

STATE WATER PLAN

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Water has been for at least 12,000 years a rationally and emotionally important subject to the inhabitants of what is New Mexico. Consequently, it has been the subject of considerable careful thought and planning, no little plotting, and some violence.

An orderly treatment of the subject of water resources development and planning in New Mexico seems to me to require at the outset some discussion of the fundamental law governing the appropriation of water in our State. While this law may not be immutable, it must be the point of departure for planning, and rights heretofore established under it must be protected.

Our constitution provides that the unappropriated waters of the natural streams of the State, perennial or torrential, belong to the public; that these waters are subject to appropriation in accordance with law; that beneficial use is the basis, the measure, and the limit of the right to the use of the public waters; and that priority of appropriation gives the better right.

Our surface water code which was enacted in substantially its present form in 1907 and our groundwater code which was enacted in 1931 have these provisions as cornerstones. The philosophy underlying these laws is commonly called "the appropriation doctrine of water rights."

The appropriation doctrine was followed first by custom and then by law in New Mexico long before the constitution was adopted in 1912. Under this doctrine, one has no right to the use of water simply because it flows by or through or under his land. It seems clear to me that this is a very practical system for the management of water in an arid region. Certainly development of any nature would be discouraged if it were possible for the latecomer to interfere with water supply upon which earlier investments are based.

Under the statutes governing the appropriation and use of surface water, any person intending to construct works and make a new appropriation of water or to change the point of diversion or place and

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purpose of use of an existing water right must apply for and receive a permit from the State Engineer before doing so. Before the State Engineer can issue the permit applied for, he must find that the exercise of the right to be granted will not be detrimental to any other right. These statutes provide for the publication of a notice of the application to give those who might be adversely affected opportunity for a protest and hearing on the application. The decision of the State Engineer is, of course, subject to appeal to the courts.

The statutes establishing the administrative procedures to be followed in the appropriation and use of groundwater are similar to those for surface water. When the State Engineer finds that the waters of an underground supply have reasonably ascertainable boundaries and he so proclaims, he assumes jurisdiction over the appropriation of those waters. He proclaims, or declares, an underground water basin by the issuance of an appropriate order and publication of a description of the boundaries. Thus far, the State Engineer has declared 24 underground water basins to prevent the impairment of existing rights to the use of water, to insure beneficial use of the water, and to provide for the orderly development of the groundwater resources of the State. These declared basins cover about 40,000 square miles, or about one-third of the total area of the State.

Groundwater outside the boundaries of underground water basins belongs to the public and is subject to appropriation, but anyone may develop this water and put it to beneficial use without a permit from the State Engineer.

The legislature created the New Mexico Interstate Stream Commission in 1935. The Commission consists of nine members. Eight of the members are unsalaried; each of these eight is appointed by the Governor to represent a different major irrigation district or section of the State. The State Engineer is by law the ninth member and Secretary of the Commission; in this capacity he acts as the Commission's executive officer.

The Commission is authorized to negotiate compacts with other states to settle interstate controversies or to make equitable distribution and division of waters in interstate stream systems. New Mexico is party to eight interstate stream compacts. All of our significant surface streams are now involved in such agreements. One of our streams, La Plata River, is subject to four such compacts. The Commission is responsible for the negotiation of any amendment to these compacts and for interpretations necessary to the administration of the compacts.

In addition to our constitution and statutes and the eight interstate compacts, the Supreme Court decree in Arizona v. California, et al. and three federal district court decrees, govern the appropriation and use of water in New Mexico.

The State Engineer is bound by the terms of the compacts and the federal court decrees in his administration of the water resources of the State and these agreements and rulings have an important effect on

the amount of water available for use in New Mexico. When New Mexico has fully developed her surface water resources within the allowances of the interstate compacts and federal court decrees the annual river inflow to the state of about 2-1/2 million acre-feet will approximately equal the outflow and New Mexico will use, beneficially or otherwise, about the amount of stream flow that she produces--roughly 3-1/2 million acre-feet.

One of the major functions of the Interstate Stream Commission is to review and comment on plans for federal water projects in New Mexico and on interstate streams in other states to make sure that New Mexico's interests are protected. This work includes cooperation in and coordination of the work of federal agencies in planning projects in New Mexico. The Commission has participated in the formulation of project plans, operating criteria, and authorizing legislation for many federal projects, including for example, the Navajo Dam and Reservoir Project and related Navajo Indian Irrigation Project on the San Juan River, the San Juan-Chama Diversion Project, the Animas-La Plata Project on the Animas River in Colorado and New Mexico and the Hooker Unit of the Central Arizona Project, all Bureau of Reclamation Projects and the Corps of Engineers Cochiti and Galisteo Reservoir Projects.

In the past seventeen years, about \$660 million worth of federal water projects have been authorized or completed in New Mexico and an additional \$130 million worth of projects are presently under feasibility grade investigation.

At the present time we are diverting about 3.5 million acre-feet of water annually in New Mexico. Of this amount, about 90 percent is used for the irrigation of roughly a million acres of land; most of the balance is used for municipal and industrial purposes. All but about 150,000 acre-feet of the surface water that we are entitled to under the interstate compacts and court decrees is already committed to existing uses or to projects that are soon to be completed, such as the Bureau of Reclamation's San Juan-Chama, Navajo, and Animas-La Plata Projects.

Considering the quantity of water New Mexico has available and is entitled to, it seems fair to say that we are well along toward creating a plan for the development and control of our available water resources and implementing that plan. Nevertheless, looking ahead we see much that remains to be done in water resources planning. In 1950 the State had a population of about 680,000 people. In 1960 our population was 951,000 and the 1970 census shows a population of just over one million. Some experts tell us that we may have to accommodate a population of over four million by the year 2020. Of course, all these people are going to want water for their economic enterprise and for their pursuit of pleasure.

In 1967, the Interstate Stream Commission asked the Bureau of Reclamation to take primary responsibility for the preparation of a State plan for our water resources. The product of this planning effort will include input from a large number of State and federal agencies. The Bureau of Reclamation is coordinating the efforts of the Interior Department agencies, and the Interstate Stream Commission is coordinating the efforts of the federal agencies, other than Interior agencies, and the large number of State agencies that are participating. The Commission is also consulting with and advising the

Bureau in the plan's preparation. The scheduled completion date is now the end of fiscal year 1974.

As you will recognize, a statement of the problem is essential to its solution. The target date of the water plan is 2020, and the only way to state the problem is to make projections of the distribution of our population and economic activity at that time. Unfortunately, our vision for the target is a little less than 20-20.

To cover a wide range of alternative futures, we are using three sets of projections. To coordinate with the resource planning being done by the State Planning Office, we are using projections prepared for that office by the Bureau of Business Research at the University of New Mexico. To coordinate with the Westwide Water Plan being prepared by the Bureau of Reclamation in response to a charge of the 1968 act authorizing the Central Arizona Project, we are using projections prepared by the Office of Business Economics and the Economic Research Service (OBERS) in 1968. To represent a more conservative alternative future, we are also using the 1972 series C projections prepared by the Bureau of Economic Analysis.

The projections of population vary from 4.6 million in 2020 for the projection of the Bureau of Business Research, to 2.7 million for the OBERS 1968 projections, and 1.6 million in 2020 for the Bureau of Economic Analysis projection.

Following the circulation of the "Situation Assessment Report on the State Water Plan" last Spring, we were criticized because "tacit within the large projections is an automatic statement of policy--a policy of growth for growth's sake regardless of any side effects, a policy which has become increasingly discredited." In answer to this criticism, I assure you that the Bureau of Reclamation and the Interstate Stream Commission have neither the authority nor the ambition to set the State's policy with respect to the growth of population and economy. We see the establishment of such policy as a function of the legislature and perhaps other State agencies such as the State Planning Office. The projections of population that we are using do not reflect the policy or even the judgments of those preparing the State plan. We are constrained to the use of at least two of the projections to coordinate with other planning work. Without advocating any one of the three projections that we are using, it does seem that these will give us the opportunity to have a look at a wide range of possibilities.

I find it interesting and somewhat paradoxical that the projected water depletion requirements for 2020 are relatively independent of the population projections. Assuming a plan that would provide for irrigation depletions at about the present level plus the irrigation depletions that would be implemented by authorized federal projects, the requirement for a population of 4.6 million is 4.3 million acre-feet of water annually, and the requirement for 1.6 million people is 3.6 million acre-feet annually. This anomaly arises out of the projection techniques which estimate requirements for irrigation, power generation, and mining and milling independent of population. Other projection techniques might yield significantly different results, but these seem to be reasonable for the New Mexico plan.

The projection for irrigation, which is the largest single component, amounting to about 2.2 million acre-feet annually, assumes that about one-half of the approximately 450,000 acres currently irrigated with mined groundwater will go out of production by the year 2020, but that a similar amount will be placed under irrigation using mined groundwater from other aquifers. In addition, about 150,000 acres would be put under irrigation with surface supplies from authorized federal projects.

I should also point out that these projected requirements do not include projected requirements for recreation, which for the high projection amounts to 3.4 million acre-feet annually for lake evaporation. It does not appear that we can reasonably hope to furnish the lake surface that 4.6 million people will want for boating and water skiing.

Work completed on the water plan to date serves to at least state the problem. We can estimate that about three million acre-feet annually, including about 600,000 acre-feet from groundwater mining, will be available for depletion within the State in 2020. This estimate assumes that as the aquifers are mined out on the east side, additional mining from other aquifers, including those in the northeastern part of the State, would be undertaken; that the current groundwater mining in the southwestern part of the State will still be economic; and that we will not undertake mining of aquifers intimately related to streams such as those in the Rio Grande Basin.

The availability of three million acre-feet annually must be compared to projected requirements of four to five million acre-feet annually.

There is some hope that the difference between availability and demand can be made up by importation from sources which we are not currently entitled to have. For example, water might be imported from the Columbia River system to the Colorado River system and our entitlement to Colorado River system waters increased for use in at least the San Juan and Rio Grande systems in New Mexico. However, the law authorizing the Central Arizona Project prohibits even a study of that possibility until 1978.

There is underway a study of the practicability of bringing surplus water from the Mississippi River system to West Texas and Eastern New Mexico to sustain the irrigation economy based on groundwater mining. The construction costs of such a project, as yet unreported, are obviously enormous; a pump lift of 4200 feet, which is roughly the difference in elevation between New Orleans and Clovis, suggests very large annual operation and maintenance costs. The economic feasibility of the proposal remains questionable. With respect to the social factors, there is some question whether the project could be completed in time to save the economic structure which exists now in the area. The political viability of a project to export water from the Mississippi River Basin to West Texas and Eastern New Mexico might be the toughest question to answer. When a semiarid state begins to look past her borders for supplies beyond her current entitlements, her neighbors obviously have legitimate cause for concern. A state such as Louisiana with an apparent surplus of water must jealously guard its future and carefully weigh all conceivable future requirements for water for municipalities, industries, pollution control, including salt water intrusion, and for recreation and the maintenance of the ecology and aesthetics of bays and estuaries.

The one thing that is eminently clear is that we cannot rely, in a plan to be completed in fiscal year 1974, on importation from areas of apparent surplus supplies.

Optimism about major water resources projects is further dampened by the recent proposed report of the National Water Commission which would recommend termination of the federal policy requiring no interest and using power subsidy for repayment of irrigation project costs; interest rates for project evaluation and project cost repayment far above those that would encourage the construction of water resources projects needed for the attainment of long-range social objectives; virtual dismantlement of the federal water project construction agencies; and curtailment of irrigation in the West to make water available for growing municipal and industrial requirements.

For more than a quarter of a century now there has been reason to hope that man might manipulate the weather to increase the water supply of the western states, but work on that possibility is still, in my opinion, very much in the research phase. Uncertainty about the possibility of increasing precipitation in meteorological situations such as we experience in the summer months is as great, or perhaps even greater, than it was a quarter of a century ago. Reportedly, work done by or through the Bureau of Reclamation's Division of Atmospheric Water Resources Management gives indications that significant increases in snow melt runoff could be achieved at relatively very low cost. But even the most sanguine of those involved in the work tell us that another year or two of field trials will be needed to confirm or deny this possibility.

Even though all of the scientific questions with respect to our ability to modify precipitation were laid to rest, there would remain almost imponderable questions, and possibly insuperable problems related to the law and environmental factors. I am sure that most of you are not surprised to find that it is not universally agreed that we should increase our snow melt runoff, even if we could. Hopefully, we can better appraise the prospects for increasing our water supply by weather modification before the water plan is completed and, of course, the plan could always be adjusted after it is completed to accommodate scientific and political progress on this possibility. But at this point it does not appear that we should plan heavily on meeting our 2020 requirements with man-made precipitation.

There is some prospect that New Mexico's usable water resources can be augmented by desalting. New Mexico has been interested in desalting as a source of fresh water for at least twenty years. In the early 1950's the question of whether the federal government should undertake a research program in weather modification or a research program in desalting to supplement water supply was an issue before the Congress. Clinton P. Anderson who represented New Mexico so effectively in the Senate is a master of political science with only slightly less acumen in physical science. He is thoroughly familiar with the importance of water to the Southwest. The Senator was a protagonist in the Congressional actions which established research programs in both fields, and he acted to sustain and expand both programs.

When Congress, in 1958, by legislation introduced by Senator Anderson, authorized the Office of Saline Water to construct a plant in the Southwest to demonstrate a desalting process, New Mexico seized the opportunity to con-

tribute to a program which promised to enhance the Nation's water supply, and the \$1.8 million forced circulation-vapor compression plant was constructed at Roswell. The location of the authorized demonstration plant in New Mexico was supported in one of the few resolutions ever adopted by this conference.

There are in New Mexico at least 8 communities of more than 1,000 population which are now using waters with a dissolved solids concentration of more than 1,000 ppm for public supply. Desalting of these supplies could make an important contribution to the welfare and comfort of the citizens of these communities and their visitors. It appears to me that in the short term this is the most likely application of desalting in New Mexico.

Working in cooperation with the Office of Saline Water, the State, through a contract with the Southwest Research Institute, has recently completed an investigation of the physical and economic feasibility of improving and increasing the water supply of five representative New Mexico communities currently using water having concentrations of dissolved solids and hardness above those recommended by the Public Health Service. This five-city study will be used in the New Mexico water plan report and should be very helpful in evaluating this potential benefit.

It appears to me that perhaps the most important contribution of the Office of Saline Water program has been the establishment of desalting techniques sufficiently well to set a floor on water supply or, if you prefer, a ceiling on water cost. By desalting, a supply of fresh water adequate for all conceivable needs could be made available if and when the value of the use for which it is needed is high enough. The prospects for using desalted water for irrigation in New Mexico do not seem imminent, but even this application is possible sometime in the future.

My hopes that desalting techniques will contribute to meeting our 2020 water problem were considerably diminished by the recent decision of the Office of Management and Budget to discontinue the demonstration and research work at Roswell and the President's budget proposals which would drastically reduce appropriations for the Office of Saline Water and terminate its research in the desalting of brackish waters.

We are considering other possibilities for narrowing the difference between availability and demand. Among those being considered are improvements in evaporation suppression, vegetation management, irrigation management including exotic techniques such as trickle and drip irrigation, exploitation of geothermal resources, air cooling for heat disposal, and urban residential water conservation measures. Some of these show promise, but the amount of water that might be developed or saved, as well as the time when such techniques might be practicable, is uncertain. At this time, it seems useful to consider but not to rely on these possibilities for closing the gap between availability and demand.

If weather modification, desalting, and improvements in water conservation do not prove productive beyond what we can now reasonably hope; if we cannot find rivers that have surplusses that can be exported for use in New Mexico--and we must continue to have some doubt that we can; and if we have to accommodate

more people in the Land of Enchantment--and this seems fairly certain--there will need to be a change in the pattern of water use in New Mexico.

A key element of the problem is the fact that agricultural pursuits provide relatively little opportunity for increased employment. For example, it is estimated that the 110,000 acre Navajo Indian Irrigation Project now being constructed by the Bureau of Reclamation on the San Juan River will provide for the livelihood of 33,000 people on the Navajo Reservation. The project will divert 508,000 acre-feet of water annually and will deplete the supply by 254,000 acre-feet--a depletion of about 7.7 acre-feet per person supported. In an urban-industrial culture such as that existing in the Albuquerque area, the depletion requirement is only a little more than a tenth of an acre-foot per person. So if the problem is to support an increasing population on a fixed supply of fully appropriated water, the answer is to use a progressively larger proportion of the State's water supply for municipal and industrial uses.

A fundamental attribute of a water right held under the doctrine of prior appropriation, as our statutes recognize, is the right to change the point of diversion and place and purpose of use of the water, provided that the change does not impair any other water right. Thus, a city can purchase irrigation water rights by negotiation or condemnation at a fair value and, under conditions set to avoid impairment of any other water right, change the point of diversion and purpose of use to meet its requirements. By this mechanism, the depletion of water by municipal and industrial use in the State could be increased 100% with a reduction of less than 10% in irrigation usage.

The plan will consider potential for augmenting the usable water supply that we are entitled to, but the first phase of the water plan formulation will involve the conception of works to distribute the supplies available to the State under existing interstate agreements and court decrees to supply the projected distribution of population and economic activity. The formulation and consummation of such a plan obviously implies some interesting political problems but these do not seem unmanageable. Some changes in federal and State law covering situations where water rights are held by the federal government or political subdivisions of the state such as conservancy districts may be needed to give the desired degree of flexibility for water transfers.

Fundamental in this approach to the problem is the assumption that the value of water used for irrigation will be less than the value of the same amount of water applied to municipal and industrial purposes. This is the case today, but it seems not inconceivable that conditions in 2020 will prove the assumption invalid.

The environmental consequences of transferring water use from irrigation to other purposes and of forgoing or failing in the rescue of irrigation economies based on groundwater mining also deserve consideration. In his recent book, A God Within, Rene Dubos, a noted scientist, has pointed out:

A great majority of persons in any case have no opportunity to experience and enjoy nature except in its humanized aspects--cultivated fields, parks, gardens and other manifestations of human settlements. In consequence it is not enough to save

the Redwoods, the Everglades, the Grand Canyon, and as much wilderness as possible; it is equally important to protect the aesthetic quality of urban settings and farm lands. Figuratively speaking, we must improve Coney Island.

The drying up of vast acreages of irrigated land to furnish water for municipal, industrial, and other purposes and by the unrelieved exhaustion of available groundwater resources would have a very serious, adverse impact on the environment of a large number of people.

For this reason, if no other, it is important that we continue to direct our thought and efforts to the augmentation of our usable water supply by importation, weather modification, desalting, and conservation.

Conclusion

I believe we have made reasonable progress in that first essential step, the statement of the problem, but the Bureau is just beginning to think about going to the drafting board to map solutions. We are not in a position yet to talk very much about specific alternatives for various localities.

Following the presentation of our situation assessment report last year, some expressed concern that "environmental factors appear not to be seriously considered." It is my current view that the water plan will give considerable attention to water quality, but that it will not be able to treat in detail such problems as air pollution, solid waste disposal, and the adverse environmental and psychological effects of high population density. There will, of course, be ample opportunity for others with expertise in these fields to make formal comments on the implications of the water plan with respect to such factors.

During plan preparation we expect to have consultation with local officials, perhaps on a county-by-county basis, and to conduct such local or regional hearings as these officials find appropriate. I also expect the Interstate Stream Commission to conduct at least one more public hearing on a draft of the final report for statewide participation and to invite all interested persons to comment in writing or orally. I look forward to further consultation with you on the New Mexico State Water Plan.