Texas Water Resources Institute

December 1979
Volume 5
No. 10

To Build a Dam

By Lou Ellen Ruesink, Editor, Texas Water Resources

I'm going to build a dam and stop the water so I can wade in it.

I've built lots of dams before. First you have to know which way the water's running. Sometimes it ain't worth the trouble cause the water dries up before the dam's built; and sometimes there's so much water it washes my dam right down the storm sewer. Rocks make dams strong, though; and I pack mud real tight to hold the rocks together.

Someday, when there's a big rain, I'm gonna build a dam, collect the water in plastic jugs, and sell it to the neighbors. They like rain water for their house plants. I don't know whether they'll buy this water or not. See how dirty it is from all the tires and gas and stuff on the pavement.

You know that kid Joey building his dam down the street. If I build my dam tall enough-and long enough-to stop all the water, Joey sure will be mad.

The procedures our cover engineer has followed are quite similar to those necessary in constructing major reservoir projects around the state. He first established a purpose for his dam, then planned his project, and found a way to finance it. Just as his real-life counterparts do, he also worried about water quality behind his dam and impacts downstream from his dam.

Citizens in Jackson County, Texas have spent the past 25 years following these same basic steps. This time next year, however, those who are still around should see their project completed. They will then be the envy of every chamber of commerce in the state with their 75,000 acre-feet of water available annually to attract industries and their 11,000 surface acres to attract recreationists.

The number of years it took to complete Lake Texana, located midway between Houston and Corpus Christi, is not an exceptionally long time for planning, authorizing, and building a dam according to the Texas Department of Water Resources. The steps to complete the Jackson County water supply project chronicled below explain why reservoirs should be planned and approved far in advance of need.

1954-1962: Establishing Purpose

As early as 1954, local citizens were convinced of the need to control and store the flow of the Navidad River. They established the Jackson County Flood Control District that year to work for a water supply project. Water users in the area-primarily rice farmers and small towns-were totally dependent on a diminishing groundwater supply; and industrial development along the coast was hampered because of little fresh surface water.

Investigations conducted in the late 1950's by federal and state agencies concurred that a surface supply was needed in the Jackson County area. The area studied generally covered the Lavaca River Basin and the two adjacent coastal basins. The Jackson County Flood Control District hired consulting engineers Lockwood, Andrews, and Newman to present a plan for developing a water supply for the area. This firm conducted surveys and in 1961 presented a design for a dam at approximately the same location as the Bureau later proposed. The engineers called their project Lake Texana after a once thriving, now extinct town at the reservoir location. Plans for private financing of this project were not successful.

Separate studies by the U.S. Study Commission and the Bureau of Reclamation both recommended a project involving a dam in the Lavaca-Navidad basin to form a reservoir. At the same time, the Texas Water Development Board studies recommended a reservoir on the Navidad River to meet future area supplies and to serve as a link to move water from East Texas to the Rio Grande Valley. The transfer plan has since been scrapped, but current and future water needs are still basically those presented by the plan.

Recent studies have verified the earlier supply studies by showing that the groundwater in the area is declining due to the fact that users are pumping more each year than nature is replacing. Area water users are having to pump water from greater depths than they did 20 years ago, and the deeper water is more highly mineralized.

Pumping costs have risen dramatically because water must be brought to the surface from greater depths and because natural gas prices have increased sharply. This means that rice farmers, who were not interested in buying surface water as long as groundwater was inexpensive, now find surface water from Lake Texana a more economically feasible alternative than it seemed two decades ago.

Even though irrigation supply is not a purpose of Lake Texana, farmers have already requested water from the future reservoir for irrigation. Authorization from the U.S.

Congress and permission from the Water Rights Commission will have to be granted, however, before water can be sold for irrigation.

For the present the water stored in Lake Texana may be used only for municipal and industrial supply and for recreation.

1963-1966: Determining Feasibility

Once federal, state, and local agencies established that a water supply source was needed in Jackson County and surrounding areas, the Bureau initiated studies to determine the feasibility of building a dam on the Navidad River.

Historical data showed that average annual flow of the Navidad River is more than adequate to supply a reservoir. In fact, only 22 percent of the average flow of the river will be needed to supply Lake Texana. The water flowing through the county was not claimed by any other user and far exceeded freshwater demands of the bays and estuaries at the mouth of the river. Lake Texana will actually stop only four percent of all fresh water going into Matagorda Bay.

Studies also found a safe site for a dam and adequate construction material for the project. Additional investigations determined that very little sediment and other pollutants would affect the water quality or storage capacity of the reservoir. As a matter of fact, storage capacity of the reservoir should decrease only ten percent in 100 years due to sedimentation. Water quality in the reservoir is expected to remain high because the watershed produces little natural or manmade pollution.

Costs and benefits of the project were evaluated, and a report recommending that a reservoir be built in Jackson County was submitted to the Bureau of Reclamation in 1963. As the plan was reviewed and approved at each administrative level, it moved through the Secretary of the Interior, the Bureau of the Budget, and reached the U.S. President in 1965. The report was also presented to the House of Representatives in 1965.

1967-1972: Financing the Project

Jackson County citizens formally gave the project their support in 1967 by approving a $3.7 million bond issue as local contribution. County property owners also authorized a tax not to exceed $.15 on every $100 worth of property for the maintenance, operation, and upkeep of the river authority and its facilities. The Texas Water Development Board officially joined the county by offering financial backing through the Texas Water Development Fund.

The needs and feasibility of the project were explained and reviewed at several Congressional hearings during 1967 both in Washington and in Jackson County. Congress did finally approve the project, and the legislation authorizing the Bureau of Reclamation to construct the project was signed by Lyndon B. Johnson at the Texas White House in October 1968.

The next year the Lavaca-Navidad River Authority was created by the Texas Legislature to complete the job started in 1951 by the Jackson County Flood Control District. Bill Farquhar, who had been with the district since 1967, was named general manager of the river authority and remains in that position today.

It was not until 1972 that a financial agreement was reached by the local, state and federal funding agencies. Future water customers will eventually pay for most of the $70 million project, but the federal government provides the financing interest-free for 30 percent of the project cost the first ten years. The federal government also picks up the tab for items for which the river authority cannot charge such as recreation and fish and wildlife enhancement.

The 1972 contract also stipulated that, upon completion of the project, the care, operation and maintenance of the dam and reservoir will be the responsibility of the Lavaca-Navidad River Authority.

1972-1976: Minimizing Impacts

Jackson Countians were able to see and feel their project underway beginning in 1972.

The Bureau opened an office of 50 employees in the Jackson County seat of Edna in 1972 and began work. Land surveys, appraisals, and acquisition took four years to complete and eventually involved the Bureau purchasing 18,000 acres in 120 tracts.

One hundred miles of fence was then built around the future lake perimeter, and the area to be inundated was partially cleared. Only parts of the lake site were cleared for boating and water skiing safety. Sufficient timber and brush were left, however, to provide protection for fishermen during windy weather, for fish concentration and for waterfowl. A multi-level release system was included in the plan to allow reservoir operators to choose the level from which water will be released downstream. This protects downstream bays and estuaries in case water in the reservoir becomes stratified-layered-according to temperature, chemical makeup, or oxygen level.

Relocation also began in 1972 and took fourteen million dollars and six years to complete. It involved moving miles of highways and railroad tracks as well as oil and gas wells and pipelines. Because the site of the town of Texana had historical value, the Bureau funded a series of projects and reports on the history, architecture, and archeology of the Texana area conducted by University of Texas students working with the Texas Archeological Survey. Artifacts from the site will be on permanent display at the river authority headquarters adjacent to the reservoir.

The project construction schedule was delayed almost two years because of a court case challenging dam construction principally on the basis of its impact on freshwater inflow to bays and estuaries. The case was decided in favor of the project, but cost escalation during the delay added between $15 and $20 million to the project cost.

1976-1979: Constructing the Dam

Construction of the dam itself began in 1976. The structure goes down 45 feet below sea level in the river basin and rises to 55 feet above mean sea level. It is a 1.2-mile earth-filled dam across the river valley with a total of 6.7 miles of earthen dikes on either side of the dam for added safety. A concrete spillway and 12 gates will control the release of flood waters, and two conduits built into the dam will release water to customers.

The dam in Jackson County is different from most dams in that it had to have protection on both sides from water erosion and from hurricane tides since it is less than 20 miles from the Gulf Coast.

1980: Completing the Project

Barring a major drought year, the reservoir could be filled in 1980-25 years after the first study recommended it. When full, the reservoir will have approximately 125 miles of shoreline and contain about 170,000 acre-feet of water.

The river authority estimates two million visitors a year during the first years of operation. Plans to accommodate these visitors include a 600-acre state park, a 250-acre primitive camping area, a 100-site recreational vehicle campground, eight boat ramps, and a marina complex.

Water distribution lines to the first customer should be installed during 1980, and full responsibility for the care, operation and maintenance will be transferred from the Bureau to the river authority.

The project has been built--admittedly--in advance of need, but the Texas Department of Wate, Resources estimates that all of the 75,000 acre-feet available annually will be bought well before the year 2000. That's 20 years from now, so it's time for the citizens of Jackson County to start planning another dam!