Water Use and Water Control Planning on the Rio Grande

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To better understand our present situation, suppose we look at what has taken place in the Upper Rio Grande Basin above Fort Quitman, Texas during the past 60 years. I use that period because in 1896 W. W. Follett made a complete canvass of irrigated lands in this basin, the first authoritative survey in modern times. He reported a total of about 450,000 acre irrigated, as shown in Table 1.

An interesting historical note is by C. R. Hedke, who estimated that about 125,000 acres were irrigated in the Middle Rio Grande Valley, Cochiti to San Marcial, in 1880. Due to seepage problems associated with sedimentation in the Rio Grande channel, this acreage dropped to about 45,000 acres in 1910. It has increased since formation of the Middle Rio Grande Conservancy District but is still considerably less than the reported 1880 acreage.

In 1936 the National Resources Committee, in what is known as the Rio Grande Joint Investigation, again surveyed the Upper Rio Grande Basin and found 646,000 acres irrigated, also shown in Table 1. This was probably the most detailed study ever made of irrigation in the Upper Rio Grande Basin. The Federal Departments of Agriculture, Army and Interior participated in this survey with the States of Colorado, New Mexico and Texas at a total cost around $400,000.

There were many other surveys of various parts of the Upper Rio Grande Basin in these 60 years by Herbert W. Yeo, John H. Bliss, E. B. Debler, R. J. Tipton, C. R. Hedke, E. P. Osgood, Russell Dallas, R. J. Hosea, J. L. Burkholder, and probably others. The Irrigation Census of 1949 gives the only available figures on irrigated acreages in recent years, a Basin total of 815,000 acres.

Table 1 shows one of the principal reasons for everyone being short of water. Even if the water supply had remained constant, an increase of some 80 percent in the irrigated acreage would have been felt. In addition, everyone knows that only in a few years of the past quarter-century has the Rio Grande produced what used to be called a "normal" yield of water, a little more than a million acre-feet delivered in Elephant Butte Reservoir.

Figures for New Mexico are divided at Elephant Butte Reservoir. As most of you know, compact commissioners from the three states, when negotiating the Rio Grande Compact, decided it was too difficult to divide

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the water apportionment for the Rio Grande Project between New Mexico and Texas. For operation of the Compact, they stipulated that New Mexico would stop at Elephant Butte Reservoir. The entire Rio Grande Project would be considered to be in Texas. Figures in Table 1 can be added together to give the total acreage in geographical New Mexico, or the figures "south of Elephant Butte" can be added to Texas to give the compact acreage for Texas.

Table 1

Irrigated Acreages - Upper Rio Grande Basin[1/]

Section of Upper Rio Grande Basin	Investigators		
	W. W. Follett 1896	Rio Grande Joint Investigation 1936	Irrigation Census 1949
Colorado (Excluding Closed Basin)	245,000	322,000	506,000
New Mexico			
North of Elephant Butte	150,000	153,000	133,000
South of Elephant Butte	37,000	90,000	89,000
Texas	18,000[2/]	81,000	87,000
Totals	450,000	646,000	815,000

1/ National Resources Committee - Regional Planning, Upper Rio Grande - 1936

2/ Probable irrigated acreage in late 1860's. 1896 acreage not given.

Since the Rio Grande Compact has been mentioned, I would like to give my personal opinion of that compact, for what it may be worth. There has been much criticism of this agreement between Colorado, New Mexico and Texas, with approval of the United States Congress. Negotiations were begun in 1923 and a temporary compact was concluded in 1929. Permanent allocation of Rio Grande water was delayed until after the Rio Grande Joint Investigation and signing of the Rio Grande Compact in 1939.

In recent years the Rio Grande Compact has been criticized in all parts of the Basin. New Mexico was the first to feel the pinch. Texas, including that part of New Mexico below Elephant Butte Reservoir, followed in the list of aggrieved parties. We frequently hear statements in these sections of the Basin that they were gypped in the compact negotiations and that a new compact should be negotiated giving them more water than did the 1939 agreement. You may be surprised to learn that Colorado, which has been going in debt under the Compact for the past few years, feels the same way and makes identical statements. I honestly feel that if a new compact were negotiated today on the Rio Grande, Colorado would insist on the right to use more of the water originating in Colorado than it did during the 1936-1939 negotiations. Both New Mexico and Texas might wind up with less water than they are now entitled to.

We must remember that a compact on the use of interstate streams is essentially a horse trade. Almost always the total of original demands for water in each state is greater than the water supply in the river. Then the compact commissioners from each state have many long sessions at which each gives a little until the total demands are within the amount which the river normally supplies. Usually, after several years of negotiations and exhaustive engineering studies by each state, an unbiased view will find that each state came out with about as fair a deal as the others. I feel this was true for the Rio Grande Compact when it was signed in 1939. It was a pretty equitable compact, based upon what was known about the river up to 1929, the period of record used in the engineering studies.

Two natural phenomena about which little or nothing was known at that time have since become very important factors in the operation of this compact. They have caused most of the criticism. First, salt cedars, willows, cottonwoods, baccharis and other phreatophytes existed then but in smaller quantities and their effect on water was hardly known. They have spread throughout the Middle Rio Grande Valley since then and we now know they consume large quantities of water. Sediment blocked the river channel above Elephant Butte Reservoir and prevented low flows from reaching the reservoir. This deterioration in river bottom conditions consumed so much of New Mexico's apportionment of water that she went into debt on her compact deliveries of water to Texas for many years. Recent channelization of the river and partial

eradication of phreatphytes has partially restored the ante-1929 conditions and New Mexico no longer incurs a water debt every year.

Second, the effect on the Rio Grande of pumping large quantities of groundwater for irrigation was unknown until a few years ago when most of the water from a very large snow pack disappeared in the river channel through the San Luis Valley in Colorado. Seemingly, most of this river flow went into recharge of the ground water aquifer which had been depleted by heavy pumping of irrigation wells. Now Colorado goes into debt each year under the Compact.

Granted that these two comparatively recent conditions have interfered with operation of the Rio Grande Compact as it was envisioned by the negotiators in 1939. But would a new compact now, knowing about these things, be any better for New Mexico and Texas than the compact we have? I doubt it.

Probably the chief defect in the Rio Grande Compact is the combining of the entire Rio Grande Project with Texas for operation of the Compact. This has created a psychological barrier between two parts of New Mexico which should think and act as one on all interstate water negotiations. It has caused the unique situation of the State Engineer and the Compact Commissioner for New Mexico having to represent the State in legal actions against a part of New Mexico which is joined to Texas.

We must grant that the boundary between New Mexico and Texas through this project is a meandering line. From Anthony to El Paso this boundary is the center line of the Rio Grande at the time of the Gadsden Purchase. It cuts through farms and makes it very difficult in this section to determine how much water is delivered to irrigated lands in each state. But much more difficult determinations have been made and I believe an engineering study could develop a sound basis for equitably apportioning water in that area to each state. Such a change in operation of the Compact would not directly provide any additional water in New Mexico but it would help to unify New Mexico's thinking and eventually lead to improvement in the water situation.

As everyone here probably knows, all waters of the Upper Rio Grande Basin, as in most other river basins of New Mexico, are fully appropriated. In common with many adjoining states, our last chance for additional water in the near future is by importation from the Colorado River. The Upper Colorado River Compact, signed in 1948, after allocating 50,000 acre-feet of water to Arizona, apportions to New Mexico 11.25 percent of the remaining water to which the Upper Colorado River Basin is entitled under the Colorado River Compact of 1922. Based on historical records of the Colorado River, this would average about 838,000 acre-feet annually, less some reservoir losses. Of course, with water yields declining everywhere in recent years, no one can be sure what our allocation in acre-feet will be

in the future. Compared to the small amount of water originating in the San Juan Basin in New Mexico, this seems a very generous allotment. To implement this apportionment, Colorado has assented to storage and diversion into New Mexico of water originating in Colorado.

The diversion of water from headwaters of the San Juan River into the Rio Chama (Tributary to the Rio Grande) was studied on a reconnaissance basis during the Rio Grande Joint Investigation in 1936-1938 and was found to be feasible.

A few years ago when New Mexico explored ways to put out allotment of Colorado River water to beneficial use, the Interstate Streams Commission asked the Bureau of Reclamation to study the San Juan-Chama diversion more intensively. The first report was issued in March 1955. This plan includes three storage reservoirs and five diversion dams for collecting and storing water in the San Juan River in Colorado, and nearly 50 miles of main conduit. The imported water would be discharged into Willow Creek, a tributary of Rio Chama, and would be regulated in the proposed Heron Reservoir for use in the Upper Rio Grande Basin. This reservoir would be used only to adjust the imported water with the varying natural flow of Willow Creek, with no storage of water for more than a short time. Outlet works in El Vado Dam would be enlarged so releases from the Heron Reservoir would pass through El Vado and down to the Rio Grande unimpeded.

The plan published in March 1955 would provide supplemental water for 45,000 acres of presently irrigated lands in the smaller irrigated valleys in northern New Mexico. Considerable flood water from Rio Grande tributaries flows through these valleys and downstream to the Middle Rio Grande Valley and Elephant Butte Reservoir, where there are vested rights to its use. Four comparatively small storage reservoirs would have to be built in these headwater tributaries to hold the flood waters for use in the northern irrigated valleys. Imported water from the San Juan Basin would be delivered to the downstream irrigated areas to compensate for water they now use but which would in the future be used upstream.

Water from the San Juan would be supplied to help firm up water supplies of the Middle Rio Grande Conservancy District and the Elephant Butte Irrigation District. The El Paso County Water Improvement District No. 1 in Texas would not receive any San Juan water. The Upper Colorado River Compact prohibits water from that Basin being used outside of Upper Colorado Basin states. The 1955 plan does not include development of new land for irrigation.

Imported water would be provided for the City of Albuquerque. In addition, the 1955 plan would contribute enough water the Upper Rio Grande Basin, without allotment to any individual interest, to replace depletions which may have occurred in the past half-century because of

more intensive use of watershed lands, improved forage and timber cover, small erosion control structures and other measures to control sediment. This is a subject about which few facts are known. Only estimates, on which few authorities agree, can be made of the additional water, if any, that has been consumed by these measures to halt deterioration of the Rio Grande watershed and reduce sedimentation in the river and in reservoirs.

The proposed allotment of water in this plan is as follows:

		Acre-Feet
Supplemental irrigation:		
Northern irrigated valleys	39,800	
Middle Rio Grande Irrigation District	25,000	
Elephant Butte Irrigation District	71,900	136,700
Municipal and industrial water supplies		55,800
Replacement of depletions caused by basin improvements		42,500
Total diversion from San Juan River Basin		235,000

Estimated project costs were allocated as follows:

	Total cost	Repayment
Irrigation	$87,531,000	$21,290,000
Municipal and industrial	27,503,000	27,503,000
General basin depletions	20,393,000	6,600,000
Recreation	360,000	1/
Stream measurements	110,000	1/
Colorado River Basin Fund 2/	----	80,034,000
Non-reimburseable items 1/	----	470,000
Totals	$135,987,000	$135,897,000

1/ Public Law 485, 84th Congress, provides that these costs shall be paid by the Federal Government.

2/ This act sets up a Basin fund by which excess revenues from sale of hydropower, after cost of power facilities is repaid with interest, will be used to pay the cost of participating irrigation projects which is beyond the repayment ability of the water users.

The San Juan-Chama Project is one of 24 so-called "participating" projects for which planning studies have been authorized by the Congress. The Inter-state Streams Commission of New Mexico and the Bureau of

Reclamation are exploring various suggestions for a feasible project which will enable New Mexico to use its apportionment of water under the Upper Colorado River Compact and which can be presented to Congress for approval and appropriation of funds. This and other irrigation projects in the Upper Colorado Basin are called "participating" because they will participate in revenues from the sale of hydro-power to be generated by the Colorado River Storage Project after construction costs for power facilities are repaid with interest. New Mexico was apportioned 17 percent of the Basin fund.

As the above tabulation shows, irrigation interests in general were expected to repay without interest only $21,290,000 of the estimated cost of $87,531,000 allocated to irrigation in the Bureau's 1955 plan. The rest would come from power revenues from large storage reservoirs in the Upper Colorado River Basin. This was an overall percentage for the Basin and varied between localities in proportion to their ability to repay. Repayment ability was determined on an irrigated-acreage basis. Examples are $1.79 per irrigated acre annually in the Elephant Butte Irrigation District and $0.61 in the Middle Rio Grande Conservancy District.

The Bureau's estimated repayment for the irrigation features is based on the promise that these costs will be paid entirely by the irrigated land. This has been the practice in most irrigation projects of the West but another concept has been applied in a few places. Under the "conservancy district" type of project, repayment of the irrigation costs is spread over urban property as well as irrigated lands. We all know that the business welfare and prosperity of most cities within an irrigation project is dependent to a large degree on the productivity of the irrigated lands. Why then, shouldn't business, industrial, and other city interests help pay for the irrigation features that produce much of the prosperity for the entire project area? An example of this type of project is the Middle Rio Grande Conservancy District, in which business, urban and industrial interests within the City of Albuquerque and Bernalillo County join with the irrigation farmers in paying for the irrigation project. True, there are good arguments for and against this type of project organization but it does relate repayments to the benefits derived from a project much better than does the usual method of assessing repayments. A district of this type can also represent all water-using interests in obtaining additional water which will be needed in the future and in making most efficient use of all available water supplies.

The 1955 Bureau plan was not accepted by all parties. It was rejected by the Elephant Butte Irrigation District, representing irrigation water users of this area. This rejection nullified the 1955 plan.

Since then the Interstate Streams Commission has been negotiating with other water-using interests willing to pay their share of the estimated project costs and for which an exonomically feasible project can be developed. Naturally, the State of New Mexico is interested in putting its allotment of Upper Colorado River water to beneficial use as soon as practicable. As you know, California and other states could use this water to advantage. While it is now legally allotted to New Mexico, we all realize that the national interest will not let our state hold it indefinitely under theis agreement; Water is getting too scarce for that. Sooner or later the Congress will take notice of outside demands for any water not being used beneficially and it might be allotted elsewhere.

Some elements which might be included in a revised plan for the San Juan-Cham Project are supplemental water for the City of Albuquerque, the AEC at Los Alamos, the Middle Rio Grande Conservancy District and Holloman Air Development Center near Alamogordo. These and other proposals are being considered by the Interstate Streams Commission and the Bureau of Reclamation. I understand the State has applications for water on behalf of the interests listed above, but it is too early to determine what form the revised project will take. It seems safe to assume that there are enough legitimate requests for the imported water, with favorable indications for economic feasibility, to assure that a San Juan-Chama Project will be submitted to the Congress in the next few years.

To be quite frank, the chief obstacle to importing more water into the Rio Grande, making more efficient use of present water supplies and otherwise improving the water situation in the Upper Rio Grande Basin, seems to be suspicion and distrust among the various groups of water users. This is only one man's opinion but most attempts to improve the general water situation in this Basin seem to have foundered because water interests in different parts of the Basin could not get together. To be sure, engineering, legal and financial difficulties have been and always will be great. But they have been overcome in rare instances where water-using groups have been able to agree on what should be done. Experience has shown that most obstacles can be overcome in an atmosphere of good will and genuine cooperation.