaluate and incorporate the lessons of the past. Unless this is accomplished the failure of the plan, like the reoccurrence of drought is inevitable.

Reference

HEC, 1988. *Lessons Learned from the 1986 Drought*. Technical Report Prepared for the Institute for Water Resources, U.S. Army Corps of Engineers. IWR Policy Study 88-PS-i.