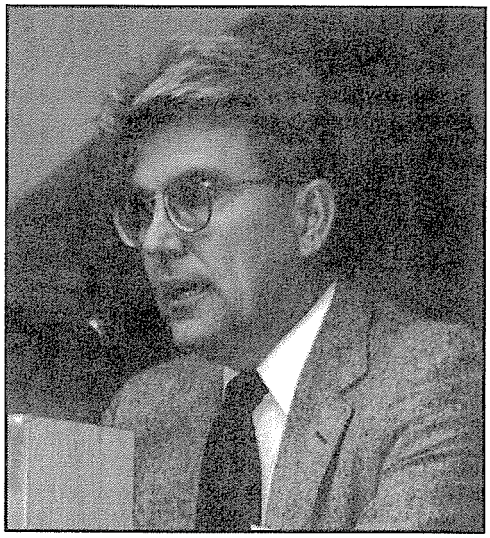
Gary Esslinger is the Treasurer-Manager of the Elephant Butte Irrigation District. Gary is a third generation member of a pioneer farming family living in the Mesilla Valley. After receiving a B.S. in Business Administration from Northern Arizona University in 1973, Gary worked six years in Los Angeles for a large flour milling corporation as office manager. After becoming tired of city life, Gary returned to the Mesilla Valley and began working for EBID in 1978 where he has been for the past 17 years. For the past 8 years, Gary has been the District's Manager. He also holds the title of Treasurer with the District's Board of Directors.



WATER DEVELOPMENT IN THE LOWER RIO GRANDE: THE ELEPHANT BUTTE IRRIGATION DISTRICT

Gary Esslinger
Elephant Butte Irrigation District
P.O. Drawer A
Las Cruces, NM 88004

I have been asked to talk to you today about water development in the Lower Rio Grande and to give a brief history of the Elephant Butte Irrigation District (EBID). I'll describe the role EBID has played in the past; its current role, and perhaps provide a glimpse of where the district is headed.

Historical records indicate that the Rio Grande Valley was traversed and its geography known to the Spanish explorers and missionaries in the 16th century. Santa Fe was founded in the early years of the 17th century. Evidence shows that some of the old ditches in the Las Cruces vicinity have ancestral roots dating back 300 years. However, it wasn't until sometime between 1840 and 1850 that the slow migration of Anglos into the area became conspicuous.

Early irrigation in the valley was practiced through community systems of ditches diverted from the Rio Grande. Dams were precariously and laboriously maintained in the Rio's shifting channel and against its torrential floods.

Along the course of the Rio Grande from Colorado to the Gulf of Mexico, irrigation development during the forty years following 1850 was so rapid that we find by the early 1890s, Congress was being asked to help prevent water depletions along the river in southern Colorado and northern New Mexico. Fortunately, pioneers in southern New Mexico had already made tentative plans for impounding the stream despite their geographic proximity to Texas and Mexico.

By 1902, irrigation works on various western streams were considered necessary for continued irrigation development. However, no one was financially secure enough to take on such an enormous task.

Projects of this magnitude could only be financed by an agency backed by the federal government. The need for large-scale irrigation projects was finally crystallized by the Congress in passing the Reclamation Act of 1902, which formed the Reclamation Service or Bureau of Reclamation.

The Reclamation Act authorized the expenditure of funds derived from the sale of public lands in various arid states to construct irrigation works. The Act provided that dams and canals would be built, but the cost associated with these projects would be repaid by the farmers who benefited from the projects.

The Act of February 25, 1905 authorized Texas as a Reclamation State and authorized the Rio Grande Project . Upon determining the project's feasibility, the Act authorized the Secretary of the Interior to enter into a repayment contract with the Elephant Butte Water Users Association on June 27, 1906 to repay the U.S. government for its investment in the project. The Act also included a proposed extension of the project into Texas.

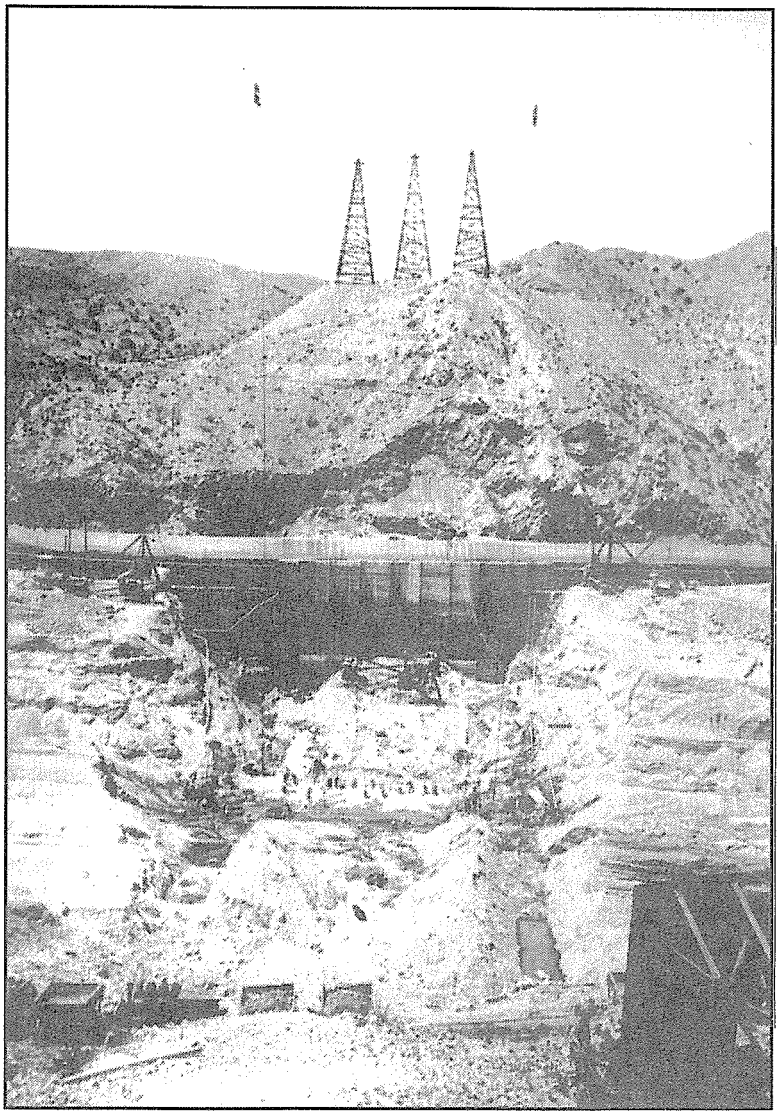


Figure 1. *Construction of Elephant Butte Dam keyway with Rio Grande routed through concrete and timber channel, c. 1910. Photo courtesy of the U.S. Bureau of Reclamation.*

In 1906, an international treaty with Mexico was signed by the federal government pledging delivery of 60,000 acre-feet of water to Mexico annually and to pay all costs associated with storing and delivering this water in perpetuity. In 1908, the U.S. government, through the predecessor of today's Bureau of Reclamation, appropriated "all the unappropriated water of the Rio Grande and its tributaries" for the purpose of irrigating lands in the Rio Grande Project (RGP) in New Mexico and Texas."

After appropriating the waters of the Rio Grande for irrigation purposes, the U.S. built the Elephant Butte Dam and Reservoir to supply agricultural water for the RGP. The RGP consisted of two irrigation districts in New Mexico and Texas and was the third Reclamation project authorized by Congress. Fifty-seven percent of the water stored at Elephant Butte and Caballo reservoirs belongs to the Elephant Butte Irrigation District, the remainder belongs to the El Paso Water Improvement District # 1.

Work on Elephant Butte Dam began about 1910, two years after the Leasburg Diversion Dam was completed. For the most part, the system of canals long in existence such as the Doña Ana and Las Cruces ditches were put into service first. It was not until about 1916 when the Elephant Butte Dam was completed that the system of canals and the heading at Mesilla Diversion Dam came into service.

An excerpt from *The Conquest of the Desert* by George B. Anderson describes the magnitude of such a project as the RGP.

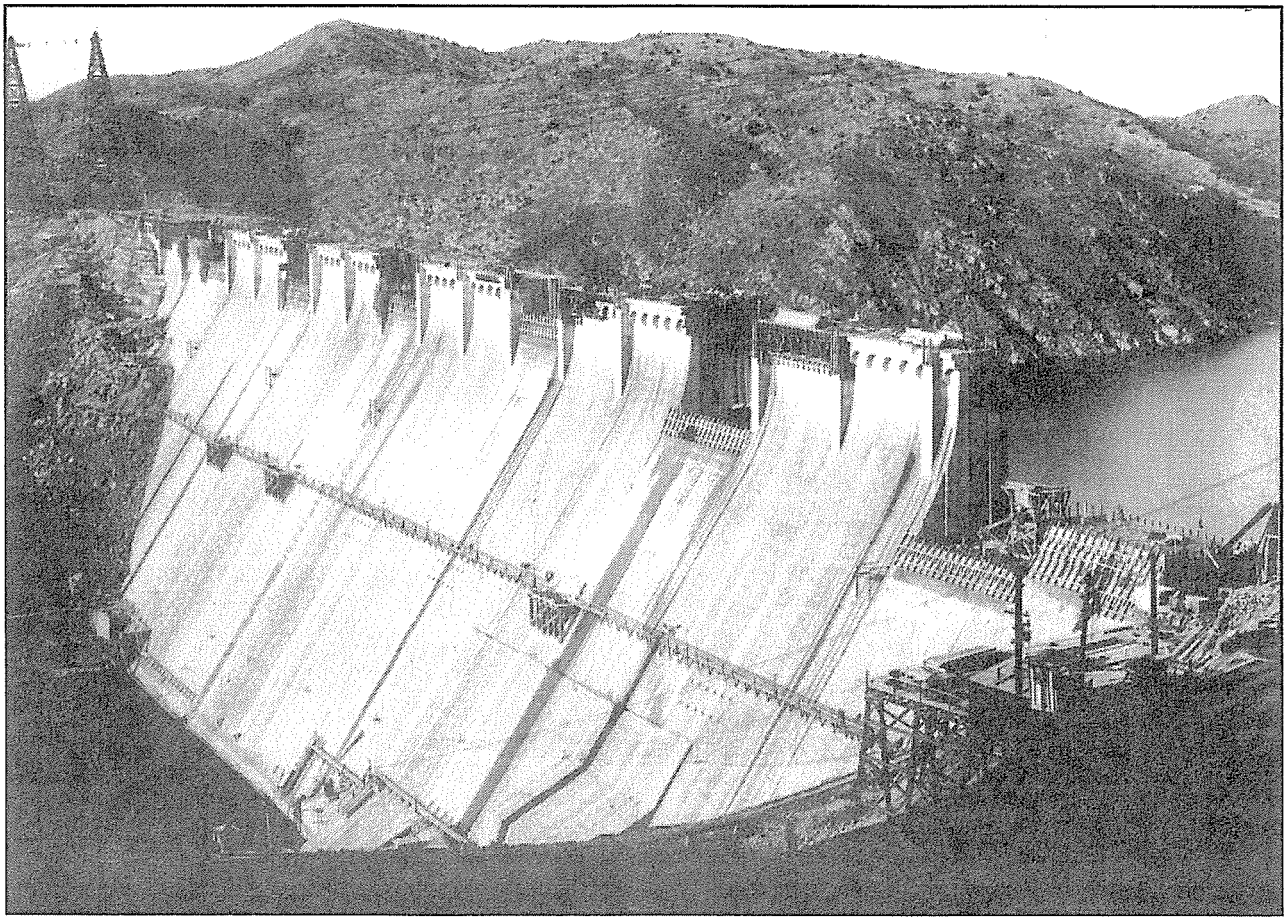


Figure 2. *Elephant Butte Dam nearing completion with water storage already started, c. 1915. Photo courtesy of the U.S. Bureau of Reclamation.*

The main dam will create a reservoir one hundred and seventy-five feet deep at its lower end and about forty miles in length, with a storage capacity of two million acre-feet, equal to a body of water one foot in depth spread over a flat surface having an area of two million acres, or over eighty-seven billion square feet, or three thousand one hundred and twenty-five square miles—an area nearly twice as great as that of the state of Delaware, and about three times as great as that of the state of Rhode Island. This means, in other words, that the flood waters to be held in storage in this gigantic dam, if suddenly loosed, would cover an area equal to that of Rhode Island to the depth of about three feet.

The Engle Dam will be arched upstream on a six-degree curve, the upstream edge of the crest having a radius of nine hundred and fifty-five feet. From the bedrock foundation to the top of the parapet walls on the crest of the dam the distance will be two hundred and fifty-five feet, and from the sand of the river bed to the crest, one hundred and ninety feet. The concrete dam will be one hundred eighty feet thick at the bottom, twenty feet thick at the top, eleven hundred and fifty feet in length at the top and four hundred feet in length at the present river level. On the top or crest of the dam there will be constructed a roadway fourteen feet wide, having walls of concrete five feet high.

In addition 44,400 cubic yards of rock and earth and 335,000 cubic yards of sand

must be removed, to which 5,000 cubic yards of bed-rock must be blasted out to afford ample anchorages. In the construction of the dam, 410,000 cubic yards of cyclopean concrete must be laid, 114,000 yards of which will be built below the river bed, and 296,000 yards above the river bed. In the manufacture of this concrete about 300,000 barrels of cement will be used.

One might think that as soon as the last trowel of mortar was placed on the dam, the farmers in the valley would have had their mule teams harnessed and their plow points sharpened ready to plow 90,640 acres. Not quite! Almost coincidentally with the completion of the storage dam and the main features of the irrigation system, a period of great uncertainty, anxiety and even despair began for the valley's landowners and farmers. Although there had been some land, which because of its elevation or location was considered undesirable due to alkaline conditions, no one ever suspected the widespread and disastrous conditions that followed almost immediately.

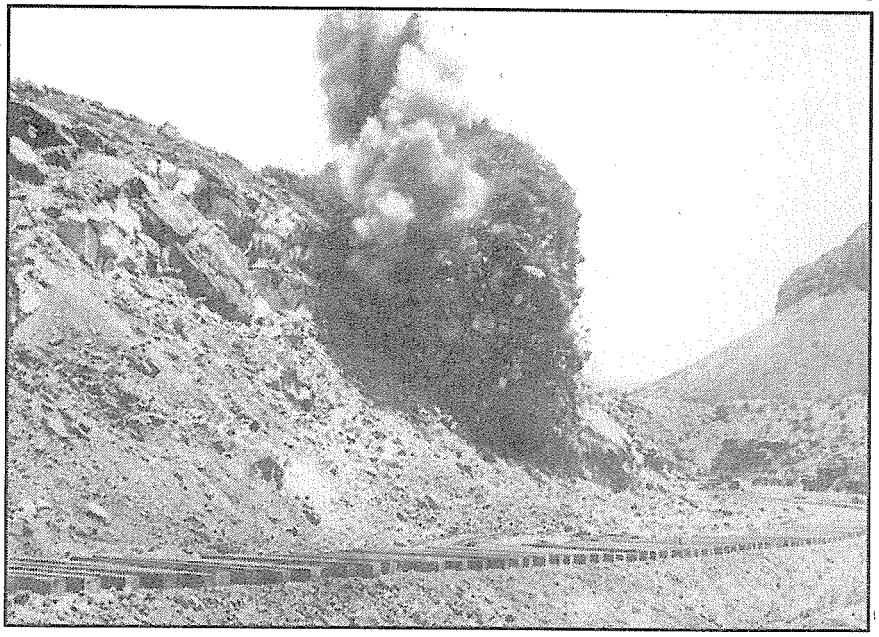


Figure 3. *Sediment and rock removal for Elephant Butte Dam placement, c. 1910. Photo courtesy of the U.S. Bureau of Reclamation.*

Storing water at Elephant Butte Dam caused the groundwater level to rise resulting in virtually clear water in the canals. This water would seep into the soils much more rapidly than the formerly silt-laden water. The rise of the groundwater level also was accelerated by the increase in the number of canals and laterals, the amount of irrigated land brought into production, and the increased time that water was in the river. Vigorous efforts were made to correct the seepage problems by constructing an elaborate system of open drainage channels of which in this district alone, there are currently about 400 miles. These drains have to a great extent eliminated the alkaline conditions by lowering the groundwater level.

In 1918, following the passage of suitable legislation by the New Mexico legislature, the EBID came into existence. To it was formally transferred all authority and obligations of the Elephant Butte Water Users Association, whereupon the Association was dissolved. The contract was a very important milestone in formulating district policy. Under state law, the newly created irrigation district had broad powers and differed from the water users' private corporation in that it had the duty to levy and collect taxes to meet its obligations.

Contracts dated June 15, 1918, Feb. 21, 1924, and July 16, 1928 obligated EBID to repay the reclamation fund about $7 million as its share of the cost of the irrigation and drainage works. The 1918 contract allowed the EBID the right to expand the project. The contract also canceled the liens placed by the U.S. government on irrigators' lands for repayment of the loan. The cancellation of the liens appears to have transferred all liabilities and risk of repayment, along with the right to the water, to the EBID from the individual water users. This contract allowed the EBID to divert and distribute water as arranged by the U.S. government and the EBID Board of Directors.

The contract also gave the EBID authority to sever water rights from land which was insusceptible to irrigation. This authority prevented these lands from having appurtenant water rights. The EBID could then reassign these rights to other lands within the

district. The EBID in turn established a waiting list of lands which had petitioned to receive water rights that were within the district boundaries. Although 90,640 acres of water rights were appropriated to the project, the district's boundaries are in excess of 133,000 acres. Today, there remains land awaiting water rights as they become available.

One other important milestone in the district's formation worth mentioning is the 1922 Act. This Act enabled the Secretary of the Interior to dispense with water rights applications when he entered into a contract with an irrigation district to repay the U.S. In that case, the water would not be owned by the landholder, but instead would be vested in the irrigation district. The district would then use its taxing authority to guarantee repayment of the loan. Thus, in conformance with the 1922 Act, water associated with Bureau of Reclamation projects, such as the RGP, is not sold along with a piece of land. Instead, the landowner only has the right to receive water on that piece of land under the district's rules and regulations as set forth by contract. As a result, RGP water cannot be transferred from project lands without the irrigation district's approval. The EBID is the guarantor of the loan and the operation, maintenance and replacement of project facilities in perpetuity. The EBID must enforce this requirement or it would have no way of preserving the land's value. Preserving the land's value provides the only real guarantee that the district can collect sufficient revenues to meet its present and future obligations.

The EBID has the liability, via its contracts, with the federal government to guarantee repayment, operation, maintenance, and replacement of project facilities. The district must protect its ability to meet project liabilities regarding water delivery for irrigation use by ensuring that its revenue source, that is, the sale and delivery of water to individual users, is protected.

Reclamation law and RGP contracts provide a procedure for municipalities to obtain water from the RGP without disrupting the existing contract rights, benefits, title, and privileges. With appropriate conservation, there may be more water available on project lands than will be needed when these lands are developed for municipal use. Thus, as RGP lands become completely urbanized, project water, if any remains, could become available for use on other lands within the district. This water should be used first for the "waiting list lands" and subsequently on other project lands not receiving water. Once these project lands are provided with an adequate water supply, then possibly, additional lands not currently part of the project may be annexed into the district and provided water. An effective water conservation plan for use of project water will stretch the available water supply and will allow the project to serve additional lands and population.

The EBID is and has been involved in many water related projects including:

- EBID Agricultural Water Demonstration Project. This ongoing project began in 1994 and involves a cooperative effort between the Natural Resources Conservation Service, the New Mexico State Engineer Office, farmers in the Mesilla Valley, and the EBID. The project's goal is to determine possible surface irrigation water savings through irrigation scheduling using irrometers and high-flow turnouts. Thus far, toward the end of the 1995 irrigation season, farmers were experiencing reduced irrigation water usage along with shorter irrigation events. A by-product of the project has been fewer fertilizer applications, which results in reduced leaching into the groundwater, and potentially, a higher profit margin for farmers.
- EBID On-farm Water Conservation Reloan Program. This ongoing program began in 1994 and involves EBID administering a program funded by the New Mexico Interstate Stream Commission. This low-interest money is loaned to farmers for land leveling, lining of irrigation ditches and reservoirs, constructing irrigation return flow conservation systems, drilling and equipping irrigation wells, installing flow meters, and constructing other similar water conservation facilities.
- New Mexico Regional Water Planning Program. EBID is participating in this statewide effort to develop and plan for the wisest use of our local water resources to insure the quality and quantity of the resource will be protected and utilized in a fashion that will support future demands. Included in the planning effort are measures for conservation, water reuse, and incorporating innovative technology in the processes.
- Las Nutrias Groundwater Project. This ongoing project started in 1992. It involves the EBID as a

sponsor of Jornada Resource Conservation and Development, Inc., which administers the project along with New Mexico Tech and the Bureau of Reclamation. This is but one effort where agricultural interests are collecting data to substantiate or disprove the undocumented assertion that agriculture is the largest nonpoint source polluter. Through the analysis of tail water captured in a tile drain system installed in the field, researchers are determining the impacts of farming practices on the shallow groundwater table.

- Rincon Valley Agricultural Land Use Study. This project is complete except for the final report. The one-year project, started in 1993, was a cooperative effort between the U.S. Geological Survey and EBID. The project dealt with sampling surface water from the Rio Grande and drains, and groundwater from 30 shallow wells spread across the Rincon Valley. Samples were analyzed for herbicide and pesticide levels, of which none proved anywhere near the maximum contaminant level, as set by the Environmental Protection Agency. This project was conducted through the irrigation as well as nonirrigation season.
- Mesilla Basin Groundwater Monitoring Program. This ongoing program involves the U.S. Geological Survey, as the lead agency, and contributing efforts by the New Mexico State Engineer Office, New Mexico State University, Las Cruces Water Department, El Paso Water Utilities, Jornada Resource Conservation and Development Inc., International Boundary and Water Commission, U.S. Section, and EBID. The program includes surface and groundwater monitoring for fluctuations due to the pumping demands of municipal, industrial, and agricultural uses by utilizing an observation well network and three piezometer nest cross sections which stretch across the Mesilla Basin. Rio Grande Seepage as well as preliminary water quality analysis is included in this program.

The EBID oversees 133,000 acres of land of which 90,640 are allowed to be irrigated with surface water during any one irrigation. The district manages the operation and maintenance of three diversion dams and 400 miles of canals/laterals and 300 miles of drains. Our staff consists of about 100 employees.

EBID is a quasi-municipality subdivision of the State of New Mexico. This designation authorizes it to tax its constituents under New Mexico state statutes. The district derives the majority of its operating budget from taxes and the sale of water.

The 90,640 acres of irrigable farmland within the district boundaries are all documented by land records, which are kept by the district in the Las Cruces office. These data serve as the bulk of the information for determining EBID's tax base.

The current Board of Directors of the EBID is making every effort to protect the surface and groundwater resources of the Mesilla and Hatch valleys in southern New Mexico. However, the population in the Mesilla Valley is growing rapidly, making it difficult to preserve this valuable resource.

Agriculture in the district makes a large annual contribution to the economy of the area. Crop values have averaged over $100 million during the last ten years. This figure represents money pumped into the economies of Doña Ana and Sierra counties. Any reduction in farming will have an immediate and adverse effect upon the economy of southern New Mexico. The importance of 90,640 acres of highly improved and productive agricultural land in the district should not be underestimated. The productivity and value of this land is entirely dependent upon an adequate surface and groundwater supply. Any activity that jeopardizes this precious resource is of great concern to the water users. Since the district has paid its entire indebtedness to the U.S. government for its portion of the lands, it must guard against any activity that relates to the RGP that would otherwise fall under the responsibility of the federal government.

Surface water alternatives and water management strategies for municipal water use continue to be developed by the district's Board of Directors. The Public Service Board (PSB) of El Paso has recognized that surface water can be a replenishable water source for its citizens. They continue to acquire sufficient water rights in Texas to assure themselves a satisfactory water supply. The cost of surface water rights and the facilities necessary to transport and treat the water will be substantial. However, surface water is replenishable. Groundwater, if mined, is exhaustible. Surface water can meet current needs and any surplus can be used to recharge groundwater areas that are now being exhausted. Enough surface water has been spilled and lost during the past years to supply El Paso and Las Cruces for many years.

Certainly the financial burden will be heavy, but an assured water-supply in a semiarid region can never be cheap. The PSB of El Paso should be commended for changing its program from one that would seriously injure a neighbor, to one that will give it an assured water supply based on surface water rights currently held by Texas interests. It has seized the opportunity to consider alternative water resource technologies in developing a program for a permanent water supply based on surface water. This route will be far better than engaging in permanent warfare with a neighbor over what will inevitably prove to be only a temporary water source for El Paso. The EBID has initiated its study for a regional water supply based on the same principles.

To keep a strong agricultural economy in New Mexico, the EBID must continue to take over more functions from the federal government, namely, the Bureau of Reclamation. Complete control of the project will determine our destiny.

It has been a long-standing policy of transferring single-purpose and many multi-purpose facilities to local water organizations when a project's costs have been paid. In an effort to implement that policy, EBID has initiated legislation for the return of the remaining district works so that it may assume complete control over them. This is no different than obtaining the mortgage deed for your home upon making the final payment.

Despite current difficulties and new ones bound to arise in the future, few doubt the overall success of the EBID. Agriculture as we now know it in the Mesilla Valley would be unimaginable without it. The district currently is working with New Mexico State University and agricultural engineering firms on developing better operation efficiencies through data acquisition and automated metering.

History has a tendency to repeat itself. The faces may have changed, but the players remain the same and the district will continue to fight for its precious resource. New Mexico is a state with a unique past, and the lore surrounding the building of Elephant Butte Dam and the founding of the district provides a number of important and colorful chapters that link the past to the present. What's around the corner? The EBID believes that its future will be as progressive as it has been in the past.