

RESEARCH--THE KEY TO THE FUTURE IN WATER MANAGEMENT

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Research, the key to the future in water management has been selected as the title for this paper, first because that is the theme of the Ninth Annual New Mexico Water Conference, and second because I wish to point out the research which is underway at New Mexico State University, the plans for future research, and the need for coordination of research.

That there are water problems, that these problems are difficult and that research is needed to contribute to the solution of these problems is highlighted by the following news headlines from Southwest publications which I have picked up during the past year.

- * Three Inches of Water Allocated for Irrigation in the Elephant Butte Project
- * Storage in State Reservoirs Low in 1964
- * Sewage Disposal is Polluting Streams
- * Fish are Killed by Industrial Wastes
- * More Water Needed for Recreation
- * What Effect Do Crops Grown on Salty Land Have on the Nutrition of Animals and People?
- * Are Residues from Fertilizers and Insecticides Carried into the Water Supply?
- * Watersheds Eroding
- * Water Sources are being Strained by the Growth of El Paso
- * Water is Foaming from Detergents
- * Little Children get Diarrhea from Wells in Suburbs
- * Water Limited for Irrigating Lawns in Denver
- * How Can Our Saline Water be Made Economically Usable?

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- * Cities Consider Piping Water from Tucumcari to Clovis, Hobbs, Roswell, Carlsbad, and Other Eastern New Mexico Communities
- * Floods in Albuquerque
- * Floods in Las Cruces
- * Group Foresees National Water Rationing by 1985

The wide range of subjects in these headlines indicates the range in research which will be needed in the solution of the water problems in New Mexico, the Southwest, and the United States. Problems in chemistry, biology, hydrology, agronomy, economics, and engineering, to mention just a few of the more obvious, are indicated. Public health, our food supply, our water supply, and our general well-being are dependent on a solution of many of these pressing problems in the immediate future. No one scientific discipline can go far toward the solution without research help from many other disciplines.

Dr. Abel Wolman, Johns Hopkins University, in a National Academy Water Resources Committee report emphasized that "interdisciplinary training of personnel is most important in the solution of water problems." His committee pointed out that "the most critical shortage in the field of water resources, by far, is the very real shortage of broadly trained people capable of planning and executing effective research programs."

The Committee stated "that the ultimate objective should be the development of a new structure and a new generation of well-rounded water scientists ready and able to approach the Nation's multidisciplinary water-resources problems in a unified manner."

Research in water cuts across many lines of sciences and no one group or no one set of scientists can solve these problems.

For example, take the Roswell saline water conversion plant and list a few of the operations required there. This list will indicate the interdisciplinary requirements even of this single operation.

- * Geologists were required to determine the water movements.
- * Chemists were needed to analyze the salts at various test well locations.
- * Engineers were required to design the plant.
- * Economists were needed to study costs and probable returns.
- * Lawyers were required to clear title to the land and arrange contracts.

- * Legislators were required to pass certain legislation to permit the financing.
- * City water system operators were required to determine uses.
- * Research contracts have been signed which involve many phases such as--how much of the water should be produced as pure water and how much as sludge. At present about 1,300,000 gallons are pumped, which produce 1,000,000 gallons of usable water and about 300,000 gallons of waste.
- * Research is underway at New Mexico State University on the problem of what to do with the sludge. At present it is being placed in (20 to 40 acre) plastic lined shallow tanks where the water is evaporated and the salts remain as residue. One question arises as to what to do with the salts. Another is what commercial value may these salts have? Many other questions could be listed.
- * Business and economics entered the picture to determine how best to use the 1,000,000 gallons. Certain plants such as canneries and chemicals need nearly pure water. Housewives find that the new water requires less soap. Water works maintenance men find that the pure water dissolves some pipe corrosion which cause the older pipes to leak.

The city is finding that less water treatment is necessary for the total city. This would be especially true if the million gallons of nearly pure water could be mixed more thoroughly into the entire supply for the city. It may be found that it would pay to produce more product water for such mixing.

The same interdisciplinary need is indicated if you start to look at a river such as the Rio Grande. Some questions which arise are:

- * How much water is there?
- * How can water be saved?
 - a. by killing water-loving plants
 - b. channelling the water around these plants
 - c. by providing low flow channels and prevent large seepage losses from the meandering river basin
 - d. how much water may be saved by improved irrigation practices
- * How is the river being polluted?

- * How can pollution in the river be prevented?
- * If polluted, how can it be cleaned up?
- * How much water is to be needed for waste disposal?
- * How much will it cost to do anything about pollution?
- * How much would it cost to do nothing?
- * How will the total supply be used?
 - a. how much for industry
 - b. how much for municipal
 - c. how much for recreation
 - d. how much for agriculture
- * The economic system will make some of these decisions.
- * The law will make others of these.
- * The social conditions will make others.
- * Will houses be built on all of the agricultural land without restriction and thus eliminate the agricultural uses? If this happens, will we arrive at a land-man ratio when we have more people to feed than the food supply will support--because the land and water were often unnecessarily used for other purposes?

Cooperation with many agencies and all groups of people in all areas of New Mexico and the states involved with us on the rivers systems will be required.

Senate Bill S.2.--Water Resources Research Institutes

In recognition of the interdisciplinary nature of the water resource problem, Senator Clinton P. Anderson of New Mexico introduced into the United States Senate, in July 1962, Senate Bill S.2, which would establish Water Resources Research Institutes in each of the states. This bill passed the Senate in April 1963. Hearings were completed in the House in November of 1963. It is expected that the Bill will reach the House soon for House action.

The passage of the Bill would give a boost to the water research work across the country just as the Agricultural Experiment Station Act boosted research in agricultural production when it was passed in 1887.

Senator Anderson stated that Title I of the S.2. Bill "is essentially a copy of the Hatch Act of 1887 which brought about the

establishment of the agricultural research stations at the land-grant colleges and state universities."

The purpose of the Water Research Bill would be to support research in all its phases--municipal, industrial, recreational, and agricultural--and to develop trained personnel to work in this field. It is felt that it is important to have the research done at universities where teaching is in progress so students may become involved and interested in the water resources field and become trained as professional people in water research and management.

New Mexico Water Resources Research Institute

The New Mexico State University Board of Regents, in February 1963, established a University-wide Water Resources Research Institute as a part of the University. The Institute will bring research and teaching programs related to water together into an operating unit at the University to serve the state of New Mexico more effectively.

The purpose of the Institute is to stimulate and sponsor investigations and experiments in the field of water and related resources.

The basic or applied research to be conducted or encouraged by the Water Resources Research Institute will include, but not be limited to, aspects of the hydrologic cycle; supply of and demand for water; conservation and best use of available supplies; methods of increasing supplies; economic, legal, social, engineering, recreation, biological, geographic, ecological, and other aspects of water problems, giving due regard to water research projects being conducted by agencies of the federal government, the agricultural and engineering experiment stations, and other agencies.

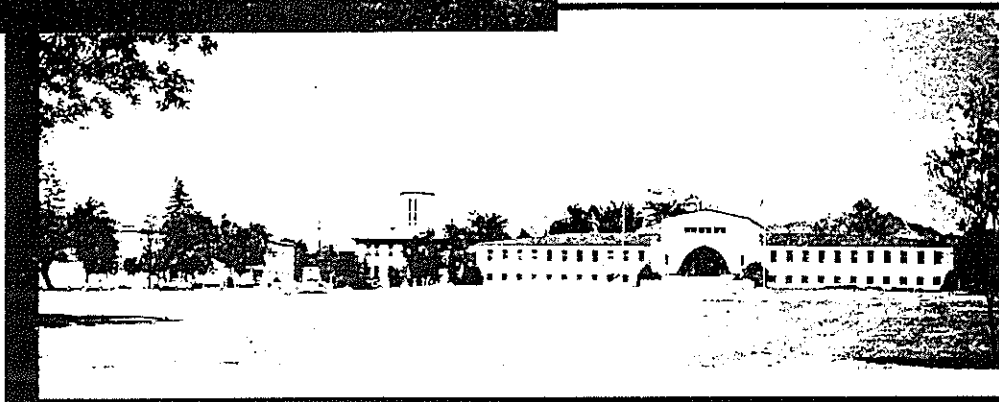
The Institute will provide education and training for undergraduate and graduate students through research employment and assistantships. It will assist in developing a professional and technical staff in water resources research and teaching.

The Institute will publish or encourage the publication of research results for public information, education, and forums on water and will assist in developing information which would permit the development of a sound water program to meet the needs of New Mexico.

This Institute will permit interdisciplinary research to be conducted with contributions being made by two or more departments as the problem demands.

In case the S.2. Bill should pass, additional funds would be made available for water research in all its phases through this Institute. It is expected that this coordinated effort will assist in the solution of many of New Mexico's more difficult water problems.

Water Resources Research Institute



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Technical Report No. 17 prepared by the Civil Engineering Department lists the various water research projects now in operation at New Mexico State University. These project listings were brought together through the work of Dr. Warren Viessman of the Civil Engineering Department in cooperation with the newly created New Mexico State University Water Resources Research Institute.

Review of this technical report will show that New Mexico State University is presently carrying on 32 water research projects with 9 separate university departments involved. The number of projects and the number of departments involved should be materially increased through the efforts of the Water Resources Research Institute.

Research truly is the key to the future in water management. It is hoped that the emphasis this water conference and the emphasis which may be generated through the Water Resources Research Institute and eventually through the passage of the S.2. Bill, that research may be stepped up to the place that it may help to solve many of the water problems of New Mexico, the Southwest, and even the entire United States.