

WATER RESEARCH ACTIVITIES NEED  
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INTRODUCTION

*[Research Aimed at Solving Water Supply and Quality Problems]*

The United States has an abundant water supply, but its geographical distribution and availability often do not match demand. This condition, magnified by the Nation's increasing population, industrial development, and agricultural production, has led to water shortages and increased competition for the available supply. To meet these demands, the United States may have little choice but to construct more dams, reservoirs, and conveyance systems; transfer water from one basin to another; and/or develop and implement conservation and augmentation technologies, such as wastewater recycling and reuse.

Obviously, there is no single solution to solving water quantity and quality problems. Nevertheless, developing and implementing conservation and augmentation technologies could play an important role provided appropriate congressional action is taken. Also, improved coordination of all water-related research activities could increase the likelihood of solving water problems.

On June 5, 1981, GAO issued a report entitled "Congressional Action Needed to Provide A Better Focus on Water-Related Research Activities" (CED-81-87). GAO recommended that the Congress amend the Water Research and Development Act of 1978 to:

- Require that conservation and augmentation technologies be comparatively assessed to assure that those with the most potential receive the highest level of Federal funding.
- Require that formal plans be prepared to guide research efforts to improve the likelihood of successful technology development and implementation.
- Assign responsibility for coordinating water research to the Water Resources Council provided the Congress believes it desirable to have an independent Council chairperson and resolves the issue of the Council's continued existence. Otherwise, the Congress should establish a water resources research committee under the direction of the Office of Science and Technology Policy.

This paper summarizes the main points discussed in the report.

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## TECHNOLOGIES SHOULD BE COMPARATIVELY ASSESSED

GAO believes an overall comparative assessment of conservation and augmentation technologies is needed to determine which have the most potential for solving water supply and quality problems at the lowest cost and with the least risk.

GAO found there does not appear to be a correlation between the potential of some technologies and their relative level of Federal funding. Some appear to have low potential but high funding; whereas others appear to have high potential but low funding. For example, cloud seeding has received considerable Federal attention, but its potential for increasing usable water supplies is uncertain. By contrast, evaporation reduction by destratification may have considerable potential but it received no Federal funding during fiscal year 1980 and it has never received over a few thousand dollars. An April 1980 study by the University of Arizona's Water Resources Research Center ranked destratification as having more potential for meeting Tucson Arizona's future water demand than other alternatives, including cloud seeding, desalting, and various interbasin transfers.

Although not specifically addressed by GAO, the author believes recycling of industrial wastewater is another area which appears to have considerable potential. An April 1979 report entitled "Water Reuse and Recycling Volume 1, Evaluation of Needs and Potential," sponsored by OWRT indicates that the gross potential for making more efficient use of water supplies through increased wastewater recycling is substantial. The report estimated that industrial recycling in California could increase from a 1975 level of 5.8 billion gallons per day to 23.8 billion gallons per day by the year 2000. This would be equivalent to about 20.2 million acre-feet per year. Even more interestingly, the report concluded that recycling in the Texas Gulf region could increase by 111.8 billion gallons per day, or about 125.2 million acre-feet per year, during the same period.

### Factors to Consider in Assessing Technologies' Potential

An overall comparative assessment or ranking of technologies should be preceded by regional and local assessments because

- potential solutions to water problems may differ among regions, and localities, and
- the best solution for one area may not be the best for another area.

Basically, an overall comparative assessment of technologies would be a ranking of the results of regional and local assessments.

In doing a comparative assessment, all regional and local water problems and potential solutions should be identified.

Potential solutions could include developing and implementing one or more conservation and augmentation technologies; constructing more dams, reservoirs, and conveyance systems; transferring water from one basin to another; and/or curtailing demand. Also, as previously noted, potential solutions may vary depending on the region or locality being reviewed. For instance, evaporation reduction by destratification may be a viable option for solving Tucson, Arizona's water problems. However, it may not be practical in many other areas.

Another major aspect of a comparative assessment of technologies involves assessing the impact of technical, environmental, legal, and social obstacles. A technology's gross potential for solving water problems may appear to be substantial, but the eventual contribution the technology makes toward solving water problems may be severely limited unless these obstacles are overcome. For example, public and user perceptions about the health problems associated with recycle and reuse of wastewater may prevent widescale implementation of the technology. In assessing a technology's realistic potential, <sup>1/</sup> a decision must be made as to what impact these obstacles will have on eventual implementation or transfer, and what action, if any, can be taken to overcome the obstacles.

#### FORMAL PLANS SHOULD BE DEVELOPED

Completion of an overall comparative assessment of technologies should provide a sound basis for establishing funding priorities for the technologies. However, this is only the initial step. Technology development, and/or transfer must still take place, and successfully, before the objective of increasing usable water supplies is achieved.

GAO believes that formal planning can assist technology development and increase the likelihood of user acceptance. It can tie research from a variety of sources into a program to better assure the efficient and effective development of a technology. Without plans research results may sit idle, programs may be prolonged with no determination as to whether objectives have been satisfied, and technical, environmental, legal, and social obstacles may not be adequately addressed and dealt with.

A plan for developing a particular conservation or augmentation technology should be a formal mechanism which identifies the tasks needed to develop the technology and encourage user acceptance. It should be considered a

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<sup>1/</sup>Realistic potential, as used in this paper, refers to the likelihood of a technology solving water supply and quality problems after considering the obstacles that may inhibit success, such as technical (including cost), environmental, legal, and social obstacles.

"living management tool," changeable as necessary to reflect current research results and expectations. A plan should include such elements as

- specific measurable objectives;
- identification of additional needed research and development;
- milestones, including an estimated program termination date;
- technology transfer goals, including identification of obstacles and how they will be overcome; and
- independent periodic evaluations.

Although the benefits of using plans to guide research efforts are difficult, if not impossible, to prove, GAO believes that planning could help tie many agencies applied research projects into meaningful programs to conserve or augment water supplies. Also, each Federal organization would have a better basis for requesting changes in funding levels because it could explain the impact its work has on the overall technology development effort.

#### WHO SHOULD COORDINATE WATER-RELATED RESEARCH?

The Water Research and Development Act of 1978 stipulates that the President should clarify agency responsibilities for water research and make arrangements for implementing inter-agency coordination. However, no single organization coordinates water research on a continuing basis as required by the act.

GAO examined past and current Federal efforts at coordinating water-related research and the need for an organization to be specifically assigned this responsibility. Also, GAO examined the advantages and disadvantages of various organizations having responsibility for carrying out this function on a continuing basis. Among the possibilities, GAO preferred two of the alternatives.

Of these, GAO believes the Water Resources Council, a Federal entity responsible for assessing the adequacy of the Nation's water supplies, should be assigned this responsibility provided the problems discussed below are overcome. It currently is responsible for assessing the Nation's water supply situation and identifying regional and local water problems. Water research coordination would be a logical extension of this responsibility, because regional and local water problems must be known before the potential of various technologies can be adequately determined. Nevertheless, agency officials and researchers expressed the following concerns which they believed would impede effective coordination by the Council.

--The Council does not have the independence or authority needed to be effective.

--The Council's continued existence has been questioned. This has hampered the Council's ability to recruit and retain an effective work force.

If these problems are not resolved, GAO believes that establishing a water resources research committee with representatives from the major agencies involved in water research could be an effective alternative, provided that

--the committee reports directly to the Office of Science and Technology Policy and

--the Office of Science and Technology Policy has the ability to redirect research funding to reflect priorities established by the committee.

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