

CASE STUDIES IN THE DEVELOPMENT OF NEW MEXICO  
WATER RESOURCES INSTITUTIONS:  
THE MIDDLE RIO GRANDE CONSERVANCY DISTRICT  
AND URBAN WATER PRICING

by

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## SUMMARY

Water has always been a key consideration in public and private decisions in the arid Southwest. Given the increasing demands upon this region's water resources for energy production and expanding urban areas, as well as a variety of other uses, water and its availability will continue to play a pivotal role.

In recent years, however, there has been a growing recognition that this region's water situation and problems must be examined within a broader social context, and that solutions are not possible if debate is cast solely in terms of the physical parameters of the problem. More and more it is being realized that the available water supply in a specific area is an institutional, man-made constraint, rather than a hydrological one. In a period of full, or nearly full appropriation, it is the man-made water institutions that are the critical factors in shaping the region's water future.

The Middle Rio Grande Conservancy District (MRGCD) is the single sustaining institution for irrigated agriculture in this geographic area, amid surging urban development. The social organization provided by the MRGCD has served to further much development and prosperity in this region which would otherwise not have been possible. This research represents an historical description of the formation and evolution of the MRGCD, as it has served the diverse populations of the region encompassed by its boundaries.

The history presented describes the many quarrels and obstacles which have been faced by the management of the District; those pressures which have led to significant evolutionary change in the management practices of the MRGCD are also described. This research provides much detail of the current issues which are being faced in the management of the Conservancy, with these

concerns holding potential for further administrative change in the years to come.

Urban water pricing is a water-management institution in the sense that water-rate structures allocate city water among the various customers, encourage social values such as green lawns and parks, and influence citizens' attitudes toward water use and conservation. Urban water demand represents one of the fastest growing areas of water use in New Mexico, and this growth is taking place in the midst of predominantly agricultural communities. How urban water institutions react and adapt in this changing environment will shape the future economic well-being of the cities and their citizens, and will provide a reflection of changing social values and attitudes toward water and water use.

The water pricing of four New Mexico cities is analyzed: Santa Fe, Albuquerque, Belen, and Los Lunas. Included are a history of water rates and water-rate structures, as well as the social and economic conditions which have influenced these rates. Both Albuquerque and Santa Fe have experienced significant changes in urban water pricing. In most instances these changes have been in the direction of more efficient water use and conservation. On the other hand, neither Belen nor Los Lunas have had dramatic changes in urban water pricing. The social and economic forces of change, while present in Belen and Los Lunas, are neither of the same degree nor magnitude as in Santa Fe and Albuquerque. In this sense, Belen and Los Lunas represent a control group in this evaluation of the adaptation of urban water institutions to changing social and economic environments.

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CHAPTER I  
WESTERN WATER INSTITUTIONS: PRESSURES FOR CHANGE

New Mexico and the Southwest have always been recognized as arid areas, with the consequence that water has always been a key consideration in both public and private decisions within the state and region. Commonly, this consideration has been cast in terms of the actual physical occurrence (or lack thereof) of water in the geographic location in which the decision was being made. As one consequence much effort and expense has been invested in the development of hydrological understanding of both surface and underground water within the numerous water basins of the area. Given the increasing demands upon the region's water resources for energy production, expanding urban areas, as well as a variety of other uses, this hydrological research will continue in importance as society demands an increasingly accurate accounting of hydrological facts and relationships within the region.

In recent years, however, there has been a growing recognition that the region's water circumstances and problems must be examined within a broader social or institutional context and that solutions are not possible if debate is cast solely in terms of the physical parameters of the problem.

In a recent report on water demand and supply in the Albuquerque Greater Urban Area (AGUA), it was concluded:

"Perhaps the most important point to be made in this paper is that the concept of an 'AGUA water supply' is very elusive. If we were to assume that it is legally possible to transfer water rights into the AGUA region from downstream and upstream uses, then the AGUA water supply is potentially much larger than we have stated .... The idea is that the AGUA water supply is basically an institutional fact, not an hydrological fact. The laws and institutions sur-

rounding water right transfer, concerning the number of wells drilled to the Middle Rio Grande aquifer, and other man-made mechanisms appear to be more important in determining the size of the AGUA water supply than the region's hydrology."<sup>1</sup>

The authors of the AGUA study clearly concluded that the most important factors determining the area's usable water supply--the most fundamental piece of relevant water information--were "man-made mechanisms" rather than physical conditions. In a recent speech one of the authors of this report stated the issue in a larger regional context.

"...there is widespread concern that the region's limited water supplies provide an insurmountable obstacle to economic improvement within the region. In my judgment, the central question in this issue is not a physical or engineering problem of inadequate supplies. Rather, the question is instead institutional in nature. The country's most sophisticated and complex set of water institutions exist in the Western U.S. The key economic question is whether these institutions will successfully adapt to the changing economic pattern in the region."

Consider a variety of even more specific circumstances.

1) Water is physically available to New Mexicans in both the Colorado and Rio Grande basins to an extent much greater than actual use. It is the man-made interstate compacts and court decisions that instead prevent the physically available water from actually being used. Similar considerations strongly influence the State Engineer's administration of underground basins in the state.

2) In a fully appropriated basin new uses can only be accommodated through transfer from previously established uses. The rules governing those transfers, which determine the extent of transfers and the conditions under which they may occur, are entirely man-made. In some states, most notably Arizona, many transfers are not legally permissible at all.

3) The quantity of water used by an individual party has been strongly

linked to the cost of the water to the party. Pricing policies for residential water varies widely across the region including some communities which, as a matter of public choice, have chosen to levy costs at a fixed level regardless of the extent of use. In such cases per capita water consumption is significantly higher than in those communities which price water differently.

4) Pay back provisions for publicly funded water projects in the West have traditionally subsidized irrigated agriculture as a matter of public policy. Yet, nationally at least, these policies are changing. It is clear that any change will have considerable impact on the future of irrigated agriculture within the region.

These are but a few examples of those that could be listed. But the cumulative weight of the evidence should be clear. In a period of full or nearly full appropriation of water supplies, it is the man-made water institutions that are the critical factors in shaping the region's water future. To what extent do the original social purposes for which the existing institutions were evolved continue to reflect the social aspirations of the people of the locality, state, region, and nation? To what extent must these institutions be modified or otherwise adapt to a changing set of purposes? Are the existing institutions in fact successfully adapting to a changing water environment, or is it likely that painful, disruptive wrenchings will occur as events overtake rigid, inflexible institutions? These are major questions which cannot be answered within the context of the limited research effort that underlies this report. The objectives of this report are instead more modest, though they are important and necessary first steps in an overall assessment of

New Mexico's water institutions.

This report will examine the evolution of two central important water institutions in the middle Rio Grande valley, one of the two regions of the State in which the accumulating pressures on existing institutions are the greatest; the other such basin being the San Juan. This report will in essence constitute two case studies of the evolution of these institutions--one urban oriented and the other agriculturally directed. The last fifty years have seen profound change in the environment in which these institutions operate and the pressures created by these changes have not--and will not in the near future--diminish. These case studies will contribute to the formation of general hypotheses on the evolution of water institutions as well as being of value in their own right as a means of more fully understanding these two important institutions.

The discussion must begin with a brief description of the present water situation in the Rio Grande basin. Since first settlement, water availability has been a crucial element in determining the welfare of the inhabitants of the Rio Grande Valley. The region is characterized by low annual precipitation varying widely from year to year and by few permanently flowing streams. Institutions have developed over time to allocate the available water supply. These institutions include the doctrine of prior appropriation established by early miners and stockmen in the Southwest, the Winters Doctrine concerning Indian water rights, the administrative decrees of state and federal agencies--the New Mexico State Engineers Office, the Middle Rio Grande Conservancy District, the Bureau of Reclamation (now Water and Power Resources Service), the Corps of Engineers--and the pricing policies of municipal water agencies. Until the end of World War II, the region was largely rural with most individuals

engaged in irrigated agriculture. The only urban areas were Albuquerque and Santa Fe. Water institutions and their policies developed around those rural, agricultural conditions. Recently, the Rio Grande Valley has experienced dramatic changes in the size and nature of the demand for water. Increases in area population have resulted in significant increases in water values and competition for existing supplies. Water resource institutions have also been pressured in recent years by changes in individual attitudes regarding water use. The population of the Middle Rio Grande Region has become more affluent, literate, and mobile, and there seems to have been a growing awareness of environmental issues, particularly regarding water availability and use.

This report is concerned with the evolution of these water resource institutions in the Middle Rio Grande Valley. It will emphasize three questions:

- 1) What are the main current policy issues for key water institutions? What are the different views concerning resolution of these issues? To what extent are these issues an outcome of historical development? In this part of the study, emphasis is on current policy issues and their resolution; but these issues will be studied in an historical context.
- 2) What was the historical context in which key water institutions were formed? Also, how have these institutions developed over time? This first aspect of the study emphasizes historical development of water institutions.
- 3) What are the major legal issues at the federal and state level that will shape the contours of future changes?

The two institutions chosen for study are: 1) the Middle Rio Grande Conservancy District (MRGCD) and 2) urban water pricing policies. A description of the two institutions is contained in the individual chapters that follow in this report, and there is no reason to repeat those descriptions here. However, it is important to briefly discuss the reasons underlying the selection of these two institutions for study.

There are a number of forces that are increasingly exerting pressure upon the water institutions of New Mexico and the Southwest. They include: 1) energy development; 2) assertions of Indian water rights; 3) concern over water quality and the environmental character of river courses; 4) changes in federal policy towards water development projects; and 5) population migration and urban growth. All of these forces engender controversy as they press upon previously established practices and policies. Of particular concern, however, to New Mexicans of all cultures has been the pressure from energy and urban development upon the agricultural economy and culture that has been a dominant characteristic of New Mexico for almost a century. Although much recent attention has focused on the energy-agricultural issue in New Mexico as in the region as a whole, less formal attention has been paid to the urban-agricultural conflict. Accordingly, this report focuses on two institutions on both sides of this conflict in the specific area of the state in which the issue is most keenly joined--the Middle Rio Grande Valley. On the one hand is the MRGCD, the single sustaining institution for irrigated agriculture in this geographic area amid surging urban development. On the other hand is the pattern of urban water use itself and the principal policy instrument governing that use--water pricing. The case studies will examine these two institutions.

FOOTNOTES TO CHAPTER ONE

- 1 Gilbert Bonem, Micha Gisser, John Myers, and Mark Resta, Water Demand and Supply in the Albuquerque Greater Urban Area (AGUA), Bureau of Business and Economic Research, University of New Mexico, December, 1977.





CHAPTER II  
MIDDLE RIO GRANDE CONSERVANCY DISTRICT

The region of the Rio Grande river below its mountain sources has provided for the needs of several different cultures since the prehistoric Indians first organized the available flows of water with canals for the delivery to their small fields. The lands south of the river's origin in the Rocky Mountains proved unproductive and arid without the transportation of water from its occurrence in the river; the river's water has provided the sustenance of life to most settlements in the region from prehistory to today.

Archeologists have provided evidence of the irrigation works of the prehistoric Indian settlements in the middle Rio Grande valley, and it was estimated by the first Spanish explorers in the region (Antonio de Espejo in 1539) that there were 25,000 acres under irrigation when they arrived. With the subsequent colonization of the region by the Spanish and Mexican settlers these irrigated agricultural communities became larger and more numerous. These community irrigation works were known as community "acequias," an organizational form which has since influenced the pattern of development throughout the middle valley's settlement and which was the general pattern of organization among agricultural settlements throughout the Southwest colonized during this period.

With the region's colonization by the Anglo in the nineteenth century the middle valley reached a pinnacle of irrigated agricultural development.<sup>1</sup> By 1880 it was estimated that more than 125,000 acres of land were being irrigated and served as extremely productive agricultural lands. Many of

these investments were soon to be lost to a very predictable natural river maturation process. The turbulence of the water's mountain origin gives way to a slow meandering river about 100 miles south of the Colorado-New Mexico border (see map, Figure II-1). As the stream slows, its load of silt and alluvium, which was easily carried in its former turbulence, must be dropped. This siltation process has also been enhanced by the human attempts to control the river's flows and utilize its seasonal runoff with small reservoirs and irrigation diversion works. With the wide meandering river bed, and its corresponding aggradating alluvial plane, the water table of the middle river valley began to rise and the region became susceptible to seasonal and flash flooding.

The normal hydrologic maturation of the middle Rio Grande valley brought much hardship to the settlers during the years after the 1880 pinnacle of development. In 1920 it was estimated that the irrigable acreage had been reduced to about 40,000 acres. The many investments made by individuals in the middle valley area served by community acequias were continually threatened by floods; and many of the formerly irrigated lands had given way to swamp, alkali deposits and salt-grass. In many areas of the middle valley the water table had risen to less than four feet, and it was estimated that as much as 60,000 acres of the valley were seeped and nonirrigable. The meanderings of the river and the poorly organized (sometimes conflicting) operations of the many community ditches provided for a very unreliable flow of water for irrigation.

It was clear that some central organization of these many community ditches and private irrigators needed to be established in the middle valley to accomplish some control over the river's erratic flows. The Governor appointed an investigative commission, and a concerned group of

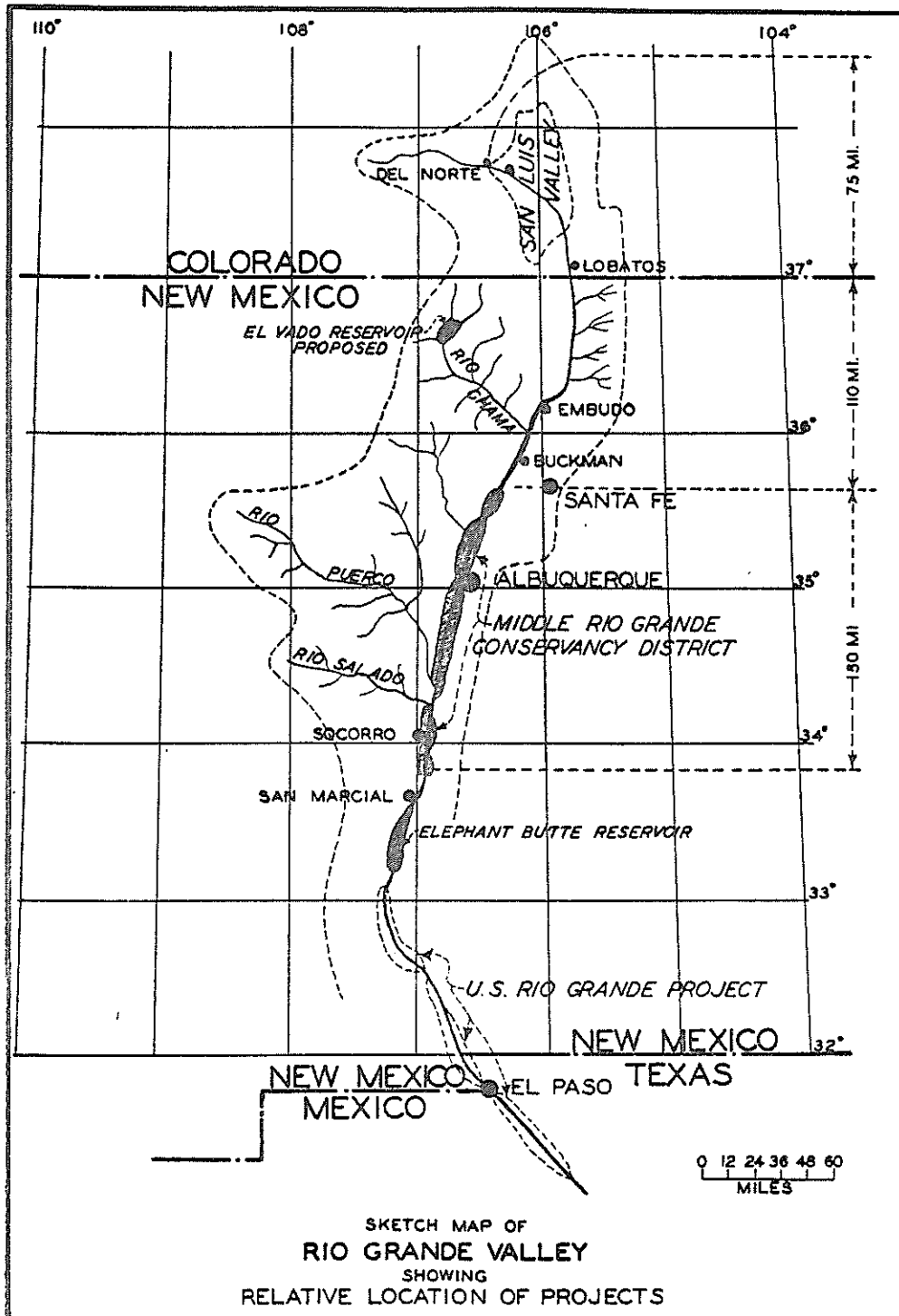


FIGURE II-1

citizens formed the Middle Rio Grande Reclamation Association, to study the possible methods to control these increasingly unpredictable flows. In 1923, the Governor's commission recommended the legislature adopt a law modeled after a Conservancy Act already in existence in Ohio. The ensuing Conservancy Act of 1923,<sup>2</sup> adopted by the New Mexico legislature, allowed the formation of the Middle Rio Grande Conservancy District (MRGCD) as a political subdivision of the State of New Mexico, a body corporate, with all the powers of a public or municipal corporation. It was hoped that the MRGCD could accomplish the drainage of the formerly productive seeped areas of the valley, develop river control facilities to protect the property of the valley from the increasingly destructive river flows, and provide an organized system of river diversions and irrigation delivery works which might expand the productive areas and enhance the economic development of the valley region.

These purposes of formation were not unique to the MRGCD, as there have been many "water institutions" organized throughout the West which helped accomplish the control of the available water resource supplies which was required to promote the settlement and development of various communities throughout the region. This research was conducted with the intention of describing the evolution of a single western water institution; with the patterns described in this evolutionary narrative serving as an illustrative example of general development patterns for similarly organized water institutions throughout New Mexico. The vital nature of the available water resources in the West constrains these resources to be allocated (and managed) in a manner which dictates (or reflects) much of the social equity values of the region. As these available water resources become increasingly

scarce (in relation to increasing demands) the allocation and reallocation mechanism employed will also be forced to consider an increasingly important efficiency concern.

#### The Organization of the MRGCD

The original group of individuals which organized the Middle Rio Grande Reclamation Association, and the subsequent MRGCD, was a small group (140 at the association's first meeting) of concerned property holders in the middle valley which represented primarily the business interests of the valley (not the agricultural community).<sup>3</sup> It was felt by these individuals that such an institutional arrangement could serve to improve the value of their investments and encourage the general economic viability of the middle valley region. This small group of individuals represented strong financial and political influence within the region (and state), and it can be fairly stated that the potential for the formation of the MRGCD was greatly enhanced by the nature of this influence. This original group of organizers, then, spearheaded the District's formation, with much of their claimed support evidenced only by the silent acquiescence of the many beneficiaries of the proposed project. The calm of the Conservancy Act's approval was followed by several incidents which would suggest the unanimity of the proposed beneficiaries might not have been as strong as originally perceived (or portrayed) by these organizers.

There were filed in District Court several petitions protesting the formation of the MRGCD, prior to its approval in August of 1925. The first of these petitions claimed support of more than 4,000 landowners, representing nearly 430,000 acres situated within the proposed District.

In this petition it was claimed that the Conservancy Act of 1923 was unconstitutional on the grounds that it provided for the confiscation of property without due process, that the Act provided for the formation of the District by a "...rediculously [ridiculously] small minority of people residing in the District" and "...subjects a majority of the land owners and the majority of the lands within the proposed District" to the wishes and desires of this minority.<sup>4</sup> This protest also suggested that the construction contemplated by the proposed District would be so expensive that the debt obligation would be both burdensome and confiscatory, in that the obligations would be "...beyond the financial possibilities of these protestants, and contrary to their best interests." This protest also contained an expression of doubt that the cost-benefit projections which had been done by the District's organizers were proper and correct (published by Rio Grande Association in August, 1923).

These and similar protests were presented several times in the District Courts, but these protestants were unable to prove that they represented a majority of landholdings within the proposed District; particularly in light of a contested reporting provided to the Court by the County Treasurer certifying the property holdings of the protesting parties. In the final hearing prior to the formation of the MRGCD, the Court ruled that:

"...under the terms of the law, there is not a great field to be occupied in the hearing; that is, if the district is petitioned by the requisite number of signers, and there is not a sufficent [sufficient] number of objectors, the court, under law, is directed to order the creation of the district, so it seems to me that the main issue is the constitutionality [constitutionality] of the law."<sup>5</sup>

The Court stated that it was forced to accept the contested Treasurer's Certification of Property Holdings, even though admitting the potential inaccuracies which might have been contained in the statements of the protestant's property. The judge's decision also stated that the protestants had "...little reason to fear lack of proper protection under the law."

On that same day (August 26, 1925) there was also entered in the District Court files an order establishing the MRGCD as petitioned by more than 100 property owners. The purpose of the District's formation as stated by this order included: a) flood protection; b) regulation of the stream channel, including widening and deepening; c) regulation of streamflow; d) diverting and otherwise eliminating flood hazards; e) reclamation and drainage of wet lands to provide for the irrigation of all lands within the District; and f) the construction of delivery facilities to make all arid and unproductive lands adjacent to the river again productive. There was clear indication that the primary intent of the District was to provide flood control and land reclamation benefits, with some lesser importance assigned the development of extensive irrigated agricultural developments. This order also stated that "...the public safety, health, convenience and welfare will be promoted by the organization of the Conservancy District," a purpose assigned the District which will be described in a more contemporary setting later in this discussion.

The official establishment of the MRGCD by the court did not provide for the cessation of the protests to its formation and operation. There were continuing legal efforts to block the District's accomplishment of its designated tasks for several years after its decreed organization. In the continuing tradition of western politics, there were armed confronta-



tions between the District's Board of Directors and disgruntled irrigators when construction threatened to temporarily curtail supplies of water to those irrigator's lands. An amusing incident (although conceivably not so for board members present) occurred when the construction crews of the District attempted to cross the Los Chavez community ditch, angering the irrigators served by that ditch, and resulting in the board members (who were present to mitigate the difficulties) scurrying up the boom of a dragline as an avenue of escape from the angry residents.

The original order allowing the District's formation described its boundaries as extending from the Indian Village of Cochiti at the northern end of the District, south 150 miles to the town of San Marcial at what is now the northern end of Elephant Butte reservoir. This area included portions of Sandoval, Bernalillo, Valencia and Socorro Counties, and the towns of Albuquerque, Bernalillo, Los Lunas, Belen and Socorro. There were also located within these boundaries Indian lands of the Cochiti, Santa Domingo, San Felipe, Santa Ana, Sandia and Isleta Pueblos; these Indian lands were later recognized as having superior rights to water delivery from the MRGCD works, as well as other rights which were detailed in subsequent contracts between the MRGCD and the U. S. Department of Interior.

These original boundaries encompassed 277,760 acres, estimated to have a net irrigable area of 128,787 acres and a total benefited area of 132,724 acres (including 28,500 acres of Indian lands). These figures were a far cry from the projections made by the preformation study conducted by the Middle Rio Grande Association, in which it was asserted that the proposed District could serve 500,000 acres of irrigated cropland with a highline

canal and from which the valley would derive benefits of \$13 million at a cost of \$4.5 million.<sup>6</sup>

As early as 1928 objections were presented in District Court regarding the inclusions of certain properties within the District, with the largest of these in the southern regions of the District. This included the area know as the Bosque del Apache, the San Marcial area and other property which had been included in the first Official Plan of the District. These complaints led to the adoption of the Modified Official Plan by the District Court on August 15, 1928, which has served as the planning document for the MRGCD since its approval. There are now slightly more than 123,000 irrigable acres of land included in the MRGCD's boundaries, of which more than 87,000 acres are presently being irrigated.

Since its formation the District has completed nearly all projects originally contemplated, including the construction of El Vado dam and reservoir (to provide assured irrigation flows and flood control), four diversion dams (the Cochiti, Angostura, Isleta and Acacia dams), construction and rehabilitation of 181 miles of levies, 345 miles of drains, and 1,370 miles of irrigation canals, laterals and ditches. The District was also a participant in the development of the San Juan-Chama transbasin diversion completed in 1973. The MRGCD is now governed by an elected Board of Directors, who are currently all irrigators or closely tied to the agricultural community--although this shift in administrative organization (from service to nonagricultural interests to an agricultural emphasis) is recent and requires significant additional explanation.

## MRGCD's Institutional Role in Allocating Water Resources

The completion of successive portions of the project's construction resulted in financial obligation to those properties benefitted. The construction work began slowly as there was great difficulty selling the original bond issue in the depressed economic conditions of the early 1930s. In late 1932 the District, unable to sell its construction bonds on the open market, sold the remaining \$5.8 million of its original \$8.7 million to the Reconstruction Finance Corporation. The construction proceeded with vigor, and as new properties were brought within the benefitted area they also became subject to an Ad Valorem tax based on the assessed value of benefits received by those properties from the MRGCD works.

There were more than 70 community ditches eventually organized, and all were conveyed to the control of the MRGCD by the Court as the necessary delivery works were completed. The decreed formation of the MRGCD by the Court also explicitly conveyed to the District all water rights which had formerly been only implied by the appropriation of water to beneficial use by these irrigators. The debt obligation owed the District by these various property holders took the form of real property liens on all lands benefitted by the District's improvements, with annual payment based on the Ad Valorem taxation.

Currently, there are only a very few water right entitlements in the middle valley not controlled by the MRGCD through this real property lien/debt obligation mechanism, with these uncontrolled rights held primarily by the several municipalities already mentioned. The MRGCD is responsible for the delivery of water to the irrigators of the District, the maintenance

of the various delivery facilities, as well as the protection of property located in the District from flood damage and loss. The only official standing of these responsibilities is the original authorization of the District's formation by the Court in 1925, and the Official and Modified Official Plans approved by the Court in the late 1920s. There have been some administrative revisions since the initial formation of the institution, but there has never been any attempt to restate or in any way significantly modify the purposes of the MRGCD since its inception.

The beneficiaries of the District have now been divided into two groups for the assessment of benefits; this division of beneficiaries being one of the few administrative modifications to date, and which also resulted in a fundamental change in the District's original method of assessing total benefits which accrued to each property holding individually. In 1959, it was decided that the administration of costs, and the assessment of financial obligations for these costs, could better be accomplished by the division of the beneficiaries into the general categories of irrigators (Class A properties) and nonirrigator property holders (Class B beneficiaries). The Class A beneficiaries are currently assessed based on a per acre rate established by the MRGCD Board annually, and the Class B properties are assessed based on the assessed valuation of their property holdings and a designated mill levy rate collected with the county tax assessments annually. At this time approximately 75 percent of the District's annual operating budget is derived from Class B assessment, while the Class A beneficiaries are contributing the remaining 25 percent. Before continuing this discussion of the District's evolving administrative practices, it

is appropriate to more explicitly detail the difficulties encountered as a result of the multiple purposes and goals originally assigned the MRGCD.

#### An Institutional Pattern of Water Resource Development

What must be immediately recognized about the operations of the MRGCD is that its purposes are not limited to just the construction and maintenance of an irrigation delivery system, as is the case for most other water institutions in the western states. In most localized areas of the West, where water resource developments have occurred, the commonly observed "water institution" is an irrigation district or mutual irrigation company managed for the exclusive purpose of providing benefits to a well-organized irrigation community. In the case of the MRGCD, the institution is described instead as a "conservancy" with a set of varied and diverse functions, in addition to the traditional irrigation district function. These additional functions including river control and channel maintenance, flood control, land reclamation and a more general fiscal responsibility to a broad range of beneficiaries.

There are other similarly organized conservancies throughout the western United States, but the roles, functions and administrative arrangements of each of these must be considered unique. The formation of each of these institutions has been strongly influenced by the general conditions of water supply availability and the social conditions of the specific locality at the time each conservancy was organized. The societies which have banded together to form these cooperative organizations were subject to strong "interest group" influences from the parties who originally formulated their purposes--although there exists a common theme in all reflecting the vital nature of the available water resources (and their development) throughout

the arid and semiarid regions of the western U.S.

With this broadened range of responsibilities assigned these various institutions (organized as conservancies) there can also be anticipated an administrative format that will allow the discussion and formulation of goals reflecting many diverse and changing social concerns in addition to strictly irrigation. With such a broad range of original administrative purposes there can also be anticipated opportunities to alter the focus of the conservancy's administrative policies. But this flexibility of institutional purpose and function are strongly tempered by the realities of their political structure. With the many goals and purposes which are assigned such institutions, and with the representation of these purposes by a Board of Directors, there can be anticipated substantial difficulties in the maintenance of a strong "central purpose" that would be more easily retained in a more limited institutional structure (e.g., irrigation district).

There are many diverse "beneficial uses" to which water resources may be appropriated by a society. Any institution which is formed for the purpose of serving many of the possible applications is also subject to a continuing evaluation of changing social needs. As such, a conservancy is likely to encounter frequent conflicts over which of the institution's various purposes should be served. Without a single central purpose the political coalitions which can develop within this multi-purpose administrative structure can be anticipated to greatly influence the circumstances and practices of the conservancy's administration. The benefits described in the conservancy's formation may be broad, but the priorities assigned the completion of these objectives will directly

reflect either the most urgent goal, or the purpose with the strongest (political) contingent of beneficiaries. These patterns of social organization and political influence can be directly observed within the structure and evolution of the MRGCD, and this general administrative pattern will serve to structure the analysis of the MRGCD's administrative evolution which follows.

#### An Administrative History of the MRGCD

The Conservancy Act of 1923 provided for the formation of the MRGCD and for the details of its supervision by the District Courts of the State. All proceedings, activities and actions of the MRGCD were subject to the jurisdiction of the Conservancy Court, comprised of the Judges of the Second Judicial District who reviewed the decisions and action undertaken by the District's Board of Directors. Until recently the District Court was also responsible for the appointment of the District's Board of Directors, a relationship which has in the past provided for a conservancy responsive to (and essentially administered by) the judicial system of the state.

The first appointed Board consisted of three members, which in turn served as the administrators for the three departments created in the District's first year of operations (Administrative, Engineering, and Legal Departments). There was made a Preliminary Fund Assessment of 25¢ per acre in Rio Arriba, Santa Fe, Sandoval, Bernalillo, Valencia and Socorro Counties--the counties through which the Rio Grande flows from the northern border of the State to the southern end of the Conservancy. This area was much greater than the total area now benefitted by the MRGCD works, and the Preliminary Fund Assessment provided the original capital required to get the

planning and construction activities underway. The final obstacle to the commencement of construction and operations was cleared by the December 12, 1925 decision of the New Mexico Supreme Court which found the Conservancy Act of 1923 constitutional.

During the first three years after the District's formation in 1925 there was developed an Official Plan for the District. This planning document was approved by the Conservancy Court, after several modifications, on August 15, 1928.<sup>7</sup> This Modified Official Plan (from here on referred to as the Official Plan or simply as the Plan) has served to guide all the activities of the MRGCD since its approval, and has been subject to little substantive revision during this period.

This Plan contemplated construction amounting to \$11,828,000, although the District was to be responsible for only \$9.6 million of this total due to the anticipated repayment by the Federal Government of the costs required for the construction of facilities planned for the Indian lands located within the District. In this same year the District Court approved the original Conservancy Appraisal Record which assessed the benefits from the planned MRGCD to be \$22,088,058.<sup>8</sup>

In June of 1930 there were presented petitions in the Conservancy Court requesting that the appointed Board of Directors be replaced, stating that their actions had been irresponsible and detrimental to the smooth operation of the District; and asserting that the actions of the current Board had been politically motivated. These petitions resulted in the removal of the five Directors serving at the time, although there was substantial consideration of the matter before this removal action ensued. In the opinion of Judge Milton J. Helmick, entered in the District Court files June 20, 1930:



The present Board members were selected by an unofficial political group in March, 1927, when the Conservancy was threatened with extinction at the hands of the Legislature then in session. Judge Owen and I accepted the Board so named for us and signed a formal appointment in return for the promise of the passage of a new Conservancy Act, and as a means of saving the Conservancy project from wreckage. In this fashion the present Board supplanted the one originally chosen and appointed by me. This spring I became alarmed for the welfare of the Conservancy, and about a month ago I waited upon the Board members and requested their resignations on the sole ground that I believed a change in the Board would quiet much clamor and restore the confidence of the native people in the project.

I do not think it can be doubted that the Board has not used means nor exercised patience sufficient to acquaint the native farmers with the Conservancy project, adjust their troubles and dispel their fears. In his brief Mr. Sutherland says: "If the Board could view the farmers' problem with the same sympathetic attitude that they have the wishes of the bondholders, and make a fair fraction of the concessions they have made to the latter, there is no shadow of a doubt that someway to ameliorate the situation and win the people could be found. They have not seemed to want to win the people."...The Board has perhaps been so much concerned with the financing and engineering aspects of the project that it has ignored the equally important human element. In his report Taylor, Amicus Curiae, aptly says: "However irksome, a successful public official must maintain friendly contact with his constituents or his conscientious efforts will be imparilled."<sup>9</sup>

This decision provided much evidence of how the MRGCD was originally conceived and operated by its supporters, with some evidence of the necessary political relationship between the organizers and the judicial/legislative administration which provided the "officiality" of its formation. This decision provided a Court endorsed "attitude" for guiding the administration and operation of the MRGCD for many years to come. Decisions during this period clearly evidenced the District Court's operational premise of serving the "best interest" of the beneficiaries in the infant District; but there must also be recognition that this responsibility, as adopted by the Court

during the MRGCD's infant years, is probably not considered to be within the scope of the Court's jurisdiction by today's society. This particular decision suggested that those responsible for the administration and operation of the District needed to substantially increase their awareness of their political role as agents charged with serving the needs and wishes of their constituency and their responsibility and accountability to the individuals who made up that constituency. This need surfaces time and again in the history of the MRGCD.

The economic depression which followed the Stock Market Crash of 1929 brought hardship to the attempts to make the MRGCD a self-supporting venture. The original \$8.7 million bond issue encountered great difficulties with only \$2 million sold by the mid-1930s. It appeared in 1932 that no other option existed to sustain the MRGCD but the sale of the remaining outstanding bonds to the Reconstruction Finance Corporation at 90 percent of their par value, thereby placing all properties of the District under financial obligation to essentially one central institution, a relationship that has persisted to today. By 1934, with renewed financial support, the District had completed more than 95 percent of all the work contemplated in the Official Plan.

In 1933, the District allowed the formation of a subdistrict within its boundaries, the Barr Irrigation District, with purposes supplemental to those contained in the Official Plan. The subdistrict was allowed to issue bonds for the purpose of constructing irrigation delivery works which had not been contemplated by the Official Plan. Little other purpose was given the creation of the subdistrict, and this subdistrict was subsequently conveyed to the MRGCD after completing the works desired.

After clearing the constitutionality hurdle, the predominant legal confrontation for the first several years of operation was the acquisition of right-of-way easements to the property and works of the community acequias, and the conciliation of landowners affected by these easements. In several of these cases there were required Court injunctions to prevent the parties to be served from interfering with the required works of the MRGCD construction crews. What is somewhat remarkable is that there are no records in the District Court files that suggest any attempts were made to acquire these right-of-way easements until late 1930, more than five years after the District's formation and two years after the approval of the Official Plan. Although little more need be said, the initial operations of the MRGCD were not smooth, nor were the views of the existing property holders given little more than cursory consideration in the years immediately following the District's formation.

The Conservancy Court records provide some evidence that the District was so constrained by the "Official Plan" that it was unable to address any but these original goals. In the mid-1930s a suit<sup>10</sup> was brought by the Albuquerque Gun Club (established in 1912) seeking damages due to the drainage of the formerly ponded and swamped lands of its members. These lands had previously served as a duck hunting recreation site of the Club's members, and the drainage accomplished by the District had eliminated these wildlife habitats. These lands and recreation activities could have been substantially maintained if the purposes of the Club could have been included in (or inserted into) the Official Plan; but no such inclusion was considered. The case was eventually dismissed by the New Mexico Supreme Court (December 1, 1937) and the Albuquerque Gun Club received \$80.00 as compensation for the damages which were incurred.

There has been some slight revision of the Official Plan, with these modifications generally limited to amendments resulting from the presentation of proof that the Official Plan incorrectly or improperly described the benefits which were to be received by specific parcels of land included in the Plan. These modifications required Court hearing, and can summarily be described as lands which were subsequently excluded from the benefitted area by the alteration of the Official Plan. The Annual Report for fiscal year 1936 states that all the construction contemplated under the Official Plan had been completed, except for a minor amount of supplemental work added after the Plan's approval in 1928.

The onset of the next decade brought renewed interest in the flood control and river channelization efforts contemplated as part of the original purposes of formation. The Annual Reports of the early 1940s repeatedly recognized the priority which must be assigned the control of the river and the need to provide flood protection for the continued development of the urban areas and the existing irrigation investments. Corresponding to the interest in increasing this river control, there was recognition in these Annual Reports that the work contemplated was far beyond the capability of the MRGCD to undertake alone, and that a large part of the financial responsibility for these works belonged to the federal government. It was hoped that this further relationship with the federal water management programs (already existing in other regions) would insure better upkeep of the flood protection works and relieve the District of its debt interest responsibilities. The need for these flood control works was

dramatically reinforced during the Spring of 1941 and 1942 flood seasons, when extremely high flows on the river caused some moderately extensive damage in several areas protected by MRGCD flood control works (in 1944 the District received \$500,000 in federal emergency flood relief funds for this damage).

The Board of Directors adopted a resolution in 1942 requesting that the Bureau of Reclamation and the Army Corps of Engineers continue studies and surveys of possible flood control works which could be undertaken in the valley, and conveyed all necessary right-of-ways to District property as were required for the completion of any of these flood control works. On August 4, 1944, the District accepted responsibility for the first of the flood control works completed by the Army Corps of Engineers. In this acceptance there was also recognition that the levels of flood flow which occurred in 1941 would result in substantially increased damage as a result of the continuing aggradation of the river's bed. The attempts to control the river's natural maturation seem to be, at best, at a standstill since the MRGCD programs were initiated in 1925.

In 1941, the District undertook a reappraisal of the benefitted properties, basing these assessed benefits on a uniform rate of \$95.00 per acre. There was reported a total (re)appraised benefit to all of the properties included in the MRGCD of \$18.8 million (this was less than appraised benefits in 1928), although there was no probability provided that would indicate how certain these appraised benefits might be (e.g., the

probability of any of these benefits being swept away in the next flood). This reappraisal mechanism, in conjunction with the adjustment in the percent maintenance levy assessments, provided for the variable financial needs of the district's operation and maintenance for several years. There were many minor legal disputes during this period contesting the appraisal of benefits. It was not until the District was required by the federal Reclamation Act to change its methods of assessment that the system was dismantled.

A statement regarding the continued subdivision of property within (primarily) the Bernalillo County portion of the District has been repeated in nearly every Annual Report from 1941 until the present. The pattern of the increasing urbanization of the constituency was considered initially as a potential blight on the future of the Conservancy (probably ill-conceived),<sup>11</sup> although there was also later recognition that the shift to a more urban population in this area made more water available to the irrigators downstream than would have been available under the drought conditions of the ensuing decade (which followed the flooding of 1941 and 1942).<sup>12</sup> The original purposes of formation, and the battles which had been fought since the District's inception, had been a result of an overabundance of water. For the first time the District was forced to face conditions of water shortage in the mid-1940s and this condition has remained a concern into the present administration of the District. Further discussion of water shortage and the MRGCD will be left to the next section, as the administration of the District did not have the benefit of hindsight to guide their actions and the continuity of this historical narrative would be impaired if facts were provided which were beyond the experiences of

those who were forced to choose the administrative course followed by the MRGCD.

The management of the irrigation facilities of the MRGCD became an increasingly dominant concern of the administrative operations of the District in the mid-1940s. The constraints placed on water users by the treaty originally negotiated in 1906 with Mexico, and the limitations resulting from the negotiations which concluded with the Mexican Water Treaty of 1944, placed extremely tight limits on the available supplies of water. Additionally, the interstate agreement between Colorado, New Mexico and Texas (1939) apportioned specific water allotments to each state and provided a system of credits and debits for water delivered to points within each state. These Rio Grande Compact obligations created a situation where the Conservancy was increasingly reliant on flows of the river and was unable to make use of the (irrigation and flood control) reservoir for any purpose but delivery of water obligations under the Compact. The shortage of water for irrigation "on demand," and the recognition that limited flows provided substantial loss of the available water to percolation through the ditch banks, suggested several modifications to the District's operations. The irrigation management techniques employed by the District in the operation of the irrigation delivery works of necessity had to be improved, and with these water shortage conditions there was also increased operation, maintenance and rehabilitation expenses during this period.

In 1945 there was formed a group of concerned citizens, known as the Rio Grande Flood Control Association, made up of residents and property owners of the urban areas of the District (around Albuquerque). This group,

acting as a lobbying agent in Washington (primarily), eventually succeeded in attracting federal attention to the increasing problems of flood control in the middle valley. Following several years of discussion, the resolution of legal details by the attorneys for the MRGCD, Bureau of Reclamation and the Army Corps of Engineers, and the preparation of reports which were subsequently presented to Congress, there was congressional action in 1948 approving funding for a project known as the Rio Grande Flood Control Project. There was authorization of \$3.5 million in 1948, but the funding was not actually appropriated for several years, and the first construction on these works was begun by the Corps in 1950.

It was becoming increasingly clear that the flow of federal money in no way assured the flow of water, as the severe drought conditions which began in the mid-1940s worsened in 1950. Great concern was frequently expressed that if the water supply conditions did not improve soon there would also occur a loss of the crop investments which would threaten production for several years to come and potentially the financial integrity of the District itself. From the District's Annual Report, filed November 20, 1950:

"The increase in the cultivated acreage continued and it appears that the water supply problems will soon become serious. We have been saved from a crisis until now because of the urban development of Bernalillo County which cannot go on indefinitely. These and many other difficulties can be cured, or partially relieved, by the contemplated Reclamation program which we hope will be undertaken by the Bureau in the near future."

In 1952 there was approved a contract between the MRGCD and the Bureau of Reclamation which allowed the Bureau to begin to take over all responsibilities for the operations and maintenance of the physical works



of the District (except administrative duties and operation and maintenance of the El Vado Reservoir). This contract also relieved the District from the outstanding debt interest obligations, as the Bureau purchased all outstanding bonds and the contract spelled out the interest-free debt obligation repayment scheme which resulted. Under provisions of the federal Reclamation Act the District was also required to revise its methods for the appraisal of debt obligation assessed to each beneficiary of the District's works (although it was not until 1959 that this new system was actually implemented).

The take-over of operations and maintenance responsibilities by the Bureau of Reclamation in 1952 did not smooth the stormy seas which had been negotiated in the past. In that same year there was a suit filed by Texas which alleged that the MRGCD had been operating in violation of the Rio Grande Compact and that the irrigation practices of the District were both inefficient and improper. It was recognized by the District from the date that this suit was filed that it would require a great deal of attention for several years to come and could potentially threaten the continued existence of the irrigation operations of the District.<sup>13</sup> The protectionism which was so strictly adhered to in the past (i.e., water and property entitlements) was again in the forefront of the administrative concerns, although a more imposing appearance was now provided by the District's association with the federal government.

A good example of this protectionism was provided by the attempts to form, within the existing boundaries of the MRGCD, a second conservancy in the period of the early 1950s. The Sandia Conservancy District was organized<sup>14</sup>

with wholly different purposes than were conceived by the Plan of the MRGCD. The Sandia Conservancy was to serve as an agency to control the flash flood flows which resulted from thunderstorms in the Sandia mountains immediately east of Albuquerque. There were statements made in the MRGCD Annual Reports of 1952 and 1953 that this proposed conservancy, which would be partially contained within the existing boundaries of the MRGCD, presented problems for the smooth operation and maintenance of the District as it existed. The organizers of the Sandia Conservancy (which included the City of Albuquerque) had originally requested that the MRGCD modify its Plan so as to included these necessary flood control works, but this notion was summarily rejected by the District at the time. When petitions were filed in 1953 for the formation of the Sandia Conservancy the MRGCD filed an appeal protesting the formation of the new conservancy in the New Mexico Supreme Court, contesting the ability of the City to sign for the residents of Albuquerque and requesting clarification as to whether there could exist two conservancies within the same geographic area. The Court rejected the appeal by the MRGCD and allowed the formation of the Sandia Conservancy District as contemplated for the purposes of controlling the flash flooding from the Sandia Mountains.<sup>15</sup>

The mid-1950s brought the completion of all necessary contracts with the Bureau of Reclamation and the MRGCD (now including the operation and maintenance of the El Vado Dam and Reservoir) and allowed the actual appropriation of monies from the federal treasury for the continued construction contemplated by the Rio Grande Project. From the Annual Report for fiscal year 1955, this was considered to be the "...most outstanding year in the history of the MRGCD." More detail of how this relationship

developed and why it is considered so vital to the operations of the District follows, although the issues and conditions of water scarcity in the West must be included and elaborated upon for this relationship to be brought into proper perspective.

#### Water, The Bureau of Reclamation and the MRGCD

The first inhabitants of the middle Rio Grande region (and throughout the arid and semiarid West) immediately recognized that for their settlements to survive and prosper water must be diverted from the sources of its natural occurrence. From the practices adopted by the first native inhabitants and later settlers there eventually emerged a codified set of legal principles which reflect these early societies' notions of the efficient allocation of this most vital resource, with the right to use assigned with restrictions reflecting several canons of social equity.<sup>16</sup> Fundamental to understanding the laws which govern the appropriation of western water resources (commonly referred to as the prior appropriation doctrine of water rights) is the notion that the water entitlement conveys the right to appropriate a specific quantity of water from a designated source of supply, with the application of that water to a particular "beneficial use". The water right is granted as a usufructuary right, with ownership of the water's corpus retained by the "public interest," to be administered in accordance with the pertinent state and federal laws.

Water rights are of many different qualities, with these qualities pertaining to the assurance of the ability to appropriate a water entitle-

ment from a designated source of supply. A water right is granted with specific priority ranking among the other rights already in existence, (e.g., a new appropriation is considered to be junior in priority to all existing rights), and is protected from impairment by any water rights granted subsequently (e.g., later appropriations for the source of supply may not damage the ability of the existing, more senior water rights access to their entitlements). The priority dating of a water right entitlement is based on the first date of appropriation from a source of water. There are several exceptions to this priority principle.<sup>17</sup> Of note are the priority dates assigned the water rights of the reservation and Pueblo Indians and the water right entitlements concomitant with the lands set aside by the federal government. In the case of the Pueblo Water Rights the priority date is assumed to be more senior than any other water rights from any source of supply, although there is substantial dispute, and pending litigation, regarding the quantification of these water right entitlements in New Mexico. The reservation Indians and the federal land reservations are assigned water right priorities according to the date of the Congressional action setting aside those lands for specific purposes (there is also significant dispute regarding these water right entitlements, concerning both the quantity and priority which has been assigned these water rights).

The purpose and method of use employed for the utilization of the water rights is extensively considered in the application of the principle of prior appropriation doctrine. Key to the interpretation of these principles are the expressions or definitions provided for "beneficial use" and "the public interest" by the legal doctrine governing appropriations

of water in a state, as well as the quantification provided each granted entitlement. There can be distinction made between diversion quantification and the consumptive use quantification of an appropriation of water. In the case of irrigated agriculture, as much as 60 percent of the water diverted for irrigation returns to a source of supply for subsequent beneficial appropriation by another individual (e.g., through percolation). The most explicit definition of a particular water right entitlement results from a statement within the document granting a water right which describes the consumptive use quantification of that entitlement which has been calculated in relation to the return flow.<sup>18</sup> Throughout much of the West governed by the prior appropriation doctrine the specific consumptive use is assigned in accordance with an estimate of the "average" crop water requirements per acre based on the soil conditions, climate, elevation and growing season within a particular region.

With the formation of the MRGCD there was conveyed to the District all existing property of the community acequias, as well as the water right entitlements which resulted from these historic irrigation appropriations. There were more than 70 community ditches in existence within the boundaries of the conservancy when it was formed in 1925. As the District's works were extended to serve these community acequias, there was also Court conveyance of the water and property rights (limited) which had been established by those irrigators. The description of the prior appropriation doctrine, provided above, hints at the possible problems which occur in statements of water right entitlements. But the listing of the entitlements which have been granted the MRGCD provide evidence of how muddled these statements of water rights can become in more practical

circumstances. The water right entitlements which have been granted the MRGCD are of four basic types: 1) the water rights granted to the District for storage in El Vado Reservoir, which are subsequently released to meet the various needs of the District downstream; 2) the water rights granted the District for the purposes of irrigation, with some of these rights having been perfected by their appropriation to use by irrigators prior to the formation of the District (perfected rights) and those rights which were "created" by the formation of the District and the construction of El Vado to store the previously lost seasonal streamflows; 3) those rights which have been assigned to the Pueblo Indians, and for which the District has been assigned the responsibility of delivery to their irrigation works under contract with the Department of Interior; and 4) the water rights made available by the transbasin diversion of water from the San Juan River into the Rio Chama River (a tributary of the Rio Grande), and which were contracted by the MRGCD from the Department of Interior.

Each of these rights are in some ways different, but in total comprise the water right entitlements which serve the MRGCD. Several of the rights shown in Table II-1 are stated in terms of the acreage irrigated, and to arrive at a specific volumetric quantification of these rights there must be applied an approximate figure descriptive of the "average" consumptive use of the crops raised in the middle valley region of the Rio Grande. The figure used, 2.1 acre-feet per acre, is the figure that is used by the State Engineer currently in calculating the consumptive use entitlements for water rights applied to irrigation in the middle valley when there is a transfer of water rights from (or to) irrigation use. Under

TABLE II-1  
MRGCD WATER RIGHTS

Permit #1690 El Vado Filing (first filed September 4, 1923 by Middle Rio Grande Water Association, refiled February 28, 1924, assigned January 16, 1926, application May 27, 1930, approved October 20, 1930).  
198,110 acre-feet impounded at reservoir (storage right)  
Priority Date: September 4, 1923.

Permit #0620 Application for Change in Point of Diversion for 71 Community Ditches (granted January 26, 1931).  
123,267 acres irrigated land (total)  
80,785 acres with perfected water rights  
42,482 acres with water rights under Permit #1690  
Priority Date: January 26, 1931, although this would probably be contested in an adjudication of these rights.

Indian (Pueblo) Reserved Rights--(six existing pueblos)  
8,348 acres irrigated  
Priority Date: indefinite, Pueblo Indian Water Rights are considered to be senior to all other rights.

San Juan-Chama--Federal Transbasin Diversion Project  
MRGCD Water Rights under Contract for deliveries  
20,200 acre-feet (consumptive use right).

Estimated Quantification  
(Consumptive)

80,785 acres X 2.1 a-f/a =	169,648.5 acre-feet
<u>42,482</u> acres X 2.1 a-f/a =	<u>89,212.2</u> acre-feet
123,267 acres X 2.1 a-f/a =	285,860.7 acre-feet
<u>8,348</u> acres X 2.1 a-f/a =	<u>17,530.8</u> acre-feet
<u>131,615</u> acres	303,391.5 acre-feet
	<u>20,200</u> acre-feet
	<u>323,591.5</u> acre-feet

New Mexican water law, the "puzzle piece" missing which would provide quantitative certainty to the middle Rio Grande valley is the adjudication of all legitimate water right holdings. In such an adjudication there would be established the actual volumetric water right entitlements of all the appropriators from the source of water supply by the State Engineer and the Courts of the State. In the case of the Rio Grande, the surface and groundwater sources are considered to be hydrologically interconnected and inseparably linked. This judicial ruling would state all points of diversion, quantities of diversion, quantities applied to beneficial consumptive use (e.g., the consumptive use quantum of each right) and the priority date assigned each of the water right entitlements.

The water right "entitlements" which are described in Table II-1 reflect the best available quantification of the MRGCD's water rights. This in no way should be construed to reflect the quantity of water which is actually used by the District in the irrigation operations. Furthermore, any adjudication of the District's water rights in the future is likely to question whether these rights as shown in Table II-1 have continuously and diligently been applied to beneficial use. As a hedge against such a claim, the District has repeatedly made application to the State Engineer for extension of time to complete appropriation of all these entitlements, as is allowed under state law. Again, there is no pretense that these figures indicating permitted water right appropriations in any way reflect the actual water rights which would be assigned the District in a adjudication by the State Engineer and Courts. These figures only represent the acreage which the District is permitted to irrigate, and serve as some indication of the maximum quantity which could potentially be assigned the MRGCD.



The centralization of the control of these water right entitlements by a conservancy results in the homogenization of the various entitlement qualities described above. For the irrigators served by the MRGCD there is no ability to discriminate between the differing water right entitlements, with the exception of the paramount priority which has been assigned water deliveries to the irrigation works of the Pueblos.

For all non-Indian users of the MRGCD's water entitlements there is no priority assigned any individual use, and in the case of a shortage which limited the available quantity of water, all users in the District would be forced to share equally (pro rata sharing) the water which was available. There are several institutional methods which can be employed (and have been) by the District in such a situation, including voluntary limitation of normal use, alteration of normal delivery schedules, forced curtailment of certain uses and other mechanisms which would make for the more efficient use of the water which is available.

The fine structuring provided by the assignment of "water rights" might appear to prevent the possibility of water shortage as long as the flows of the river remained near their average levels--but this statement has been demonstratively proven incorrect by the history of water's availability in the MRGCD. When we left the evolving MRGCD in the previous section there was a situation brewing which would lead to much consternation for both the irrigators and the administrative personnel of the District. There had been negotiated interstate and international water delivery obligations, to which the MRGCD had been a party. These obligations, as may be recalled, were negotiated at a time when the predominant water problem faced by the District was essentially an overabundance of water and controlling the flood flows on the river. The first 17 years of the District's operations had led to a

perceived abundant water supply, but this pattern (which ended with the floods of 1941 and 1942) gave way to a drought cycle exasperated by these contractual obligations.

As the riverbed continued to aggragate and as the natural flows of water lessened, the water users and the District itself became increasingly concerned with the nature of the obligations with which it was faced. From the 1946 Annual Report:

The Rio Grande Compact governs the use of water in the middle valley and under its terms we were unable to use water which had been stored in El Vado and saved from the previous years runoff. The Compact Commission refused to allow sufficient water releases from the reservoir after July 15 to satisfy New Mexico needs and as a result considerable hardship and crop loss was experienced throughout the entire District. The situation was brought about through continuous waste of El Vado water by the water users of the valley.

This was the most disastrous irrigation season since the completion of the District. There was no spring runoff of snow waters on the Rio Grande and the total runoff on the [Rio] Chama was all retained in El Vado to be spread over the following months [months].

We had been notified by the Rio Grande Compact Commission that due to debit accumulated by the State of New Mexico, no releases from the reservoir storage would be allowed below the 90,000 A.F. level for 1946. Despite repeated pleas the Texas Commission, on advice of the water users and engineers from the Elephant Butte Area, refused to allow any further releases and on July 10th, the outlet gates were closed. Due to extremely dry weather for the balance of the irrigation season over the entire Rio Grande watershed, the district's agricultural losses were immediate and grew more serious as the growing season progressed. The probable loss for the crop year can possibly reach the two million figure. The second most serious result of the water shortage was the filling of the canals with mud and silt. We were compelled to use any water available and this water was to a large extent composed of flash floods which invariably carry enormous amounts of silt, and the maintenance outlook for the ensuing year was rapidly becoming very dismal and probable cost estimated increasing at an alarming rate.

And from the 1947 Annual Report:

The amount of debit water under the Rio Grande Compact had increased until the amount owed to down river users on August 31 was more than the total capacity of El Vado. It is possible that future releases from storage combined with winter runoff will reduce the debt to a point where we might possibly retain some storage water available to local users. I cannot estimate the total amount of this water but it unquestionably will be far below minimum crop requirements.

The increasingly uncertain water supplies and the problems which were forced upon the beneficiaries of the District had become so critical as to require twenty-four hour supervision of the irrigation delivery system and a conversion to less water-demanding cropping patterns. Clearly the assistance of the federal government was becoming increasingly important; and it seemed that regardless of rights to water entitlements, there were not quantities of water available sufficient to support the needs of the MRGCD. It is from this set of critical conditions that the relationship between the Bureau of Reclamation and the MRGCD was forged.

#### Water Needs and the "White-Hatted" Bureau of Reclamation

The organization of the Bureau of Reclamation was provided for by the Reclamation Act of 1902,<sup>19</sup> this Act having resulted from the realization by the federal government that the arid and semiarid regions of the western states required substantial assistance to accomplish any large scale development. There had been several observations by various authors that the "feast or famine" conditions of water's availability from its snowpack sources (primarily) resulted in water supply conditions throughout the West which were totally unsuited to a large scale development without major streamflow control. The Reclamation Act provided a mechanism through which the various farmers of the western region could acquire federal loan assistance for the construction of reservoir and irrigation works.

Demanded of those who became partners with the federal government in these water resource developments was the securing of these loans by the imposition of a real property lien on all the irrigation works, property and water rights of these farmers. Also required was the passage of state laws to allow for the formation of institutions to serve as a central intermediary between the federal government and the individual irrigators. Shortly after the Reclamation Act's passage in 1902 there followed similiar state legislation in most western states, with the New Mexico legislature passing and adopting the Conservancy Act in 1923.

In the years since its organization many projects have been undertaken and are managed by the Bureau of Reclamation throughout the western United States. Many of these programs have been undertaken with assistance from the Army Corps of Engineers, the Soil Conservation Service and other agencies of the federal government. With the critical water situation in the middle Rio Grande valley by the late 1940s, the MRGCD was searching for any federal agency which could address the problems which were being faced at the time. The proposal presented to Congress in 1947 and 1948 combined the resources of the Army Corps of Engineers, the Bureau of Reclamation and the MRGCD in an endeavor called the Rio Grande Flood Control Project.

The contemplated project was designed to protect a much larger area of land more completely than could be provided by the existing MRCGD flood control works, and initiated further efforts to extensively channelize the riverbed. With the onset of the 1950s the flood control programs of the Corps of Engineers received federal funding approval and were begun; but the debt obligations for water deliveries to Texas had been only moderately reduced, and there was an ever increasing acreage cultivated within the District. Ne-

gotiations between the District and the Bureau of Reclamation became increasingly frequent, and at the same time the drought cycle took a turn for the worse in 1951. A dismal picture is painted by the following from the 1951 Annual Report:

On the darker side was the continued drought. The past year was one of the driest on record and while fair crops were made through careful distribution of available water, all our reserves were completely exhausted and early in July El Vado was completely dry for the first time in its history. Unless there is a complete change in weather conditions in the near future there will be no crops raised in this area for the next several years.

We also met increasing opposition to our water policy from various people connected with the Rio Grande Compact, and, unless there are some modifications and new interpretations of this contract it most certainly will seriously damage, if not completely ruin, this district. We sincerely hope some solution to this problem can be found as it seems incredible that such a document drawn by so few people could be allowed to act against the well being and even livelihood of so many innocent people living in such a large and important area as the Middle Rio Grande Conservancy District. This is even more amazing when it is admitted that the Middle Rio Grande Conservancy District has carried out its duties under the compact for the delivery of water and that the conditions bringing about the present dilemma are caused by natural pheonomena outside our district and most certainly beyond our physical and financial power to control. It most certainly will require cooperation between the affected areas instead of continual opposition to proposed corrective programs in order to arrive at a permanent solution to these difficulties which affect not only our immediate area but large districts in other states.

The 1952 Annual Report states that the first of the contracts between the Bureau and the MRGCD had been approved, with an agreement by the Bureau to take over the operations and maintenance of the District's works, as well as undertake a new rehabilitation program of the existing works. The administration of the Conservancy pursued negotiations with the Soil Conservation Service for study of how a program of runoff and waterflow retardation, coupled with soil erosion prevention steps, could be accomplished to make better use of the water the District had available--all apparent steps in the right direction--

and certainly appropriate in light of the suit which had been filed by Texas alleging violations of the Rio Grande Compact and questioning the irrigation practices of the District itself.

The pending suit (brought by Texas) may have provided the first direct evidence of how valuable the relationship between the Bureau of Reclamation (and thereby the Department of Interior) and the MRGCD was, as one of the first issues discussed by a Special Water Master appointed in the case was the "indispensability" of including, and legally joining the Secretary of the Interior as party to the dispute. This relationship between the MRGCD and the Bureau of Reclamation--whereby the Bureau has direct financial interest in the District and thereby a direct interest in any litigation which might damage these interests--fundamentally changes the type of action which may be successfully brought against the District. By including the United States in any litigation, as is required due to holding by the United States of the legal title to the District's properties (by contract), the actions, policies and administrators of the District are protected by the doctrine of sovereign immunity. This "indispensability" issue has been repeated several times in other litigation, and in several instances has served as an effective shield from prosecution. A description of several of these litigations will be returned to after further discussion of the evolving relationship between the District and the Bureau.

The Bureau was conveyed all the real property of the District under the reclamation contract negotiated during 1954. In that same year the discussion of the Conservancy's participation in the San Juan-Chama Project began. The drought cycle continued, with programs initiated by the Bureau to make better use of the water captured in the District's drains, and there were some reasonably good crop yields from the irrigation management improvements. The District

was still forced to operate exclusively on the water's availability in the river, and a program was actively pursued which encouraged the drilling of wells (by individuals) within the District to ease the pressures on the struggling irrigation system.

On February 1, 1955, all the operation and maintenance duties of the District were turned over to the Bureau (with the exception of El Vado), and there was a Congressional appropriation of \$11 million to the Bureau of Reclamation and the Army Corps of Engineers as had been requested. These funds were to be used in the Rio Grande Flood Control Program and served to reconstruct and improve many of the original works of the District. In 1956 the contract between the Bureau and the District was amended to include the operations of the El Vado Dam and Reservoir, and final approval by Congress of the San Juan-Chama diversion project was actively pursued (this project was being billed as an urgently needed addition to the District's water supply).

The year 1956 was considered to be the driest year in the history of the District, and only through the additional water supplies provided by the wells which had been drilled, and through the careful management of irrigation deliveries, was the District able to avert a total breakdown in crop production. Construction was nearly completed on the Jemez Dam and the Abiquiu Dam construction was initiated under a Congressional funded program now known as the Comprehensive Plan of Development for the Middle Rio Grande Project. It was also in 1956 that the middle valley region of the Rio Grande was declared a designated groundwater basin by the State Engineer, thereby rendering much more stringent control on the ever increasing number of private wells in the District.

In 1957 the suit brought by Texas, which had been pending for six years, was dismissed after several discussions of the "indispensability" issue and several appearances before the U.S. Supreme Court. Several programs were initiated to improve the efficiency of the irrigation system, including a phreatophyte eradication program (very high water use, weeds and trees which grew abundantly on the ditch banks). There was developed during this time a new assessment program as was required by the federal Reclamation Act. The beneficiaries were requested to be assigned financial obligations on the basis of whether or not their property was greater than five acres and irrigable. The two classes (Class A and Class B properties) were approved by the Court in May of 1958, with the first assessments based on these classes made in 1959.

It was by now very clear to all involved with the District that the programs undertaken as a result of the recently established relationship with the federal government promised to be extremely beneficial to the overall purposes for which the District had been established; and indeed, it could fairly be asked why this relationship was not pursued earlier. The operations of the District seemed to have smoothed significantly as a result, and even the (natural) availability of water seemed to be improving (although the Bureau could not be credited with this change). The District had clearly entered a new phase in its continuing evolution, and the years of the ensuing two decades would bring even further stability to what had only several years earlier appeared to be a crumbling conservancy.

#### The Modern MRGCD

The new Class A/B assessment structure met with only limited opposition when it was introduced, and can be said to more equitably assess the benefits derived from the works of the MRGCD because it identifies and makes assess-



ments uniformly based on user classes. Originally the Class A properties were considered to be any property holding greater than five acres which could be served by the irrigation works of the District. As could be expected, there were several (minor) exceptions taken to the original classification of Class A property (approximately 2,030 acres were reclassified after the first assessment), with these properties assessed on a per acre rate set by the District's Board. The Class B beneficiaries are assessed a mill levy ad valorem tax based on the appraised value of their property holdings located within the benefitted area of the District.

It seems that the most beneficial role played by the Bureau of Reclamation in the administration of the Conservancy has been to provide structure to the loose system of debt obligation assessment which had existed before their involvement (this old system had provided for frequent disputes of appraised benefits and debt obligation assessments). Although this structure may not correctly discriminate between the irrigators and the nonirrigating beneficiaries of the District, it has provided the ability to assign taxation rates according to the variable financial needs of the two (principal) benefits provided by the District: irrigation to one group of properties, and flood control to all properties within the District. Presented in Table II-2 are the Class A acreages considered to have been served as agricultural lands within the District for the years listed. These properties pay assessments based on the per acre rate which is set annually by the District's Board of Directors. Table II-3 presents the most recent assessment records, including total levy assessments and the amount actually collected from these assessments.<sup>20</sup>

TABLE II-2

## CLASS A ACREAGES IN THE MRGCD

<u>Year</u>	<u>Acres</u>
1959	58,117.31
1960	56,085.73
--	--
1972	55,635.82
1973	54,857.67
1974	54,336.64
1975	54,809.16
1976	53,872.64
1977	53,729.51
1978	53,330.11
1979	87,744.85

TABLE II-3

## CLASS A PER ACRE ASSESSMENTS

<u>Year</u>	<u>Per Acre Rate</u>	<u>Total Levy Assessment</u>	<u>Total Collected Assessments</u>	<u>Percentage Uncollected</u>
1959	\$ --	\$408,735.35	\$ 407,378.96	0.33
1960	--	337,547.00	335,978.71	0.46
1972	12.04	673,187.70	670,356.94	0.42
1973	12.75	702,151.14	705,065.76	0.00
1974	12.75	695,195.46	693,804.61	0.20
1975	10.16	551,295.96	549,972.95	0.24
1976	9.45	510,621.55	508,852.39	0.35
1977	9.90	532,011.24	510,096.08	4.12
1978	13.40	--	--	--
1979	14.41	--	--	--

The decreasing irrigated acreage pattern shown by the figures provides clear evidence of an observable trend within the agricultural community of the District, although the jump in 1979 would indicate that some problems might be found with this conclusion. The sudden jump is the result of the property reclassification undertaken in 1979, with the total acreage change resulting from the redefinition of the Class A beneficiaries. Class A lands are now considered to be any lands greater than three acres and served by irrigation works of the

District. The pattern of revenue assessments, presented in Table II-3, provides for little in the way of conclusive evidence about the financial management of the District; although when compared with tables to be presented subsequently it does prove useful. More interesting is a look at the pattern of Class A assessments from the counties benefited by the District, as is presented in Table II-4.

TABLE II-4  
CLASS A TOTAL ASSESSMENTS BY COUNTY  
1959-1977

<u>County</u>	<u>Total Class A Assessments</u>	<u>Percentage of Total Class A Assessments</u>
Sandoval	\$ 577,391.72	6.46
Bernalillo	1,480,846.97	16.56
Valencia	4,350,359.55	48.65
Socorro	2,533,499.94	28.33
	<u>\$8,942,098.18</u>	<u>100.00</u>

Clearly the areas below Albuquerque in Valencia and Socorro Counties are the regions within which the primary agricultural production of the MRGCD takes place. The Class A acreages located within Sandoval and Bernalillo Counties are not insignificant, but their import to the irrigation operations of the District must be appropriately recognized in much of the discussion which follows. To complete this overview of the current assessment structure utilized by the MRGCD, Tables II-5 and II-6 present the Class B properties' contribution to the financial maintenance of the District.

TABLE II-5

## TOTAL APPRAISED VALUATION OF CLASS B PROPERTY IN MRGCD

<u>Year</u>	<u>Total Appraised Value</u>	<u>Private Ownership</u>	<u>Public Utilities</u>
1972	\$ 182,495,000	\$ --	\$ --
1973	192,829,000	--	--
1974	202,335,000	--	--
1975	221,017,000	--	--
1976	236,918,000	--	--
1977	274,724,781	242,260,562	32,464,219
1978	259,137,776	223,669,716	35,468,060
1979	262,100,935	--	--

TABLE II-6

## CLASS B ASSESSMENTS

<u>Year</u>	<u>Millage Rate</u>	<u>Total Levy Assessment</u>	<u>Total Collected Assessments</u>	<u>Percentage Uncollected</u>
1959	--	\$1,063,098.12	\$ 1,061,646.70	0.14
1960	--	926,051.71	923,050.50	0.32
1972	12.06	2,299,523.32	2,308,720.53	0.00
1973	12.80	2,438,577.09	2,443,073.80	0.00
1974	12.30	2,468,256.08	2,527,166.65	0.00
1975	9.18	2,245,389.26	2,002,090.72	10.84
1976	8.03	1,902,729.94	1,868,554.74	1.80
1977	7.10	1,950,545.97	1,641,887.29	15.82
1978	7.17	--	--	--
1979	10.03	--	--	--

Again, these figures provided substantial information regarding the contributions of the properties benefited by the river control works of the District, and provide information regarding the patterns of property development within the District, but provide little substantive conclusion in and of themselves. Table II-7 presents the total contributions made to the Class B assessments by county, and may provide some insight into the structure of the geographic property distribution and the nature of the primary beneficiaries of the flood and river control efforts undertaken by the District.

TABLE II-7

CLASS B TOTAL ASSESSMENTS BY COUNTY  
1959-1977

<u>County</u>	<u>Total Class B Assessments</u>	<u>Percentage of Total Class B Assessments</u>
Sandoval	\$ 1,017,056.30	3.48
Bernalillo	24,601,413.14	84.14
Valencia	2,846,370.90	9.73
Socorro	774,094.75	2.65
	<u>\$29,238,935.09</u>	<u>100.00</u>

Although there can be recognized very definite patterns of development within the District (e.g., the decrease in the irrigation acreage of Bernalillo County), it is also clear that the District has not significantly changed in terms of the structure of beneficiaries since its inception (i.e., District irrigation and flood control groups of beneficiaries). The reduction in irrigated acreage reflects the increasing urbanization of the metropolitan area around Albuquerque, as do increasing trends in the total appraised value of property in the District. The subdivision of property within the District, and in the Albuquerque area, has resulted in many small irrigators (less than five acres) who have been deriving (minimal) irrigation benefits from the formerly more extensively irrigated lands which were subdivided (possibly best described as an irrigated "ranchette"). This is probably the strongest motivation for the 1979 change of the Class A beneficiary definition described.

To complete the picture of the District's current operations, Table II-8 presents the summary of water use and irrigable acreage utilization for the District in 1978. There should be recognition that the figures for irrigated acres presented in this table do not correspond to the figures presented in Table II-2, with this disparity explained by the many small irrigation opera-

tions just described. Whether or not the new Class A definition will provide for a correction of this discrepancy is not really important, as these figures in Table II-8 more accurately reflect the actual patterns of irrigation and crop production within the District. The numerical description of the MRGCD operations will be left at this point, although we will frequently use some of these figures in the more narrative description of the District's development. These figures provide useful insight into several of the legal and administrative issues to which the Conservancy is currently addressing itself, and from which will result the continuing evolution of this institution.

#### Current Issues--The MRGCD an Evolving Institution

The financial administration of the MRGCD is now really only a matter of mechanics and in recent years has not presented any fundamental constraints to the operations or security of the District itself. This is not to downplay the problems and/or headaches of the actual assessment process encountered by the District in meeting its financial needs, but is to say that the District is now financially very stable and fiscally properly managed. There have been several administrative policy changes in recent years, and some substantial litigation which has had significant impact on the operations and administrative posture of the Conservancy today. Several of these current issues are simply continuations of old disputes, while others reflect more fundamental changes in the constituency of beneficiaries to which the District must be responsive. The following is not intended to represent an exhaustive list of the concerns and problems of the Conservancy today; but rather it is hoped that these disputes might serve as examples of the sources from which there can be anticipated to result fundamental changes affecting the future of this water institution.

TABLE II-8

## 1978 MRGCD WATER USER CENSUS

TOTAL IRRIGABLE ACREAGE	121,680 acres	
Lands in Irrigation Rotation		
Harvested Cropland & Pasture		58,444
Cropland Not Harvested		421
Acres Irrigated		<u>58,865</u>
Fallow or Idle		13,962
Acres in Irrigation Rotation		<u>72,827</u>
Lands Not in Irrigation Rotation		
Idle, Fallow or Grazed		6,608
Farmsteads, Roads, Ditches, Drains		4,605
Area Not in Irrigation Rotation		<u>11,213</u>
Total Irrigable Area for Service		<u>37,640</u>
		<u>121,680</u>

<u>Crops</u>	<u>Percent of Total Acreage</u>
Barley	1.27
Corn	3.02
Oats	1.51
Rye	0.06
Sorghums	0.83
Wheat	1.33
Alfalfa Hay	59.21
Other Hay	6.18
Irrigated Pasture	16.66
Corn Fodder	1.48
Silage or Ensilage	5.85
Beans, Dry & Edible	0.08
Asparagus	0.02
Cabbage	0.04
Corn, Sweet	0.07
Lettuce	0.03
Melons	0.05
Watermelons	0.01
Onions	0.04
Potatoes	0.01
Squash	0.01
Tomatoes	0.03
Trees (Nursery)	0.03
Grass	0.18
Apples	0.45
Grapes	0.01
Peaches	0.01
Family Gardens & Orchards	<u>0.87</u>
	99.34

Water Rights and the MRGCD Today. The seemingly endless dispute over water faced by all cultures settling in the arid regions of the West is still one of the hottest issues in the current administration of the MRGCD. The District's water rights potentially are the most valuable of all the property entitlements to which the District can lay claim,<sup>21</sup> and certainly any reduction or diminution of these water entitlements could be construed as threatening the stability and integrity of the District itself. Substantial litigation has been pursued by the District to protect their water right entitlements, although the most definitive of these litigation potentials, the adjudication of all water right holdings in the middle Rio Grande, has never been advocated by the District.<sup>22</sup>

The most revealing, and potentially the most threatening, of the recent water right disputes which have involved the District is the litigation commonly referred to as the Cox case.<sup>23</sup> The case is the result of an attempt by William and Nancy Cox to sell their water right entitlement from within the District to a party outside of the District's boundaries. If these water rights were perfected private water rights outside the District, no problem would exist in the Coxes attempts to sell (and transfer) this water right entitlement under the laws of New Mexico. The fact, however, is that the water rights owned by the Coxes are located within the benefited area of the Conservancy, and it is asserted by the District that without the benefits (reclamation and flood control) provided by the District's works, the water right entitlement in question would not exist.

On the other side of the litigation, it is asserted by the Coxes that the water right entitlement which they desire to sell is what is known as a vested water right, in that the specific entitlement existed prior to the



District's formation (a right not created by the District's organization) and is therefore not subject to the District's control. On these grounds the Coxes filed application for change with the State Engineer's Office, according to New Mexican law, in 1975. The application for change was not contested by the District on the basis that transfer will impair the District's water rights, but rather on the grounds that this water right is now subject to the jurisdiction of the MRGCD solely, and that the asserted jurisdiction of the SEO is incorrect. In essence the MRGCD's argument is that the water right would be moved outside the District, and that due to the benefits provided by the District's works, this water right transfer is subject to the approval by, and jurisdiction of, only the MRGCD (in conformance with and as provided by state law).

The ramifications of this dispute go far beyond the limits of the case itself, and could lead to the significant alteration of claimed water right entitlements possessed by the District. The District's need to assert authority over this transfer stems fundamentally from a felt need to resist pressure from the nonagricultural water users who wish to purchase water rights and transfer these water rights outside the District. Permit No. 0620 (see Table II-1) states that nearly 81,000 acres of irrigable agricultural land existed in the valley (with perfected water rights) at the time the District was organized, of which the claimed vested rights of the Cox lands are a part. If the Cox transfer application were to be allowed by the Courts, the remainder of these perfected rights could also potentially be transferred outside of the District's benefitted area. The impact of such an occurrence is obvious, and the potentials of such a precedent are no mystery to those involved in the dispute.

In terms of the District's position, the dispute boils down to the following fundamental questions: 1) of those water rights which predate the District, could any of those rights have been placed to continuous beneficial use without the benefits of the MRGCD; 2) even if these rights are found to exist, the District retains the power to control all waters use as provided by the following state statute:

Persons, public corporations and others desiring to secure such use of the waters or watercourses of the district, or or the district rights therein, may make application to the board for permission to lease or purchase for such use.  
[N.M. Stat. Ann. § 75-28-26 (9) (1973).];

3) although the State legislature recognized there may exist vested irrigation rights with the District, "nevertheless, in the proper operation of such districts, and especially in time of droughts, it is essential that the districts have the specific and unquestioned power to distribute the water remaining available for irrigation and to properly allocate the same for the purposes most essential for the welfare and economy of the landowners within the district" [N.M. Stat. Ann. § 75-28-28 (1953), emphasis added.]; and 4) because the District has a "perpetual lien" on all the real property of the District [N.M. Stat. Ann. § 75-32-10 (1953).] and because the conservancy statute includes water rights within the definition of "real property," [N.M. Stat. Ann. § 75-28-3 (1953).] its consent must be obtained before any transfer of water rights would be possible.

Clearly the MRGCD has strong support for their claimed jurisdiction, but the State Engineer, in an assertion of its own authority in the matter, swept aside the MRGCD protest and granted the Cox application for transfer. From this ruling the MRGCD appealed de novo to the appropriate State District Court where the case now sits.

The case began with the State Engineer in 1975 and is still before the State District Court awaiting trial on its merits. In the meantime, numerous procedural matters have been raised by both governmental agencies involved, requiring at least one interlocutory appeal to the Appellate Court. As of this writing--more than four years after the filing of the initial application--the case still languishes in State District Court with a number of procedural matters still pending before it can proceed to a hearing on the merits. Even after resolution on the merits in District Court, the case assuredly will be appealed for final resolution by the State Supreme Court.

A litigation strategy which has been very useful in other similar disputes is well evidenced by the Cox case. This might most simply be described as a stalling tactic which has served to make the disputed transfer so expensive (e.g., transaction costs) as to require its continued pursuit to be more a matter of principle than a litigation of a specific transfer. Water right entitlements are indeed the basis for all the powers and authority of the MRGCD. Any attempts to challenge or diminish these rights is likely to meet with the same response by the District; there is nothing more fundamentally important to the continuation of the MRGCD than the protection of their water right entitlements.

One condition placed on the use of water within the Conservancy which supercedes State law is a result of the relationship between the Bureau of Reclamation and the District. The Reclamation Act of 1902 provided that all participants within projects funded under this legislation would be required to irrigate less than 160 acres of land owned by any individual participant. This requirement has not had any significant impact on the operations of the District or the majority of the property holders within the District, with the

exception of providing a constraint on the sensibility of acquiring more than 160 acres of land under any single individual ownership. In June of 1980 the U.S. Supreme Court ruled that the 160 acre limitation does not apply to irrigators in California's Imperial Valley thereby lessening the impact of this rule throughout the West (although the decision was specifically limited to the Imperial Valley--any summary alteration or repeal of the acreage limitation was left to Congress by the Court).

The water right entitlements of the MRGCD have been described adequately, although no qualification of these rights has been provided which describes the ability of the District to transfer or lease these rights. Several authors have examined the increasing scarcity of western water resources, and all have generally concluded that for the West to continue its development some socially efficient mechanism must be allowed to reallocate the available water resources to new and/or higher valued uses of these resources.<sup>24</sup> There has been extensive discussion of how, with the increasingly scarce nature of the water commodity, this reallocation can be accomplished through the mechanisms of market economics (whereby the water will tend to migrate to its highest valued users). An alternative to this market mechanism has been the suggestion that water should be reallocated according to principles and proclamations assumedly established by each state, of those uses which are to be considered "more beneficial."<sup>25</sup> Regardless of the mechanism, the conclusion remains that the water resources of the West are becoming increasingly scarce, with increasing demands being placed on the water which is available, and that some mechanism will be required to make better use (e.g., more efficient) of the water resources which have provided for the development of the arid and semiarid regions in the past.

In recognition of this future constraint on the utilization of the District's water entitlements there has been some discussion of the potential for leasing the water rights of the District to other uses outside of the District's boundaries. It must also be recognized that such a proposal is very contrary to the position taken by the District in the Cox case, but the discussion of the potential is also very illustrative of the nature of the District's water right entitlements.

A fundamental distinction can be drawn between two wholly separate types of water right entitlements which are possessed by the District. The majority of the District's water rights are governed under state law and have been acquired through the procedures promulgated by the SEO. All of the 80,785 acres considered to be vested or perfected irrigation rights existing prior to the District's formation, as well as the additional 42,482 acres granted at the time of the formation (see Permit Number 0620, Table A) are subject to jurisdictional control by the SEO. The water rights belonging to the Pueblo Indians and the water entitlements provided by the San Juan-Chama contract are subject to the federal limitation on their use and transfer. This distinction is somewhat artificial though, as the assignment of the District's debt obligation to the Bureau made all property of the District subject to the Bureau's "real property lien," and under the laws of New Mexico a water right is treated as a form of real property.

The question of leasing the District's water right entitlements then must be discussed in light of two (somewhat) different legal doctrines, as the jurisdiction of either the state or federal authorities is still indeterminate as has been indicated in the Cox case. The federal law (primarily provisions of the Reclamation Act of 1902) on the transferability of water

right entitlements supplied from federally supported projects is ill-defined. These laws provide much detail regarding the formation and requirements imposed by water supply contracts, but there is no mention of the transferability of these water entitlements.

Fortunately, the contract drawn between the Bureau of Reclamation and the MRGCD in 1951 (for rehabilitation and construction) provided specific provisions for the transfer of water rights:

The District may, subject to approval of the Contracting Officer, or the Contracting Officer may to the extent now or hereafter authorized by law and insofar as can be done without adversely affecting Indian rights, contract for the disposal of a part of the project water supply for any use not detrimental to the primary uses herein specified; provided, that all payments collected by the District shall be paid over promptly to the United States, for credit upon any unpaid obligations of the District under this contract.

This contractual provision, when coupled with state statute, provides for the District's ability to transfer its water entitlements to other uses.

The State statute provides:

Persons, public corporations and others desiring to secure such use of the waters or watercourses of the District, or of the District rights therein, may make application to the board for permission to lease or purchase for such an item.

Although the contract between the Bureau and the MRGCD makes no specific provision for how long these leases could be, it is provided in the contract that the "provisions of this contract shall apply to and bind the successors and assigns of the parties hereto." This would indicate that a lease could extend for a period as long as the term of the original contract between the Bureau and the District. Clearly the provisions of this contract would indicate that the leasing of the District's water entitlements have been

provided for, but unfortunately there are several other provisions which might complicate the strict interpretation of the leasing's consideration in the above.

The decision provided by the United States Supreme Court in the case California v. United States, [46 U.S.L.W. 4997 (July 3, 1978)] seemed to reverse a long line of cases upholding federal control of federal reclamation projects. The decision held that a state may impose conditions on the "control, appropriation, use or distribution of water" in a federal project so long as those conditions are not contrary to express Congressional directives respecting the project. In light of this holding, it may now be argued that leasing federal water by the District is no longer a matter which can be left to the exclusive control of the Bureau of Reclamation. To the extent that such a lease involves the "control, appropriation, use or distribution" of federal water, it now may be arguable that the distinction between "federal" and "state" water no longer exists and that any leasing of federal waters are now subject to the same control as the leasing of state waters as described in the following.

The argument against the MRGCD's power to lease its waters to persons outside the District begins with the notion that ~~no~~ where in the Conservancy Act is such an express authority given to the Board (see N.M. Stat. Ann. § 73-14-1 et seq.). Furthermore, it can be pointed out that the statute specifically requires:

No sale, lease, assignment...shall be made or granted which shall infringe upon or interfere with the water rights of lands in the District... [N.M. Stat. Ann. § 73-14-47 (1978)]

and,

In time of droughts, it is essential that the districts have the specific and bequested power to distribute the water remaining available for irrigation and to properly allocate the same for the purposes most essential for the welfare and economy of the landowners within the district.  
[N.M. Stat. Ann. § 73-14-49 (1978).]

To the extent that the leasing of water by the District to those outside the District might, in time of shortage, "infringe or interfere with the water rights of lands in the district" it can certainly be argued that the lease would violate both of the above provisions.

In addition, for the District to remain consistent with its position on the "indispensability" of the Bureau in all legal proceedings, the District must concede that such a lease would also have to receive the approval of the Bureau of Reclamation and, absent of that approval, the District is powerless to act.

Although the issues are different in the leasing discussion and the previously discussed Cox case, the leasing of water by the MRGCD raises the same specter of conflicting state agency jurisdiction which is presented in the Cox dispute. The jurisdictional dispute in Cox arose when the Coxes applied to the State Engineer for a water right transfer of MRGCD water and the District interposed its objections to the assertion of the State Engineer's jurisdiction, arguing its authority to control such a transfer.

The resolution of the Cox dispute in favor of the State Engineer's jurisdiction would certainly provide for the authority of the District to lease its water entitlements, but unfortunately this is not the decision which is being sought by the District. There is a strategy which could be employed by the District to achieve favorable resolution of this jurisdiction dispute and still allow for the leasing of the District's water rights. If the District is able to successfully delay the proceedings in



the Cox case until such a time that the Coxes decide that the most sensible action is to drop the suit for financial or personal reasons, then the way has been cleared for the District to more actively pursue the leasing of its entitlements. It can be expected that the leasing of the District's entitlements outside of the District would require some resolution of the State Engineer's jurisdiction, but a resolution of this dispute might be more easily arrived at if such a decision were in the interest of the District (rather than a threat as is the Cox dispute).

In the absence of a resolution providing for the leasing of the District's water right entitlements, and with the strict constraints placed on all entitlements in the middle valley region of the Rio Grande as a result of the Compact obligations, the utilization of the available water supplies can be expected to become increasingly critical to the further development of the middle valley region. As has been indicated, it would seem that the District has been provided permits to appropriate and store sufficient water for its needs. Moreover, during recent years the debt obligation of the District to Texas has been finally eliminated through: 1) the careful administration of the water available; 2) the temporary transfer of Albuquerque's San Juan-Chama water project entitlements for the past several years; and 3) as a result of favorable flows on the river in recent years. The important question that is inevitably confronting the District in the very near future concerns the actual quantification of water that is being "beneficially used" by the irrigators of the District. The permits presented in Table II-1 recognize water right entitlements for the irrigation of 131,615 acres, plus an additional entitlement to 20,200 acre-feet of water under the San Juan-Chama project.

On the other side of the coin, the figures provided by Table II-2 indicate a declining trend in the irrigated acreage of the District, and the recent reclassification of property within the District suggests that only two-thirds of the acreage permitted for irrigation are actually so utilized at this time. An adjudication of water right entitlements in the middle valley would certainly consider this reduced area, and a reduction of as much as one-third of the District's water right entitlements could undoubtedly be discussed. It is also possible under State law that the District could lose its water right entitlements through other methods such as abandonment or adverse possession for nonuse, but both of these revocations of water rights would certainly meet with substantial resistance by the District. The condemnation of water rights is possible, but in this particular case it is more likely that an adjudication hearing would be a more efficient way to acquire water entitlements from the District by anyone wishing to do so.

The current administration of the District is aware of such a potential suit, and it can also be assumed that this is a source of interest in leasing the District's water entitlements. There have been other instances where similar urban development has resulted in significant decreases in irrigable areas in other regions of the West (most notably in the metropolitan Denver area), and cases in which the water entitlements of a water institution (e.g., conservancy) have been reassigned to other beneficial uses such as municipal use. The significance of these entitlements' assignment to the District has been recognized; the pertinent issue is then whether the District will be successful in finding sufficient applications through which it can make beneficial use of all these valuable resource entitlements--this concern possibly providing the most critical of all the issues which must be faced by the MRGCD in the future.

The State of Flood Control in the MRGCD. The management of the MRGCD as a water institution, and in particular as a flood control agency, has been of principle concern since the District's formation in 1925. Unfortunately, the battle which is being fought by this institution is actually a battle with the forces of nature. In the years since the District's formation, flood control works, dams, levies and river channelization have not stopped the processes of river aggradation. Today a trip to the valley provides an ominous image of the future--the levees which limit the river's channel have also limited the width of the alluvial deposits' development, with the bed of the river now visibly above the surrounding valley lands--nature has been controlled, not beaten.

There has continued to be concern over the potential for severe flooding of the valley lands, and in early 1979 there was presented for public comment a new flood control study prepared by the Army Corps of Engineer's to provide increased protection to the urban area from Bernalillo to Belen. These plans contemplate increased levee protection for all the areas included, and the maximum protection proposed (to control flood flows described as occurring once every 700 years) would cost an estimated \$48 million, for which the state and local contributions would be nearly \$12 million under the water policy promulgated recently by the President and the National Water Policy Commission. The MRGCD has been labeled the logical sponsor for such a program, although there was not strong sentiment supportive of the maximum protection plans provided at these cost estimates. Regardless of the actual program which is initiated, it is apparent that some additional flood protection program is required to protect the increasing property values of.

the middle valley. It is also equally apparent that all of these projects are beyond the financial capabilities of the MRGCD or any other single entity existing in the valley at this time.

Akin to these flood control proposals is a dispute over the actual benefits which are received by property holders of the middle valley, as these benefits relate to the tax assessments paid by these beneficiaries. Currently, operation and maintenance assessments are based on an administratively established division of 25 percent contribution by the Class A properties and a 75 percent contribution by the Class B properties. It is reasonable to ask whether this proportion also represents the actual benefits received by these properties, and/or whether this proportion reflects the actual costs of the District's operations and maintenance for each of the two classes of beneficiaries. No definitive answer is easily arrived at in this matter, and any such attempt could be challenged, based on the general nature of benefits which have resulted from the District's programs (i.e., regardless of the annual contribution provided by any individual Class B property, and as long as it continues to not be damaged by flooding, the fact that this property exists at all is a result of the drainage (and river control) works of the District).

To raise this question, without the ability to answer it definitively, provides for much insight into the current operations of the District. The beneficiaries of the MRGCD have no ability at this time to either directly or indirectly evaluate whether the benefits which they actually receive are in proportion to the contributions which they make--a situation from which could spring significant dispute, and grounds upon which the administrative operations of the District could be severely criticized. Indeed, the finan-

cial operations of the District are complex, but not so complex that the District's political/fiscal responsibility could not also include an assessment of whether or not its financial structure is disproportionately benefiting a particular group of beneficiaries. No indictment of the Conservancy is intended by this comment, but rather a simple recognition that an administrative failing in this regard could lead to (or continue) poor relationships between the individual beneficiaries of the District and its administration. The historical evidence is clear as to the problems such circumstances can provide to the operations of the District.

Fencing and the MRGCD as a Public Institution. The clear pattern of increasing urbanization of the MRGCD jurisdiction has already been described, but there is no better single example of how this changing environment can affect the concerns of the Conservancy District than is presented in the dispute over the fencing of the District's irrigation and drainage ditches in the Albuquerque area. There have been numerous complaints voiced regarding the dangers presented by open ditches in an area populated by many families, most of whom are not involved in any way with the irrigation operations of the District. In June of 1972 there was filed a class action suit<sup>26</sup> against the MRGCD, Mr. Ellis Armstrong (Commissioner of Reclamation for the Bureau of Reclamation) and others asking for injunctive relief to abate a nuisance caused by the existence of unfenced irrigation ditches in the District. The suit was originally brought in the State District Court, but was remanded to Federal District Court by Defendant Armstrong pursuant with the Federal Code.

Once in Federal Court, Defendant Armstrong moved for dismissal, contending that the suit was in reality a suit against the United States to which it did not consent, and as such, should be dismissed pursuant to the doctrine of sovereign immunity. The Court, in January of 1973, dismissed the action and sent the case back to State District Court. Once back in State Court, the remaining defendants made a motion to dismiss on, among other grounds, the failure to join an indispensable party, the United States. Finally, in 1974, the Court concluded that the United States was an indispensable party, reasoning that the United States, as title holder of the District land, might have to pay for any fencing, and even if the contract were construed so that it did not have an obligation to pay for any fencing, the repayment of its loans to the District might be in jeopardy because of the increased financial burden placed on the District. The Court held that this action could not proceed any further without the presence of the United States as a party, and since the Federal District Court had already held that the U.S. was immune through sovereign immunity, dismissed the action.

This decision was later affirmed by the New Mexico Supreme Court in 1975 in an order entered without opinion. Again the power of the "indispensability" of the United States in such action was demonstrated and handled with a great deal of administrative finesse, but "...the public safety, health, convenience and welfare" which was to be promoted by the organization of the Conservancy (quoted from the Court order establishing the District in 1925) were certainly ignored by the Court's and the District's actions in this matter.

After several years of continuing effort and negotiations between the City of Albuquerque and the MRGCD, and after 92 individuals had drowned in

the ditches of the Conservancy in the previous 20 years (50 percent children under age 7), the City decided it was time to erect the fences without the permission of the District in March of 1979. The District's reaction to this work certainly surprised both the City and those who were to benefit from these fences--the District threatened to bulldoze the fences if the City did not cease their construction, with relations between the Mayor and the District at a confrontation. There was subsequently worked out between the City and District attorneys a plan by which the fences could be constructed on an "experimental" basis, with funds provided by the City, State and federal levels, although no support for these fences was provided by the District. This fencing project has been continued into the 1980 irrigation season.

Apart from the central concern about loss of life, the issue which is of greatest concern in this dispute is the nature of the District's recognition of the "public interest" role which it has been repeatedly remanded to recognize by previous Court rulings. The Conservancy District is a public agency designed to improve the lands of the middle valley for the purposes of settling and developing this area by people. There is then both implicit and explicit in all the actions and decisions contemplated by the District a responsibility to a single concern--the public interest of its constituency. The District's legal shelter from litigation as a result of the "indispensability" of the United States, and the sovereign immunity of this indispensable party, has provided the District with the ability to shun the public interest role essentially at its convenience, as is well illustrated by this example.

## The Continuing Evolution of the MRGCD

There have been several changes and modifications to the operations of the MRGCD since the early 1960s. The majority of these changes have had only limited impact on the functioning of the institution, although there are several which should be noted. Probably the most influential of all these changes has been the change from an appointed Board of Directors to an elected Board in the early 1970s. This was the result of litigation challenging the constitutionality of the appointment of these Directors by the Judges of the Second Judicial District.

The plaintiffs filed a class action suit<sup>27</sup> against the MRGCD, its Board of Directors and the Judges of the Second Judicial District in New Mexico, alleging that N.M.S.A. § 75-28-11 (1953), which provided for the appointment of the Board of Directors of the Conservancy by the Judges of the Second Judicial District, was unconstitutional. The gist of the plaintiff's argument was that the Constitution of the United States requires that persons residing within the District be given the right to elect the Board of Directors of that District on a one-man, one-vote basis.

The defendants filed the usual motion for dismissal, claiming that the United States was an indispensable party to the dispute, as had become the pattern over the previous years. In this instance, with no request for a money judgement or any other financial ramifications in the case, the Court, on October 12, 1973, denied the motion.

Shortly after the Court's decision, and during the 1974 legislative session, the New Mexico Legislature proposed a Constitutional amendment mandating that any political subdivision with taxing authority (including the MRGCD) have an elected governing authority. Because of the obvious



effect of this Constitutional amendment on the suit, the Court, on March 29, 1974, stayed the proceedings pending the outcome of the referendum on the proposed amendment.

On November 5, 1974, the Constitutional amendment passed and was codified as N.M. Const. Art. VIII, § 9. The amendment precluded a "tax or assessment of any kind" by a "political subdivision when enabling legislation did not provide for an elected governing authority." The effect, of course, was to require legislation which would mandate an elected Board for the MRGCD.

The 1975 Legislature responded with a compromise statute which for all practical purposes mooted the Constitutional Court challenge. The new law, Laws of N.M. 1975, Ch. 262, mandated an elected Board of seven members. Each Board member was required to be a qualified elector of the District and a resident of the District and county from which elected. A "qualified elector" was defined as a "natural person who owns real property within the... district."<sup>28</sup> Furthermore, the statute operates to require that three of the Board members be from Bernalillo County, and that one Board member be selected from each of the other three counties of the District. The seventh seat on the Board is elected at large thereby making likely a four-person majority from Bernalillo County.<sup>29</sup>

While perhaps not justifiable on strict one-man, one-vote principle, the new elected Board provides for fair representation and no longer allows control of the District by the Judges of the Conservancy Court. The results from this action are probably more telling about the nature of beneficiaries than any other change made in the District. The most recently elected Board is composed entirely of individuals who either are currently irrigating property or are closely tied to the concerns and interests of the irrigation

community.<sup>30</sup> Clearly the most organized (politically) of the various diverse beneficiaries of the District are those in the irrigation community; and apparently the Class B beneficiaries are composed of such small factions as to make their influence in the operations of the District of only limited success. The former control of the District's operations by the financially (and politically) powerful nonagricultural sector has seemingly given way to the more politically unified concerns of the agricultural community.

There can be asserted two possible courses of future action which the current political dominance by the irrigation community could provide the District: 1) that management of the District will continue to promote expansion of the flood control facilities, although these needs will be increasingly left to the administration provided by the Corps of Engineers, and that the improvement of the irrigation works of the District will proceed slowly; or 2) that the flood control works will be increasingly managed by the Corps [as in 1)], and there will be undertaken extensive improvements in the irrigation facilities, with increased recognition of the role of the MRGCD as a water institution and the needs of improving the efficiency of water's use within the District. These two possibilities are not intended to be either exhaustive or mutually exclusive, but the point is that the required flood control works have grown far beyond the capabilities of the District to provide and will increasingly become the responsibility of the Army Corps of Engineers.

The administrative question then must be asserted regarding the role which will be pursued by the District in its other primary goal, the continuation (and possible further development) of the irrigation community in the middle valley region. The control of the District's Board by the agricultural

interests would suggest that these individuals would extensively pursue the development and improvement of the District's irrigation facilities. But to use the description provided by the District's current General Manager, Mr. Robert S. Nanninga, the Board is "... composed of a group of hardheaded farmers who each wish to accomplish any task in their way" [emphasis added] which makes the development of any single goal or policy much more difficult than it might otherwise be.

It appears that the relationship between the District and the Bureau of Reclamation is still very strong, although this may also be changing in light of the recent name change of the Bureau of Reclamation to the Water and Power Resources Service (as of November 6, 1979). Whether this name change also signals a change in the focus or principal concerns of the agency is difficult to assess at this time--clearly though, the former Bureau of Reclamation had no such explicitly stated goals as are now a part of the agency's title. It should also be noted that the use of the former name throughout this description of the MRGCD was done with the intention of describing the former role of the agency. The recent name change might very well signify a substantially different purpose(s) for this federal agency which has served for nearly three-quarters of a century to promote the development of irrigation throughout the West.

There is no reason to believe that the "indispensability" shelter will not continue to be used by the District, as the repayment of the debt obligation to the United States will likely not end soon. With the expansion of the flood control facilities (as has been described) it can be expected that the current debt obligation could be expanded. Historically there can be little doubt that the District required the assistance of the federal

government to accomplish its original tasks, but the role which will be played by the feds in the future is at this time somewhat indeterminate; although it can reasonably be asserted that there will at least be a desire to continue the current relationship with the Water and Power Resources Service by the District and its beneficiaries.

Of the many plans and policies which the District is currently considering, there are two which would lead to significant alteration (and possibly evolutionary change) in the operations of the District and its role as a water institution. There has been recognition that the delivery works of the District are not as "efficient" as might be desired in accomplishing the irrigation of the Conservancy. There have been suggestions of "super canals" which would have provided substantial improved access to water for delivery (and the maintenance of delivery schedules), but there has been expressed some concern that these large canals would not provide sufficient benefits or delivery improvements to justify the expense of their construction. A financially more reasonable program which is currently being discussed is extensive (concrete) lining of the existing laterals and ditches.

It is thought that this lining might accomplish several purposes which have not been adequately considered (or accomplished) by the District prior to this time. The dirt ditches and laterals as they exist today are very inefficient, in that the filling of a particular ditch with water for irrigation may require as much as several days because of the infiltration and percolation of these waters into the ditchbank itself. A concrete lined ditch would thereby provide delivery of irrigation water on much more of a demand basis, allow more accurate estimation (or measurement) of the water

actually applied to irrigation and significantly reduce the usable water now lost in the irrigation of crops. The most attractive feature of this plan is its lower cost, in that it would require the purchase of a single machine (currently valued at approximately \$500,000) which would be capable of lining the existing ditches and laterals. Again, this is only speculation at this time and it would be premature to describe these as probable actions which will be pursued by the District.

The other major administrative change being considered which could influence the future role of the MRGCD in the middle valley is the previously discussed potential for the leasing of the District's water right entitlements. As has been indicated, there are substantial obstacles which stand in the way of this leasing potential. The common condition of water's increasing scarcity throughout the region may force the District to pursue this potential in the near future, as there is no more threatening potentiality to be faced by the District in the future that the condemnation of their water right entitlements as a result of not having placed these entitlements to beneficial use, as is required by law. It should be noted that the potential for such condemnation is distant at this time, and that any action on this possibility is unlikely until the Cox jurisdictional dispute is resolved.

The pattern is clear and should not be ignored: as the water resources of the region become increasingly scarce, and as there is increasing competition for the rights which are available, the institution which controls the majority of the water entitlements in the middle valley will be increasingly pressured to make better and more efficient use of these resources. The definition of how "better" or "more efficient" use can be promoted will

not be speculated upon, as these are decisions which must be made directly by the society served by this vital resource. The possibilities are simply too great to ignore in the consideration of the evolution of this water institution, and the recognition of this future constraint by the District's Board--without contemplating immediate action--would serve to set the stage for the implementation of programs as they are required in the future.

With this recognition of the MRGCD as a water institution, there must also be renewed recognition of the political nature of the institution as well. The reactions of the District, although sometimes seeming somewhat arbitrary (e.g., resistance to fencing), must now be recognized as actions of a politically elected Board that is forced to consider the interests of many diverse beneficiaries. It has been suggested that the best description of the Board's action, and of the District in general, is a "go slow" policy. Certainly this description must be assigned some accuracy in light of the minimal evolutionary change that can be observed in the District since its formation in 1925. Indeed, when consideration is given to the substantial change in the demographic makeup of the District since its inception, the absence of substantive fundamental changes in policy and purpose in more than half a century is striking. There has been little outward recognition of the changing aspects of the District's functions, other than in the financial operations of the District since its formation. As a result, it may usefully be suggested that the District consider a reevaluation or restatement of its political and social purposes, if for clarification's sake alone.

## Summary

There are two reoccurring themes which have only been given cursory recognition in that which has preceded--the consideration of efficiency and equity effects which result from the management of the benefits provided by the MRGCD. The first of these two concepts has been given some extensive consideration throughout the development of the District's administrative evolution. Clearly the formation of the District itself was in recognition that there was some social efficiency<sup>31</sup> to be gained simply by organizing the attempts to provide irrigation and river control works in the middle valley region early in the twentieth century. There has been substantial consideration of how the District could accomplish many of its financial tasks in terms of improved economic efficiency as well, through such mechanisms as the refinancing of outstanding bond obligations to reduce the financing costs or the assignment of the outstanding debt obligation to the Bureau of Reclamation which eliminated the interest cost to the District.

The consideration of the efficiency of the District's operations can be expected to increase in importance (primarily as a result of the increasing water scarcity which has been described) in the continuing evolution of the management procedures employed. In this management strategy there will be forced recognition of (and probable better definition of) the social goals which are to be considered and acted upon by the District's administrators. The more specifically and purposefully defined are these goals, the more efficiently can the actions of the District be directed toward the accomplishment of this social role. This recognition of the District's social role is possibly the most fundamental task which could lead to the increased efficiency of the District's operations. Without this definition,

the District and its administrators are much less able to improve on the District's operations in any but day-to-day "surface" interactions between the District and its beneficiaries.

The relationship between equity and the continuing evolution of the MRGCD is a much more nebulous concept. The organization and structure of the District has simply provided for much of the pattern of distributional equity (economic) throughout the region benefited by the MRGCD. There can be no mathematical (or logical) formulation of the correct, or socially intended distribution of the economic benefits that have resulted from this or any similar project undertaken under the same auspices. The organization of the MRGCD has provided the benefits which have been described and may be observed. It may also be assumed that the administration of the Conservancy has considered many equity concepts (e.g., "the public interest"), and that these concepts have served to guide the formulation and implementation of the District's policies.

Of value to this evolutionary description though is the discussion of how the District can better serve and address itself to the equitable administration of benefits (or costs) which result from the current and future operations of the District. Again, it appears that the more explicitly are defined the purposes and goals of the institution itself, the more equitably can the administration of the institution be accomplished.

The recommendation provided by these efficiency and equity concepts is rhetorically simple, yet poses problems beyond the scope of this analysis and potentially out of the reach of the current administration governing the District. Simply, after nearly six decades of administration and



management under a single set of organizational strictures, the MRGCD is in need of a restatement of its purposes of operation. There is no legal precedent for such a restatement of objectives, and it is therefore difficult for the current (or any future) administrators of the District to suggest such action. Yet, with the increasing pressures for more efficient and more equitable operation of the institution, this single action would provide much benefit to all parties concerned.

The presentation of MRGCD as an evolving water institution has provided much insight into the nature of the specific administrative changes which can be observed in the development of the District; but the realization of the District's evolutionary nature by those who are directly responsible for the internal development of the institution itself would serve to provide much more insightful management strategies.

## FOOTNOTES TO CHAPTER TWO

- 1 Although there were many studies, reports and other analyses which served as primary research sources, the bulk of the specific historical information was obtained by sorting through the District Court files of the Second Judicial District, File Number 14157. This file has served as the collective file number for all Court records pertaining to the Middle Rio Grande Conservancy District from its formation until 1961. Since then the legal filings pertaining to the District have been assigned file numbers according to the order in which they were received by the Court Clerk, and not under the single central file number. Some of the documents found in this file have also been assigned subnumbers chronologically with their receipt, and when available these numbers will be cited with the specific document. Otherwise the file number 14157 will not be presented in the citation in all future references to these District Court files.
- 2 N.M. Stat. Ann. § 75-28-1 et seq. (repl. 1968, Supp. 1975).
- 3 The protestants of the District's formation repeatedly alleged that the organization of the MRGCD was to serve only the interests of a small number of individuals wishing to develop their property holdings for nonagricultural purposes. These allegations were never addressed by the courts in the hearings on these protests, with the protests contesting the constitutionality of the Conservancy Act principally. The addresses given for those individuals petitioning for the formation of the District are almost exclusively Albuquerque street addresses and many of the names listed are prominent in Albuquerque business community both at that time and today. See Petition, filed September 17, 1923; and Petition, filed August 9, 1924.
- 4 Protest--filed in District Court prior to 1924.
- 5 Order declaring the Organization of the Middle Rio Grande Conservancy District, Adjudicating All Questions of Jurisdiction and Findings on Hearing; filed August 26, 1925.
- 6 "A Brief Economic Survey of the Middle Rio Grande Valley," (by authority of the Rio Grande Association) August, 1923.
- 7 Order Approving Plan With Modifications, subnumber 184, filed August 15, 1928.
- 8 Order and Decree Approving and Confirming th Conservancy Appraisal Record, subnumber 234, filed February 6, 1929.
- 9 Opinion of the Court on Removal Proceedings, subnumber 287, filed June 20, 1930.

- 10 There were several filings in this matter with the most specific detailing of the allegations appearing in: Defendant's Requested Findings of Fact, subnumber 722, filed December 4, 1934.
- 11 The Annual Reports after 1941 repeat (with differing degrees of emphasis) the common problem faced by the District's assessors in keeping up with the continued subdivision of Bernalillo County which forced additional reassessment (and thereby direct cost) burdens on the District and its records. The Annual Report of 1940 indicates that there is extremely high delinquency rates among the nonirrigators (primarily Bernalillo County). The Annual Report of 1945 most explicitly expresses these concerns regarding the increasing urban area of the Conservancy.
- 12 It is not until the Annual Report of 1949 that there is ever expressed recognition of how the increasing urbanization has made substantially greater water quantities available to other District appropriators, although this benefit was probably useful to the District after the end of the flood season in 1942.
- 13 This concern for the challenge provided by the Texas suit was first elaborated upon in the Annual Report filed December 1, 1952, although there is repeated discussion of the case in every Annual Report while the suit was pending.
- 14 The first petition for the formation of the Conservancy was submitted to the District Court in July, 1952, with the State Supreme Court finding the petition for formation valid and ordering the organization of the Sandia Conservancy District in 1953.
- 15 Although the Courts allowed the formation of the Sandia Conservancy District, this District was never able to accomplish this organization. The District prepared several plans for its contemplated works, but there was never begun any construction to accomplish the tasks that had led to the District's formation. In 1963 there was formed a similar organization under legislation which had just received approval, and the Albuquerque Metropolitan Arroyo Flood Control Authority was formed. The purposes of this agency are essentially the same as the Sandia Conservancy District, and the plans drawn for the conservancy served as the first plans for AMAFCA.
- 16 Several authors have presented these efficiency and equity aspects of the prior appropriation doctrine, and it is appropriate to note that the precise definition of these concepts primarily structures the nature of the research and analysis performed. See Stuart H. Burness and James P. Quirk, "Appropriative Water Rights and the Efficient Allocation of Resources," American Economic Review VXIX (March, 1979): 1-36; Russell L. Gum, Theodore G. Roefs and Dan B. Kimball, "Quantifying Societal Goals: Development of a Weighting Methodology," Water Resources Research 12:4 (August, 1976): 617-22; and Arthur Maass and Raymond L. Anderson, ... and the Desert Shall Rejoice--Conflict, Growth and Justice in Arid Environments, Cambridge: the MIT Press, 1978.

- 17 The assignment of water right priorities throughout the West is generally based on the notion of "first in time, first in right," but there have been several priority assignments based on the notion that the reservation of land by the federal government also assigned water rights to that land for the purposes of its set-aside. This is most generally known as the Reserved Rights Doctrine, and by which the water right entitlements are assigned priority dates based on the date that the lands were set-aside. There are other slight deviations from the general priority principle, but none apply to the circumstances of appropriation in the middle Rio Grande.
- 18 These calculations of return flow, consumptive use, etc., generally require that there has been constructed models of the hydrologic/geologic structure of a particular region which are presented with evidence of climatic and soil conditions. From this information there is generally constructed a model that proposes to describe the hydrologic conditions of water's application to crops (and other uses) within that region, and as a result of this modeling there can be assigned a consumptive use quantification. Most commonly employed is a formulation of consumptive use requirements known as the Blaney-Criddle Formula.
- 19 The Reclamation Act of 1902, 57th Congress, P.L. 161, June 17, 1902, 32 Stat. 388, 43 U.S.C. 431 (1902).
- 20 These and all the other figures presented in this section were taken from the 1978 Annual Report of the District, with the information for the past two years resulting from interviews with various personnel of the District. This figure showing Total Collected Assessments is as of August 31, 1978, and are no longer precisely the same, as these figures are restated in every Annual Report as the outstanding debt obligations are collected. Those years in which the District collected more than it leveed in assessments represents the interest penalty payed by delinquent property owners.
- 21 For an explanation of how water rights can be assigned monetary value under the doctrine of prior appropriation, see Rahman Khoshakhlagh, F. Lee Brown and Charles T. DuMars, Forecasting Future Market Values of Water Rights in New Mexico, Las Cruces, New Mexico: Water Resources Research Institute, 1977.
- 22 The District's water right entitlements are of a nature that the adjudication of these rights, although certainly more precisely defining the quantity of these entitlements, could potentially significantly reduce these rights from the maximum quantification as was presented in Table II-1. Such a reduction potential is certainly the reason why these adjudication proceedings have not been pursued by the District in the past--although the strategy of indefinitely delaying these adjudication hearings might be considered inappropriate given the circumstances of the decreasing irrigated acreage. There should also be recognition that the simplicity of the description of "an adjudication hearing" is misleading, in that this is an extremely complicated and difficult proceeding which could (would) lead to some substantial additional litigation in the middle Rio Grande valley.

- 23 Middle Rio Grande Conservancy District v. Cox, N.M. 13th Judicial District Court, Cause No. 7147, filed September 5, 1977, on appeal, also New Mexico State Engineer file No. 02377A and RG-10591.
- 24 Of these studies the most interesting are those which describe the potential for the market allocation of the available water resources. Several approaches to these market allocations are possible, and the prior appropriation doctrines' of most states have provision for the transfer of water rights between users and differing uses. Of particular note are investigations of "Water Banking," see Sotirios Angelides and Eugene Bardach, Water Banking: How to Stop Wasting Agricultural Water, San Francisco: Institute for Contemporary Studies, 1978; and research to be completed in the Spring of 1980 by Dr. Jay Bayley of the Utah Water Research Laboratory (Logan, Utah) which discusses the potential for implementing such a concept in that state. There has been provided an indepth evaluation of how the market mechanism can become increasingly sophisticated as the water resources become increasingly scarce, see John Tysseling, "Western Water Market Sophistication" (unpublished Master's Thesis, University of New Mexico, Albuquerque, New Mexico, 1979); research which was conducted under a National Science Foundation Grant and which will be published in an expanded form in late 1980.
- 25 Of all the western states, Utah has pursued this "more beneficial use" concept to the greatest extent. There have been three successive attempts to pass legislation which would provide explicit power to the State Engineer allowing that agency to advance water right application which are considered to be "more beneficial" ahead of less beneficial applications to appropriate from a source of supply. All three attempts have failed, although the law provides these powers to the State Engineer currently in less explicit form, see Utah Code Annotated § 73-3-8 (Repl. 1968).
- 26 Escamilla v. Middle Rio Grande Conservancy District, Civil Action No. 6-72-02901 (N.M. 2nd Judicial District, 1974).
- 27 Escamilla v. Middle Rio Grande Conservancy District, Civ. No. 9547, D.N.M. (1972).
- 28 N.M. Stat. Ann. § 73-14-20 (1978).
- 29 N.M. Stat. Ann. § 73-14-22 (1978).
- 30 This relationship between the nonirrigating Board members and the agricultural community was described by Mr. Robert S. Nannings, General Manager of the MRGCD, in an interview conducted November 29, 1979.
- 31 The concept of Social Efficiency is a description of relative improvements which can be made by (in this case) a water institution toward achieving an expressed (or implicit) set of societal goals. The notion of economic efficiency is closely tied with social efficiency, but the economic concept is much more limited. A study being conducted in

Colorado by the Colorado Department of Natural Resources serves well as an example of this social efficiency concept. There has been recognition that the water laws of that state allow and provide for the transfer of water rights between individuals, and because of this provision, the water resources of the state are being rapidly transferred to the high value mineral resource developers of the state. With recognition of this pattern of water resource transfer to the highest valued uses, there is also recognition that this is potentially not the socially preferred or desirable allocation of these water resources. There is now being considered by the Colorado Water Study the potential ways in which the laws of administrative practices of the state can be altered to allow for the more socially desirable (re)allocation of the water resources.

In the case of the MRGCD, the social efficiency provided by its organization allowed the centralization of common needs by the early settlers of the region. By the formation of the Conservancy the administration of the necessary works was accomplished with great "economic efficiency" and the socially valuable purposes (i.e., land reclamation) could be promoted with greater "social efficiency."



## CHAPTER III URBAN WATER PRICING

### Introduction

There are many institutions that govern water management in the West today. These institutions may be defined not just as an organization (e.g., a conservancy district, a ditch company, the Bureau of Reclamation) but, as Dean Mann has pointed out, by "the rules, patterns of behavior, the values and purposes, and organizational structures."<sup>1</sup> Urban water pricing is such a water institution. Organized as the city water department, or in some cases as a private utility, its rules (rate structures, water waste ordinances, etc.) allocate city water among competing customers, encourage social values such as green lawns and parks, and influence citizens' attitudes toward water use and conservation.

Since in New Mexico, as in most other western states, urban water use accounts for only 5 to 10 percent of total water supplies, some may think it unimportant to study urban water pricing. However, urban water demand today represents one of the fastest growing areas of water use in New Mexico and the arid Southwest, in general. And this growth is taking place in the midst of predominant agricultural communities. Expanding urban water use comes with the dramatic growth in city population, the rise in per capita income, and the concentration of commercial and industrial development in urban centers. It is this feature about urban water use that places it immediately up against the dominant social and economic force in western water management today: a fixed and fully appropriated water



supply. How urban water institutions react and adapt in this environment of fixed water supplies<sup>2</sup> will be an important determinant of the future economic well-being of the cities and their citizens as well as a reflection of changing social values and attitudes toward water and water use.

The stress on urban water institutions is already evident in many southwestern cities. Since 1974 Tucson has experienced large increases in water rates as well as major changes in the rate structure itself in order to encourage water conservation and to provide the revenue for capacity expansion. Denver has experienced rapid growth since the 1950s and today faces serious water supply constraints. During the 1976-1977 drought period the City resorted to water rationing to allocate City water. To accommodate future growth, Denver must find new sources of water (e.g., buying existing water rights or transmountain diversion projects) and make system capacity expansion, both requiring increases in water rates and/or changes in water rate structures in order to raise the necessary financing. Here in New Mexico, both Albuquerque and Santa Fe have experienced recent changes in water pricing.

In this chapter the water pricing of four New Mexico cities will be analyzed: Albuquerque, Santa Fe, Belen and Los Lunas. This will include a history of water rates and water rate structures as well as the social and economic conditions which have influenced these rates. In the case of Albuquerque and Santa Fe, these two New Mexico cities have experienced significant increases in urban water pricing. The forces largely responsible for these changes will be examined and the adaptation of the urban water institution (i.e., the rate changes) to these forces will be evaluated. While Belen and

Los Lunas have also had some recent rate increases, they have not been as dramatic as in Santa Fe or Albuquerque. The social and economic forces, while present in Belen and Los Lunas, are not of the same degree and magnitude as in the case of Santa Fe and Albuquerque. In this sense Belen and Los Lunas represent a control group in our evaluation here of the adaptation of urban water institutions to changing social and economic environments.

### Urban Water Management Environment

Before turning to the specific analysis of each of these four New Mexico cities, it will be useful to provide a more detailed discussion of the environment within which urban water institutions must operate. Earlier the condition of a fixed and fully appropriated water supply combined with expanding water use was presented as the dominant force acting upon urban water institutions. However, there are other equally important forces to which these institutions must adapt. They include the economics of water distribution, federal environmental regulations, and the uncertainties surrounding water availability due to outstanding legal claims to water from Indians and the Federal government.

### Full Appropriation

The Rio Grande basin, like many other river basins in the West, is fully appropriated. As discussed in Chapter I, this condition of full appropriation has resulted from legal, man-made constraints rather than an actual physical constraint on water availability. New Mexico's share of the surface flows of the Rio Grande river is now sufficient to meet only the claims of existing water right holders. The groundwater in the Rio Grande basin has been carefully controlled by the State Engineer's Office

since 1956 when the Rio Grande was designated a declared basin. Any new, additional appropriations of water in the Rio Grande Basin would injury the interests of other water right holders and thus are not allowed. Any new user of water or expanding user (as is the case with New Mexico cities) in the Rio Grande basin must acquire the right to appropriate additional water from another existing user by buying or transferring existing water rights. In the era before full appropriation a new user would simply have begun to divert the water and made application to the state engineer to establish the water right.

Full appropriation in the Rio Grande as well as other western basins is likely to remain as a water supply constraint in the future. President Carter cancelled many planned federal water projects soon after being inaugurated and has initiated tougher guidelines for the approval of new federal projects designed to develop new water sources. In the past these projects served to expand the usable water supply by capturing seasonal water runoff in storage reservoirs for controlled release as the water was needed. The availability of new water from federal projects is something New Mexico cities cannot count on in the future to help cut with their need for more water.

The condition of full appropriation has many implications for urban water institutions. First of all, additional water for expanding urban use must come from other water rights holders, primarily irrigation water rights. These rights may be purchased and, as Khoshakhlagh, Brown and Du Mars<sup>3</sup> have shown, this may entail considerable cost to the city. Their analysis shows that in 1976 the right to an acre foot of water in the Rio Grande (excluding Santa Fe) sold for \$786.16 compared to \$267.00 in 1962. In Santa Fe the right

to an acre foot sold for \$10,909.00 in 1975 compared to \$900.00 in 1963<sup>4</sup>.

However, water rights purchase is not the only option available to a city in need of additional water. The City of Fort Collins, Colorado solved this problem by requiring that owners of lands annexed into the City provide the City three acre feet of water per acre or supply the money equivalent<sup>5</sup>. The City of Westminster, Colorado has worked out an innovative procedure whereby the nearby ditch company and the city share the same water supply. The City makes first use of the water and then returns it to the ditch company's canals as treated effluent for re-use<sup>6</sup>. Water rights condemnation is another, although politically charged, alternative open to New Mexico cities. Even in this case compensation would have to be paid for condemned water rights obtained.

A second implication of the full appropriation condition for urban water institutions follows from the first one above. Namely, if additional water for urban use must come from existing uses, then the city will likely find itself in competition not only for the water itself but also for the basic values served by the water. Most existing water rights in New Mexico are held for irrigation farming. As water shifts from irrigation to urban uses, there will be a decline in the irrigated sector and a decline in the social values associated with the rural, agricultural way of life. This conflict is already evident in Colorado where large transfers of water rights out of irrigated agriculture have taken place and pressures to slow this transfer process have arisen.<sup>7</sup>

A final implication of the full appropriation condition is that urban water institutions must be more concerned with the efficient use of urban water. This implication holds for all water users, as well. If the water supply is fixed today, then continued economic development in water scarce

areas can only take place if the existing water is allocated to its highest valued uses. The economic marketplace and the price system allows for such an efficient allocation of resources. And there is some evidence that economic markets for water rights are becoming more sophisticated today.<sup>8</sup> For urban water institutions more efficient use of existing city water may forestall the future need to purchase additional water rights for expanding urban use. This concern for efficient use of water has implications for the pricing of urban water, as well. We will return to this topic at a later point.

### Economics of Urban Water Distribution

A municipal water system is a classic example used by economists to illustrate a "natural monopoly," where a firm's average cost of providing water services to urban customers reaches a minimum at an output rate that is large enough to satisfy the entire demand for water.<sup>9</sup> Were two firms allowed to supply water within the city, each would end up supplying a part of the market at higher average cost. Thus, a single firm or monopolist --the city water department or a private utility-- will end up providing the least-cost supply of water to urban residents.

Economies of scale in the acquisition, treatment and distribution of water are largely responsible for this outcome. Seasonal surface water flows must be impounded in reservoirs so that water will be available year round for urban water use; ground water must be pumped from aquifers below the surface. Prior to distribution the water must be treated to comply with the federal government's Safe Drinking Water Act. The water must then be distributed to thousands of urban customers by a series of underground pipes and lifting stations so that water is available on demand to every customer. Finally,

each customer must be metered and billed on a regular basis.<sup>10</sup> The economies of scale are most evident in the distribution system of pipes and lifting stations. It makes little sense (economic or otherwise) to have duplicate (smaller) pipes run down every street of the city rather than one large pipe that can service all customers. Economies of scale also exist in the construction of storage reservoirs, the size and operation of water wells, and the metering and billing of customers.

Declining average cost for urban water distribution, however, applies only for the present capacity in place. Once urban water demand begins to exceed established supply capacity, the city must undertake costly capacity expansion. Additional water rights may have to be purchased at considerable expense, as noted above; additional storage reservoirs must be built; ground water must be pumped from greater depths with associated higher pumping costs. As cities, originally developed along river valleys, now expand to the surrounding heights, distribution costs rise as water now must be delivered to higher elevations and to farther distances. Thus, in order to accommodate expanding population and water demand cities are faced with the choice of either costly increments to their existing water supply capacity or the more efficient use of their existing water supplies and distribution capacity.

#### Federal Environmental Regulations

There are two federal environmental regulations which have impacted urban water institutions in recent years. First of all, the Safe Drinking Water Act of 1971 issued standards relating to the clarity, turbidity and chemical treatment of drinking water. This regulation impacts mostly those cities dependent upon surface water as a source of city water, and requires

expensive treatment of water before it enters the distribution system. Ground water requires less treatment because of the natural filtration which occurs as the water seeps into the water table. Santa Fe is one New Mexico city which uses surface water for part of its city water. The Public Service Company of New Mexico, which operates the Santa Fe water system, was required to install a \$5 million treatment facility in 1971 in order to comply with the regulation.<sup>11</sup>

The other federal environmental regulation which is a concern to urban water institutions is the Federal Water Pollution Control Act Amendments of 1972--Public Law 92-500. While on the surface this act pertains to federally funded sewer treatment facilities, it may impact urban water pricing because of its requirement that each user (of city sewer systems) pay its proportionate share of the operations, maintenance and replacement costs of the sewerage facilities receiving a federal grant.

Many cities, e.g., Albuquerque, provide both water and sewer services to customers. The pricing structure for water and sewer services are generally dependent, i.e., the charge for sewer bears some relation to water used. And the present level of the water charge and the sewer charge may not reflect the actual cost of separate water and sewer services. In the case of Albuquerque it was found that revenue from water rates exceeded the actual cost of water delivery while sewer charges did not cover the actual cost of sewer services. However, the combined charges from water and sewer were sufficient to cover the combined costs of water and sewer. In other words, Albuquerque water revenues subsidized sewer operations. Under PL92-500 this is not allowed. In Albuquerque, this was a major factor for the recent revision in City water rates.<sup>12</sup>

The implications of these federal environmental regulations for urban water institutions are obvious. The Safe Drinking Water Act requires city water to be treated to a standard, necessitating costly water treatment facilities. These costs must ultimately be recouped through the water rate structure. Compliance with the Safe Drinking Water Act also substantially increases the cost of future capacity expansion, as well. P.L. 92-500 will impact those urban water institutions which also supply sewer services and use a joint water-sewer customer billing procedure. In those cases, the separate cost of providing sewer services must be determined and the sewer and water rates restructured so that sewer revenues recover sewer costs.

#### Uncertainty of Water Rights

To complete this description of the environment within which urban water institutions operate, some mention should be made of the outstanding claims to water that exist under the Winters doctrine for Indians and the reserved rights doctrine for the federal government. The decade of the seventies has seen the steady strengthening of Indian assertions of rights to water, land, and other natural resources. Since, as a matter of treaty and statute, Indian affairs are almost exclusively within federal jurisdiction, resolution of Winters doctrine water rights requires federal action rather than resolution within the New Mexico water law of prior appropriation.

The question of federal reserve rights parallels the Indian Winters doctrine claim. With the substantial federal presence in New Mexico in national parks, forests and wilderness areas, federal laboratories and military reservations, it was inevitable that as activity within these installations grew, their demand for water (implicit and unquantified



when these federal installations first were established) would become explicit and definite.

In both instances--Indian Winters doctrine rights and federal reserve rights--these new uses of water arrive after the water within the basin has already been fully appropriated by other users. This notion of implicit reservation of water is in clear conflict with the prior appropriation system of water law already in place within New Mexico. As future court decisions make these new claims to water more quantified, existing water users within fully appropriated basins may face reduced water supplies.

#### Efficient Water Use and Urban Water Pricing

Twice above it was mentioned that one solution to the problems confronting urban water institutions is the more efficient use of existing water supplies and capacity. In order to forestall the need to acquire costly water rights or to make costly capacity expansion, expanding urban water use can be accommodated by using existing supplies and capacity more efficiently. By efficiency here we mean, "doing more with the same or less input." Directly applied to the urban water situation, efficiency means providing water services to an expanding urban population with the same amount of water supply and capacity. This obviously must imply a reduction in per capita water use or demand.

Per capita water demand can be reduced by a variety of methods. Water can be strictly rationed with prohibitions on certain water activities such as lawn sprinkling and car washing; water conservation can be encouraged affecting people's attitude toward water use by media campaigns, landscape restrictions, and construction codes concerning water-using appliances; or the pricing mechanism can be used to restrict the demand for water. At

higher and higher prices for water, customers will begin to voluntarily reduce their water demand.

Of course, resorting to the pricing mechanism assumes that water demand does respond to price changes. Economists refer to this as the elasticity of demand. If demand is inelastic, there will be little reduction in water demand as price increases; if demand is elastic on the other hand, there will be a large reduction in water demand as price increases. The actual elasticity is subject to empirical testing.

Some recent studies by economists have shown that the demand for municipal water is sensitive to price. Howe and Linaweaver<sup>13</sup> estimated the elasticity of demand for two categories of residential water use: in-house domestic use and summer sprinkling use. They found that, while the demand for domestic water use was not sensitive to price, the demand for summer sprinkling use was. Hanke studied the effect on residential water demand due to the installation of meters in Boulder, Colorado.<sup>14</sup> Metering had the impact of now imposing a price to the customer for additional water consumption. The initial effect of the metering was a substantial decrease in both domestic and sprinkling water demand. After awhile however, the decreased domestic use demand stabilized while the demand for sprinkling water continued to decrease. The Public Service Company of New Mexico (PNM) has conducted demand elasticity studies of its Santa Fe and Las Vegas, New Mexico service areas. PNM found that residential winter water use (base domestic use) was not sensitive to price; however residential summer water use (includes lawn sprinkling use) showed some responsiveness to price changes.<sup>15</sup> All of these studies indicate that some categories of water use are sensitive to price and that there is some expectation that

water pricing can be a successful policy tool to use existing city water supplies more efficiently.

In the past urban water institutions have been most concerned with alternatives for increasing water supplies. This concern was based on the notion that water is a necessity and must be provided without regard for cost (or price). This concern also implies that the demand for urban water is inelastic. Water demands are viewed as fixed requirements, not sensitive to the price charged. As these water demands grow, they must be met by constructing additional water supply capacity.<sup>16</sup>

Historical pricing methods used by urban water institutions also have followed from the notion that demand is inelastic. Pricing of urban water has been oriented toward recovering the costs of providing water services, i.e., average cost pricing. And since average costs declined as water usage increased using the existing capacity, the rate structure was most often of a declining block rate nature where the price of additional water used declined.

If indeed the demand for water is somewhat elastic, this will have an important implication for urban water institutions in the future if traditional pricing practices are continued. As indicated before, future capacity expansion for most New Mexico cities will be very expensive. The average cost of water service will rise; therefore price will rise. If the demand for water responds to these price increases, projections of water usage upon which capacity expansion was planned may prove inaccurate resulting in over-expansion of capacity.

The declining block pricing structure also provides no incentive for water conservation. It signals the urban water user that water is cheap;

the more you use, the less you pay. This results over time in deep-seated attitudes toward water use. For example, it shapes people's attitudes about excessive water use, choices with respect to exterior landscaping, and the installation of water-using appliances and fixtures in homes. These attitudes will be difficult to turn around where the new environment facing urban water institutions calls for more efficient water use and water conservation. Thus, attempts to use the water pricing structure to reduce demand are likely to meet strong public resistance in the future.<sup>17</sup>

### Marginal Cost Pricing and Economic Efficiency

Above we used a general definition of efficiency and indicated how water pricing can be used to provide expanding water services with the same supply of water. Economists have a more specific definition of efficiency which states that an allocation of resources is efficient when the price of each resource is equal to the marginal cost of the resource. Price represents the "value" per unit of the resource to the consumer. The marginal cost is the increase in the total cost to produce the last unit. When price exceeds the marginal cost, consumers obtain more "value" from consuming the last unit of the resource than it cost to produce it. Thus, society would be better off if more of the good were consumed. In order to encourage consumption, the price must be lower. On the other hand, if price is less than marginal cost, then the "value" of the last unit consumed is less than the costs of producing the last unit. Society would be better off if less of the good were consumed. In order to discourage consumption, the price must be raised. Only when price equals marginal cost will society be obtaining the maximum benefit from the consumption of a resource.

When the marginal cost of producing the last unit of water equals the average cost of providing water, the marginal cost pricing principle of the economist coincides with the average cost pricing methods of most urban water institutions. However, when average cost is declining, as it does with expanding use of existing water supply capacity, marginal cost is less than the average. In this case, average cost pricing results in a higher price charged for water and less water delivered to consumers than is socially optimal. However, as indicated before, when water supply capacity is strained and expansion must be made, this will result in significant cost increases for urban water institutions. That is, the marginal cost of producing extra water will exceed the average cost of the system. Under these circumstances average cost pricing results in too low a price charged for water and over-use of water. Marginal cost pricing offers not only a model for optimal resource allocation but also a pricing principle which will avoid the over-use of water and the need for costly water capacity expansion.

Marginal cost pricing has other applications for urban water institutions, some of which have already been adopted, as we shall see. The cost of delivering urban water is not the same for every customer. While it would be difficult to treat each customer separately, certain classifications of customers can be made where the cost of water delivery generally varies between customer classes. Marginal cost principles suggest that different prices should be set for different customer classes where the marginal cost of water varies. For example, water flow and pressure requirements of commercial and industrial water users may entail more costly water connections and pumping than for residential customers. Urban water use has

a seasonal and temporal pattern in most cities, with peak water demand occurring in the summer months and during the daylight hours. The marginal cost of water in the winter is simply the extra operating cost to treat and pump the water. In the summer the marginal cost is the extra operating cost plus capacity expansion costs necessary to accommodate expanding peak usage. This would suggest a summer/winter rate differential to reflect differences in marginal cost of seasonal delivery. A similar argument could be made for time of day usage, where rates should vary depending upon the time of the day water is used.

Distance and elevation are also factors in the cost of water delivery. Pumping costs are directly associated with the distance over and the elevation up which water must be pumped. Marginal cost principles suggest different water rates based upon these factors. In fact, such rate differentials were initially implemented in Tuscon, Arizona, but were abandoned after negative public reaction. A pressure zone surcharge was recommended to the City of Albuquerque; however, it was not implemented.<sup>18</sup>

### Santa Fe

The Santa Fe municipal water system is unique in two respects. First of all, since 1879 domestic water service to the City has been provided by a private company. Since 1946 the City has been served by Public Service Company of New Mexico (PNM) on a franchise basis with the customer's and the company's interests overseen by the New Mexico Public Service Commission. This is in contrast to most other New Mexico cities which provide their own water service through a city water department. Secondly, Santa Fe relies upon surface water for part of its water supplies unlike other cities which use groundwater exclusively.

Santa Fe is the third largest city in New Mexico with an estimated population in 1979 of 46,753. Table III-1 displays the population growth of Santa Fe since 1930 compared to the state of New Mexico as a whole. Santa Fe has grown nearly twice as fast as the state and has nearly tripled in the forty year span of 1930-1970. Since 1970 its population has increased another 13.6 percent. These population changes obviously have placed pressures on the demands for water use in Santa Fe. Coupled with the population increases has been an increase in the per capita water use.<sup>19</sup>

TABLE III-1  
SANTA FE AND NEW MEXICO POPULATION

<u>Year</u>	<u>Santa Fe</u>	<u>New Mexico</u>
1930	11,176	423,317
1940	20,325	531,828
1950	27,998	681,187
1960	33,394	954,000
1970	41,167	1,023,000
1930-1970 (% change)	268%	142%

Source: U. S. Department of Commerce, Bureau of the Census, Census of the Population.

The water supply for Santa Fe comes from three sources: the Santa Fe River surface flows, City wells and the Buckman well field along the Rio Grande. The Santa Fe River was the principle source of water for the City until 1946 when six wells were drilled within the City. In the late

1960s it was realized that these sources were insufficient to meet future water demand as the City and its population grew. The Buckman well field was then developed. It sits fourteen miles from the city at a 1,500 foot lower elevation than the City itself.

The City water system<sup>20</sup> has the right to 4,720 acre feet of water from the surface flows of the Santa Fe River; it has a permanent right to 4,800 acre feet from the City wells, although the present peak capacity of the wells is only 3,600 acre feet. In 1977, the City water system was granted a permanent pumping permit for the Buckman well field from the State Engineer for 10,000 acre feet. However, this permit requires that the State Engineer set the amount to be pumped each year. PNM also is required to retire certain water rights along three tributaries of the Rio Grande--the Pojoaque, Nambé and Tesque--to offset the impact of their pumping on surface right holders along the Rio Grande. The present estimated pumping capacity of the Buckman well field is 5,000-6,000 acre feet. All three sources then provide Santa Fe with an estimated annual water supply of 13,320-15,000 acre feet.

The Santa Fe City Planning Department has made projections of future City water demand. They are presented in Table III-2. These projections are based upon a continued trend in both population and per capita water demand. Their analysis indicates that Santa Fe would run out of water by 1985, assuming a dry year requiring 20 percent more water than during an average year.



TABLE III-2

## PROJECTED SANTA FE WATER DEMAND

<u>Year</u>	<u>Population</u>	<u>Per Capita Demand</u>	<u>Average Year Demand</u>	<u>Dry Year Demand (20%)</u>
1980	53,300	190 gpc/day	11,300 A.F.	13,560
1985	59,400	193	12,800	15,360
1990	66,200	195	14,500	17,400
1995	73,800	198	16,400	19,680
2000	82,300	200	18,400	22,080
2005	91,800	203	20,900	25,080

Source: Santa Fe City Planning Department Water Demand Projections, 1976.

Santa Fe water demand is also characterized by a summer peak. The ratio of maximum summer day use to average day use is 2 to 1. To meet this peak demand PNM now utilizes the Buckman well field. This is PNM's most costly source of water since the water must be pumped 14 miles to the City and lifted over 1,500 feet. During recent years PNM may utilize the Buckman well field for only 30 days during the summer.<sup>21</sup> When one considers that it cost over \$6 million to develop the Buckman well field, in addition to its high operating costs, this expansion of capacity to meet peak demand for 30 days a year is remarkable.<sup>22</sup>

Pressures in Santa Fe on water pricing began to build in the early 1970s. The growing population's demand for water forced PNM to turn to the Buckman well field for additional water supplies. As mentioned previously, it was costly to develop these wells and costly to operate them because of the distance and elevation difference between the well field and Santa Fe. The Safe Drinking Water Act of 1971 required more expensive treatment of Santa Fe's surface water supplies, necessitating the construction of a

\$5 million treatment plant. PNM began incurring a deficit from its Santa Fe water operations and in July, 1976 requested a water rate increase. Prior to this, this water rate structure in Santa Fe has remained essentially unchanged, although the rates themselves have increased over time.<sup>23</sup>

Table III-3 shows the water rate structure before November 4, 1976 when the requested rate increase went into effect. The rate structure included a fixed minimum amount, which included the first 2,300 gallons of water consumption and a slight residential/commercial differential, and a declining block rate. As water usage increased, the price per 1,000 gallons decreased. On November 4, 1976 PNM implemented a rate increase which was in effect only seven months until May 31, 1977. See Table III-4. This rate change raised the fixed minimum charge for both residential and commercial customers, excluded the first 2,300 gallons of water use from the payment of the minimum charge, differentiated the minimum charge by diameter size of the hook-up, and raised the declining block rates for additional water consumption. However, the declining block rate structure was maintained.

On June 1, 1977 PNM again changed the rate structure. This rate change was more dramatic and innovative. The minimum system charge by diameter size of the hook-up and residential/commercial difference was maintained, as was the declining block rate. However, the water usage rate varied by season. It was approximately 20 percent higher during the summer season when the peak demand occurred. See Table III-5. This was a recognition of the high marginal cost of operating the Buckman well

TABLE III-3

SANTA FE CITY WATER RATES, MONTHLY  
(before November 4, 1976)

Residential

Minimum bill (includes first 2,300 gallons)	\$2.40
First 3,000 gallons (less minimum)	1.05/1,000 gallons
Next 7,000 gallons	0.85/1,000 gallons
Next 30,000 gallons	0.73/1,000 gallons
Over 40,000 gallons	0.60/1,000 gallons

Commercial

Minimum bill (includes first 2,300 gallons)	\$3.50
First 3,000 gallons (less minimum)	1.05/1,000 gallons
Next 7,000 gallons	0.85/1,000 gallons
Next 30,000 gallons	0.73/1,000 gallons
Over 40,000 gallons	0.60/1,000 gallons

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Source: General Water Service, Santa Fe, Schedule No. 5, Public Service Company of New Mexico.

TABLE III-4

SANTA FE WATER RATES, MONTHLY  
(November 4, 1976-May 31, 1977)

<u>Meter or Service Diameter Size</u>	<u>Residential Minimum Charge*</u>	<u>Commercial Minimum Charge*</u>
5/8"	\$ 2.96	\$ 4.32
3/4"	3.70	4.92
1"	6.17	6.17
1 1/2"	9.25	9.25
2"	12.33	12.33
3"	15.42	15.42
4"	18.50	18.50
6"	37.00	37.00
8"	61.66	61.66
Plus: First 3,000 gallons		\$1.29/1,000 gallons
Next 7,000 gallons		1.05/1,000 gallons
Next 30,000 gallons		0.90/1,000 gallons
Over 40,000 gallons		0.74/1,000 gallons

\* Does not include any minimum usage.

Source: General Water Service, Santa Fe, Interm Schedule No. 5, Public Service Company of New Mexico.

TABLE III-5

SANTA FE WATER RATES, MONTHLY  
(June 1, 1977-September 30, 1979)

<u>Meter or Service Diameter Size</u>	<u>Residential System Charge*</u>	<u>Commercial System Charge*</u>
5/8"	\$ 3.00	\$ 6.00
3/4"	3.00	6.00
1"	5.00	6.00
1 1/2"	7.00	7.00
2"	10.00	10.00
3"	18.50	18.50
4"	28.50	28.50
6"	57.50	57.50
8"	77.50	77.50

Plus:

	<u>Residential</u>	
	<u>Winter**</u>	<u>Summer**</u>
First 5,000 gallons	\$1.49/1,000 gal.	\$1.79/1,000 gal.
Over 5,000 gallons	1.38/1,000 gal.	1.68/1,000 gal.
	<u>Commercial</u>	
First 8,000 gallons	\$1.25/1,000 gal.	\$1.55/1,000 gal.
Over 8,000 gallons	1.15/1,000 gal.	1.43/1,000 gal.

\* Does not include any minimum usage.

\*\* Winter months are January, February, March, October, November and December; Summer months are April, May, June, July, August and September.

Source: Residential and Commercial Water Service, Santa Fe, Schedule No. 5 and No. 7, respectively, Public Service Company of New Mexico.

TABLE III-6

SANTA FE WATER RATES, MONTHLY  
(October 1, 1979 to present)

<u>Meter or Service Diameter Size</u>	<u>Residential Minimum Charge*</u>	<u>Commercial Minimum Charge*</u>
5/8"	\$ 3.00	\$ 6.00
3/4"	3.00	6.00
1"	9.00	9.00
1 1/2"	13.00	13.00
2"	18.50	18.50
3"	33.50	33.50
4"	52.00	52.00
6"	105.00	105.00
8"	141.00	141.00

Plus:

	<u>Residential</u>	
	<u>Winter**</u>	<u>Summer**</u>
First 5,000 gallons	\$1.72/1,000 gal.	\$3.09/1,000 gal.
Over 5,000 gallons	1.37/1,000 gal.	2.73/1,000 gal.
	<u>Commercial</u>	
First 8,000 gallons	\$2.20/1,000 gal.	\$2.61/1,000 gal.
Over 8,000 gallons	1.67/1,000 gal.	2.07/1,000 gal.

\* Does not include any minimum usage.

\*\* Winter months are January, February, March, October, November and December; summer months are April, May, June, July, August and September.

Source: Advice Notice No. 55, Public Service Company of New Mexico.

field to meet the summer peak and an attempt to use price as a means to reduce consumption during this summer peak season. This new rate structure remained in effect until September 30, 1979. On October 1, 1979 PNM implemented new water rates. See Table III-6. However, the major effect of these new rates was to raise substantially the summer water usage rates.

The effects of these water rate increases on the water bill of a typical household in Santa Fe are shown in Table III-7. This assumes a winter usage of 6,100 gallons and a summer usage of 16,700 gallons. These figures do not represent an average bill because they assume no demand elasticity as the price of water was increased over this period. The level of these rate increases have been dramatic. Winter water rates have increased 110.43 percent since November 4, 1976; however, summer water rates have increased 242.56 percent. The latest increase in summer rates will not be felt by Santa Fe residents until April, 1980.

TABLE III-7  
TYPICAL RESIDENTIAL WATER BILL

	<u>Winter</u>	<u>Summer</u>
Pre-November 4, 1976	\$ 6.23	\$14.71
November 4, 1976-May 31, 1977	10.09	20.21
June 1, 1977-September 30, 1979	11.97	31.61
October 1, 1979 to present	13.11	50.39
% change	110.43%	242.56%

The impact of these water rate increases can also be seen on the level of peak water usage in Santa Fe. Peak summer water usage reached a maximum in 1974 at 16.4 million gallons per day and has declined every year since. In 1978 the peak demand was 11.7 million gallons per day--

a 28.7 percent decrease.<sup>24</sup> While all of this decrease in peak usage cannot be attributed to the water price increases (since no control for weather conditions between 1974 and 1978 is made), it certainly seems reasonable to assume that the dramatic price increases are having some impact on water usage. Remember too that the number of water customers was increasing during this period of declining peak usage.

PNM now estimates that the present water system capacity is good for 20 years or more until the year 2000. Compare that to the earlier estimate of 1985 by the Santa Fe City Planning Department (done in 1976 before the price increases) whose analysis assumed a continuation of the increasing trend in water usage rather than the actual decline experienced with the rate increases.

### Albuquerque

Albuquerque's city water system is operated and managed by the city's Water Resources Department. The City's water supply comes exclusively from ground water sources and includes 18,700 acre feet of vested water rights and potentially 48,200 acre feet of San Juan-Chama Diversion water. Water consumption for Albuquerque in 1979 was approximately 43,000 acre feet so that the city faces no immediate water supply problems.

However, Albuquerque has experienced continued rapid growth in population for many years. Table III-8 displays the population for Albuquerque since 1930. Between 1930 and 1970 Albuquerque's city population increased a phenomenal 817.4 percent compared to overall state population growth of 142 percent. In 1977 Albuquerque's population was estimated at 291,187 a 19.5 percent increase since 1970.



TABLE III-8  
ALBUQUERQUE AND NEW MEXICO POPULATION

<u>Year</u>	<u>Albuquerque</u>	<u>New Mexico</u>
1930	26,570	423,317
1940	35,449	531,818
1950	96,815	681,187
1960	201,200	954,000
1970	243,751	1,023,000
% increase	817.4%	142%

Pressures on Albuquerque's water pricing have come from two primary sources. First of all, in order to accommodate the rapid increase in population, which is anticipated to continue, the City must expand the present capacity of the water system. Albuquerque expects to double the value of the water distribution system in the next six years.<sup>25</sup> This expansion will require additional borrowing by the City to finance the associated construction. Debt service of the Water Resources Department is expected to increase by 149 percent between FY 79 and FY 83.<sup>26</sup> By City ordinance the surplus of water revenues minus system operating costs must be 133 percent of current debt service.<sup>27</sup> This requirement, coupled with the increasing debt service of capacity expansion, will insure future water rate increases.

The second pressure on Albuquerque's water pricing has been P.L. 92-500. This federal law requires that the maintenance and operation costs of any sewer treatment facilities financed with federal money under the Federal Water Pollution Control Act Amendments of 1972 must be recovered through sewer charges.<sup>28</sup> Albuquerque has secured such financing for its new sewer

treatment plant. However, until December, 1978 water and sewer charges to customers were combined. The City was required to determine whether its present sewer charges were adequate to recover the full cost of sewer operations.

In November, 1977 Albuquerque commissioned a study by Arthur Young and Company and Boyle Engineering Corporation to make this determination, as well as to recommend water rate changes in light of the need to increase water revenues. Their analysis found that water revenues were subsidizing sewer operations. In order to comply with P.L. 92-500 the City would have to restructure both water and sewer rates.

In the area of water rates the Arthur Young/Boyle Engineering study recommended a rate structure which included a fixed minimum system charge and two alternatives for water usage or commodity charges. The recommended fixed minimum system charge did not include any minimum usage of water and was differentiated with respect to meter size and four customer classes (residential, commercial, industrial and institutional) reflecting differing fixed costs in delivering water to those customers. The existing water rates at the time included a fixed charge, but made no differentiation for customer class and included a minimum water usage. See Table III-9.

Two alternatives for water usage charges were presented. One was a constant water use charge to all customers based on the assumption that there are few economies of scale associated with the variable costs of production and that the average cost equaled the marginal cost. The other alternative was a variable user charge based on the pressure zone of

residence or business. This alternative was based on the recognition that customers living in higher elevation areas should bear the extra cost of pumping water to their pressure zone.

The existing water rates at the time included a declining block rate structure and a summer gardening discount rate. The first 120 units (1 unit equals 100 cubic feet) cost \$0.33 per unit, while units over 120 cost only \$0.28 per unit. The summer discount was 20 percent applied to the water bill in excess of the median winter water bill. See Table III-9.<sup>29</sup>

On December 1, 1978 the City implemented a new water rate structure. They accepted the Arthur Young/Boyle Engineering report recommendation concerning the fixed system charges. Four customer classes were recognized and the minimum water usage was excluded. The City also implemented a constant water usage or commodity charge of \$0.31 per unit for all customers. See Table III-10. The previous declining block rate structure was abandoned as was the summer gardening discount.

On December 1, 1979 an additional water rate change was implemented. This change affected principally summer water use.<sup>30</sup> During the months of April through November, water usage in excess of 250 percent of mean winter usage will be charged a \$0.20 surcharge, or \$0.51 per unit for all customers. See Table III-11.

The new water rate structure in Albuquerque--particularly the water usage charges--reflected a growing awareness of the impact of water pricing on water use, peak water use and the need for costly capacity expansion.

TABLE III-9

ALBUQUERQUE WATER RATES  
(January 1, 1977-December 1, 1978)

<u>Meter Size</u>	<u>Fixed Charge</u>	<u>Minimum Water Usage Included in Fixed Charge</u>
5/8"-3/4"	\$ 2.50	4 units
1"-1 1/4"	4.50	5
1 1/2"	9.75	10
2"	25.00	30
3"	42.00	48
4"	75.00	72
6"	125.00	92
8" or over	192.00	100

Water Usage or Commodity Charge

First 120 units - \$0.33/unit  
Over 120 units - \$0.28/unit

Summer discount of 20 percent applies to water bill in excess of median water bill calculated for months of November through March; however, no discount applies to usage over 120 units or outside city limits.

Unit = 100 cubic feet

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Source: Chapter 8, Article 5, Revised Ordinances of Albuquerque, New Mexico, Ordinance 10-1976, April 12, 1976.

TABLE III-10

ALBUQUERQUE WATER RATES  
(December 1, 1978-November 30, 1979)

Fixed Monthly Charge

<u>Meter Size</u>	<u>Residential</u>	<u>Commercial</u>	<u>Industrial</u>	<u>Institutional</u>
3/4"	\$2.50	\$ 2.50	\$ 2.50	\$ 2.50
1"	4.50	4.50	4.50	4.50
1 1/4"	4.50	4.50	4.50	4.50
1 1/2"	9.75	9.75	9.75	9.75
2"	--	25.00	25.00	25.00
3"	--	42.00	42.00	42.00
4"	--	75.00	75.00	75.00
6"	--	125.00	125.00	125.00
8" or over	--	192.00	192.00	192.00

Water Usage or Commodity Charge

\$0.31 per unit (unit equals 100 cubic feet) for all customers.

Source: Council Bill No. F/S 0-81, City of Albuquerque.

TABLE III-11

ALBUQUERQUE WATER RATES  
(December 1, 1979 to Present)

Meter Size	Residential	Fixed Monthly Charge		Institutional
		Commerical	Industrial	
3/4"	\$2.50	\$ 2.50	\$ 2.50	\$ 2.50
1"	4.50	4.50	4.50	4.50
1 1/4"	4.50	4.50	4.50	4.50
1 1/2"	9.75	9.75	9.75	9.75
2"	--	25.00	25.00	25.00
3"	--	54.63	58.55	65.35
4"	--	84.75	90.83	101.38
6"	--	140.89	151.00	168.53
8" or over	--	304.41	326.41	364.50

Water Usage or Commodity Charge

Winter\*: \$0.31 per unit (unit equals 100 cubic feet) for all customers.

Summer\*: \$0.31 per unit for usage  $\leq$  250 percent mean winter usage.  
\$0.51 per unit for usage exceeding 250 percent mean winter usage for all customers.

\* Winter months are December, January, February and March.  
Source: Council Bill F/S 0-81, City of Albuquerque.

The old declining block rate and the summer gardening discount encouraged excess water use, particularly during the summer peak. Since water system capacity must be built to meet peak day demand, this price structure was clearly disadvantageous. Also, peak water use forced the City to pump water from deeper depths and from inefficient wells necessitating higher electric utility charges and operating costs. The cost of peak water use was clearly higher than average. Yet the old water price structure charged a lower price for its use. The new water rates, which will not have an impact until the summer of 1980, should go far towards restraining peak water demand and hence the need for capacity expansion. Also, peak water users will be paying closer to the true operating costs of delivering water during peak periods.

One additional change in water pricing policy was also made in December, 1978. Prior to this, Albuquerque levied no water utility hook-up charge to new customers. The cost of new capacity which enabled these new hook-ups was borne by all customers. In December, 1978 Albuquerque implemented a utility expansion charge to be paid at the time of meter sale for each connection to the water system. All monies collected through the imposition of the utility expansion charge are used to retire bonds sold to finance expansion of Albuquerque's water system.<sup>31</sup> This has the effect of placing more of the cost of adding extra capacity on the new user. Table III-12 presents the current expansion charges.

One final action by the city Water Resources Department should be noted. During the summer of 1979 the city implemented a voluntary water even/odd program. Residences with even street numbers were encouraged to

TABLE III-12  
UTILITY EXPANSION CHARGE

<u>Water Meter Size</u>	<u>Water Service Charge</u>
3/4"	\$ 400
1"	500
1 1/4"	600
1 1/2"	1,250
2"	3,400
3"	10,575
4"	16,400
6"	27,250
8 1/2"	58,900

water only on even numbered days; residences with odd street numbers on odd numbered days. This was an attempt to reduce peak water demand during the summer months and to save energy.

In FY 79, 47.4 percent of the total operating costs of the Water Resources Department were electric utility costs for pumping water. And the deeper the City must pump from its wells, the higher the utility bill. During peak demand periods the City is forced to pump from deep or inefficient wells. By attempting to reduce the peak demand by a water even/water odd program the City would save utility costs, energy and reduce the marginal cost of providing water. The success of the program is uncertain. Peak day demand did fall in 1979 to 142 million gallons from 157 million in 1978. However, 1979 was a wet year and all of the decline cannot be attributed to the water even/water odd program.

Because utility charges are such a large portion of the operating costs of the City's water system, the water department is also pursuing a time of day pricing system with the Public Service Company of New Mexico (PNM). Under such a plan PNM would charge the City lower electric



rates during non-peak hours (during the night); at this time the City would pump water from its wells in excess of needs and store it in a reservoir for use during peak water demand periods. Obviously, the trade-off between reservoir storage costs and lower electric utility charges must be determined. It is being actively pursued and represents an innovative scheme between two utilities both with peak pricing and capacity problems.

### Belen

The City of Belen was incorporated in 1918 and had a 1977 population estimated at 6,023. Belen is located 30 miles south of Albuquerque along the Rio Grande. The source of Belen water is four wells, three with a production capacity of 750 gallons per minute and one with a capacity of 150 gallons per minute. The latter is used as an emergency standby well.<sup>32</sup> The City also has two water supply tanks for storage. In July, 1977, Belen expanded their water supply capacity almost two times with the construction of a new well and storage tank. City water policy is the responsibility of five elected city council members.

Belen has not experienced the rapid growth in population as was the case with Albuquerque and Santa Fe. Table 3-13 displays Belen's population since 1930. While the state's population as a whole grew 142 percent from 1930-1970, Belen's population increased only 127.9 percent. This should be compared also to the 817 percent and 268 percent population increases experienced by Albuquerque and Santa Fe, respectively. Thus, the pressures on the water supply and the institutions which govern urban water in Belen are not of the same magnitude as in Albuquerque or Santa Fe.

TABLE III-13

POPULATION OF BELEN, NEW MEXICO  
1930-1970

<u>Year</u>	<u>Belen</u>	<u>New Mexico</u>
1930	2,116	423,317
1940	3,038	531,818
1950	4,495	681,187
1960	5,031	954,000
1970	4,823	1,023,000
% change	127.9%	142%

According to the Belen City Manager, Belen is experiencing no present water supply constraints and City water capacity is adequate to meet the City's need for the next 25 years at present rates of growth.<sup>33</sup> During the 1960-1970 period water rates increased by approximately 20 percent. Between 1970 and 1979 there were no increases in water rates. In the summer of 1979 Belen raised water rates. However, this was an effort to avoid municipal insolvency. The City's general operating fund as of January 31, 1979 was operating at a \$82,000 deficit, including a \$8,200 deficit in the water department. The New Mexico Department of Finance and Administration advised the City that water, sewer and garbage collection rates should be raised. The water rate increase in 1979 was motivated more by general fiscal considerations than by actual water capacity or supply conditions.

While the water rates were increased, there was no change in the basic water rate structure.<sup>34</sup> The water rate structure in Belen is a fixed amount (including the first 3,000 gallons of water usage) plus a water commodity charge for usage over 3,000 gallons which is of the

declining block rate type. That is, the charge per gallon for additional gallons declines in the winter with increasing amounts of water consumed. There is a lower constant summer rate to encourage watering of lawns and gardens. There is also no differential between customer classes such as residential, commercial and industrial water users.

This rate structure is illustrated in Table III-14. The present rate structure encourages excessive water usage by charging a lower price for high volume water use. The peak demand for water in Belen occurs during the summer months. Yet the rate structure has no economic incentive to reduce water usage during the peak period. On the contrary, summer water rates are actually lower than winter rates. It should be noted, however, that the recent water rate increase was felt most heavily in the summer. The water commodity charge in the summer increased 36 percent. In the winter the increase was higher for high volume water users; it was only a 6 percent increase for usage under 10,000 gallons, but 22 percent for usage over 10,000 gallons.

Unlike Albuquerque and Santa Fe, Belen is not now facing water supply/capacity constraints. Capacity is adequate for the next 25 years given the expected rate of water demand growth. Thus, there is no pressure on the City to discourage peak water usage or water demand in general by modifying the water pricing structure. Belen's water rate structure of declining block rates and lower summer rates have traditionally been in place in most Southwestern cities. It is only when these cities are faced with costly capacity expansion, as is the case with Albuquerque and Santa Fe, that the pricing structure is used to reduce water consumption.

TABLE III-14

## BELEN WATER RATE STRUCTURE (Within City)

<u>Gallons</u>	<u>Before March 5, 1979</u>	
	<u>Winter</u>	<u>Summer</u>
First 3,000 (fixed)	\$4.50	\$4.50
3,001-10,000	0.60/1,000 gals.	0.33/1,000 gals.
10,001 and over	0.45/1,000 gals.	0.33/1,000 gals.
	<u>After March 5, 1979</u>	
First 3,000 (fixed)	\$5.50	\$5.50
3,001-10,000	0.66/1,000 gals.	0.45/1,000 gals.
10,001 and over	0.55/1,000 gals.	0.45/1,000 gals.

Source: Water Department, City of Belen, Ordinance No. 380.

## Los Luñas

The village of Los Lunas was incorporated in 1928 and had a 1977 population of 1,280. Los Lunas is situated along the Rio Grande approximately 20 miles south of Albuquerque. The source of the village's water is groundwater. It owns three wells which can provide up to 1.7 million gallons of water per day. Los Lunas also has two water tanks for storage, with a combined capacity of 515,000 gallons.

The growth in Los Luna's population has also been less than that experienced by the state as a whole. Table III-15 presents these data. Between 1930 and 1970 the Village has grown only 89.6 percent compared to the state's 142 percent. 1977 population is approximately 31.5 percent above 1970 levels indicating some significant population increases in the 1970s.

TABLE III-15  
POPULATION OF LOS LUNAS  
1930-1970

<u>Year</u>	<u>Los Lunas</u>	<u>State</u>
1930	513	423,317
1940	686	531,818
1950	889	681,187
1960	1,186	954,000
1970	973	1,023,000
% change 1930-1970	89.6%	142%

According to the Los Lunas City Clerk,<sup>35</sup> the Village has water rights in 1978 to 181,332,000 gallons per year plus 107,000,000 additional gallons per year (400 acre feet) leased from the San Juan-Chama Diversion Project. This gives the village a total water supply of 288,332,000 gallons per year. 1978 water usage was 170,000,000 gallons. Thus, the

Village faces no present shortage of water supplies. However, the number of gallons pumped in 1978 represented a 41.5 percent increase over 1977 reflecting a sizeable increased demand for water. The City Clerk expressed the fear that the future growth of the Village might result in the need to obtain additional water rights. Strong growth was experienced in the last five years because of new housing developments and City annexation of surrounding areas. In fact, Los Lunas recently has received approval from the U. S. Department of Housing and Urban Development of a Community Development Block Grant to construct an additional well.

Water rates in Los Lunas were last raised in 1977. The rate structure includes a fixed monthly charge, which is differentiated by some customer classes and which includes some minimum usage of water, and a constant water usage or commodity charge to all customer classes of \$0.50 for water consumed above the minimum. Table III-16 displays the water rate structure for Los Lunas, which has remained unchanged over the years.<sup>36</sup>

This rate structure with its constant water usage charge (after the minimum usage) does not make water cheaper as usage increases. Unlike the declining block rate then, it does not encourage excess water usage. Nor does Los Lunas price water more cheaply during the summer peak season, as Belen does. This basic rate structure has been in effect since at least 1960, although the minimum fixed charge has been raised several times since then.

For the moment the water supply situation in Los Lunas is stable. Adequate water supply and capacity exists. However, Village officials

TABLE III-16  
 WATER RATE STRUCTURE, LOS LUNAS, NEW MEXICO  
 (1977 to Present)

	<u>Fixed Charge</u>	<u>Commodity Charge</u>
Residential, Commercial, Apartments	\$ 5.25 (includes 1st 3,000 gals.)	\$0.50/1,000 gals.
Special Accounts County Court House	50.00 (includes 1st 3,000 gals.)	0.50/1,000 gals.
Laundry Commercial Establishments	5.00 (includes 1st 100,000 gals.)	0.50/1,000 gals.
Los Lunas Hospital and Training School	75.00	--
Los Lunas Consolidated Schools	5.25 per meter (includes 1st 3,000 gals.)	0.50/1,000 gals.

Source: Los Lunas, Water Rate Department.

are concerned about the recent increase in the Village's population and water service area. The Village was able to expand pumping capacity by means of a federal grant. Future water demand may put pressure on the Village water department to acquire costly water rights and to make costly capacity expansion. At that time the Village should consider using water pricing (e.g., winter/summer differential, increasing block rates) as a means to control demand for water and to forestall the need to provide costly water system expansion.

Concluding Remark: Belen and Los Lunas

Officials of both Belen and Los Lunas expressed the concern that their ability to raise water prices in the future was constrained. They believed that if the City or Village raised water prices high enough, residents would merely switch to alternative means of obtaining water at lower cost, i.e., drilling private wells. New Mexico water law allows an individual to drill one well for domestic usage and the water table along the Rio Grande is shallow enough so that drilling would not be expensive.

We gathered some data to test this hypothesis and to determine at what level of water rates it would be economical to switch to private well water. By talking to several firms that specialize in domestic water well drilling, we obtained the following information:

Cost of tank and pump, including electric hook-up	\$800.00
Drilling costs, 4" hole with plastic casing at \$8.00/ft.; for good water, average depth = 120 ft.	960.00
Average monthly electric cost to operate pump	\$3.00/mo.



We were told that a water pump has a service life of about seven years. The \$800.00 cost of the pump and tank was then amortized over seven years at a 9 percent rate of interest, yielding a required payment of \$158.95 per year or \$13.25 per month. The drilling costs were assumed to be a one-time cost and were amortized over 30 years at a 9 percent rate of interest, yielding a required payment of \$93.44 per year or \$7.79 per month. The monthly costs of a private well were estimated then as \$24.04:

Tank and pump	\$13.25
Drilling	7.79
Electric operating cost	<u>3.00</u>
	\$24.04

This compares to an average City water bill in Belen of \$7.48 in the winter (assuming 6,000 gallons used) and \$8.65 in the summer (assuming 10,000 gallons used); in Los Lunas, City water bills for comparable water usage would be \$6.75 in winter and \$8.75 in summer. Thus, current City water rates would have to be raised by more than three times before it would be economical for a resident of Belen or Los Lunas to switch to private well water.

### Conclusions

Urban water institutions today are facing a fast changing environment to which they must adapt. This changing environment is characterized by rapid increases in the demand for water arising from expanding populations and service areas, fully appropriated water basins implying water supply constraints, sharply rising costs associated with expanding water distribution capacity and federal environmental regulations which impose additional costs and even new water pricing structures on the water

system. It is argued here that one mechanism for dealing with this changing environment is the more efficient use of urban water by means of urban water pricing policy.

Four New Mexico cities were taken as case studies. The social and economic pressures on the urban water institutions in these cities were outlined and the adaptation to these pressures via the water pricing mechanism examined. Both Albuquerque and Santa Fe face to some degree all the pressures outlined above. Both cities also have had dramatic shifts in their urban water pricing policy, which in most cases represented a change in the direction of more efficient use of water. On the other hand, both Belen and Los Lunas are not now experiencing these changing social and economic pressures. While water rates in Belen and Los Lunas may have risen in recent years, these increases do not reflect the same dramatic shift in urban water pricing policy. Thus, to a limited extent it can be said that urban water institutions do adapt to their changing environment.

Santa Fe's demand for water in the 1960s was fast approaching the point where it would outstrip water supply and the capacity to deliver it. A new source of groundwater was developed in the Buckman well field along the Rio Grande. However, this source was 14 miles from the City and at a 1,500 foot lower elevation than the City. To develop, pump and deliver this extra water supply to Santa Fe was very expensive and this water is now used only during the summer peak demand period. Santa Fe also was required to build an expensive water treatment facility for its surface water supplies in order to comply with the Safe Drinking Water Act of 1971. Faced with the rising cost of treating and delivering

water, water rates had to be raised. However, water rates alone were not just raised; there was also a change in rate structure. Santa Fe moved away from a declining block rate structure for all seasons to a one with a winter/summer rate differential. Summer rates are now substantially higher than winter rates. It is during the summer months that water use reaches a peak, and capacity must be built to meet peak water demand. The higher summer rates, as many water demand elasticity studies have shown, will discourage water demand and reduce peak demand. The higher summer rates also recognize that the marginal cost of delivering water in the summer is higher than in winter because in addition to operating costs there are the extra costs of added capacity to meet an expanding peak. Thus, the summer/winter rate differential represent a major shift in water pricing policy in the direction of efficient water use. However, Santa Fe still maintains a declining block rate structure within the summer and winter water commodity charges. This serves only to make water cheaper with increasing use, and hence encourages excess (inefficient) water use.

Albuquerque has experienced rapid population growth in the past and this growth is expected to continue into the future. Population growth brings with it increased demand for urban water and expanding service areas. Hence, Albuquerque is faced with doubling the value of its existing water supply system over the next five years to accommodate anticipated growth. Albuquerque's water rate policy was also affected by P.L. 92-500 which requires that the City separately account for sewer and water costs and revenues.

In response to these social and economic pressures Albuquerque has also changed its water pricing policy. Rates have been raised, and the rate structure itself altered. Albuquerque initially moved away from a declining block rate structure to a constant rate structure. Then in December, 1979 Albuquerque's water rates imposed a summer/winter differential where summer water usage after a point is subject to a 64.5 percent surcharge. This new water rate structure is now more akin to an increasing block rate type. Water use in the summer will be more expensive and this should discourage water demand during the peak usage season. This should go far to reducing the ultimate capacity expansion that Albuquerque might have required in the absence of a change in water pricing policy. Thus, water efficiency in Albuquerque is being promoted through urban water pricing.

Neither Belen nor Los Lunas have experienced the significant social and economic environment pressures that Albuquerque and Santa Fe have. And because of this, the impetus to make dramatic shifts in water pricing policy has been absent. Water rates have increased to keep up with inflationary cost increases, and in Belen because of general fiscal conditions. Belen, however, still maintains a declining block rate structure and a summer discount to encourage green lawns and gardens. Los Lunas has a constant block rate and no summer/winter differential. In other words, neither Belen nor Los Lunas have undertaken dramatic changes in water pricing policy in the direction of more efficient water use.

### FOOTNOTES TO CHAPTER THREE

- 1 Dean E. Mann, "The Impact of Institutional Arrangements on Water Conservation Practices in the West: A Policy Analyses," Department of Political Science, University of California, Santa Barbara, mimeo, October, 1979, p. 1.
- 2 Besides a fixed and fully appropriated water supply, there are other forces acting on urban water pricing, e.g., the economics of urban water distribution, federal environmental regulations, and competing water users such as energy development, Indians and the Federal Government through reserved rights. These will be discussed at a later point.
- 3 Rahman Khoshakhlagh, F. Lee Brown and Charles DuMars, Forecasting Future Market Values of Water Rights in New Mexico, New Mexico Water Resources Research Institute Final Report, Project No. 3109-209, July, 1977.
- 4 Ibid., p. 101-102, Tables 5.5 and 5.6.
- 5 Fort Collins, Colorado, Code §112-66. Grant of water rights required.
- 6 Vision of Ballance-A City Eco System, Westminster, Colorado.
- 7 See, for example, The Colorado Water Study: Directions for the Future, Office of the Executive Director, Colorado Department of Natural Resources, Denver, Colorado, October, 1978.
- 8 John Tysseling, An Institutional Analyses of Water Rights Markets, unpublished M.A. Thesis, University of New Mexico, December, 1979.
- 9 Edwin Mansfield, Microeconomics: Theory and Application, W.W. Norton and Company, New York, 3rd edition, Chapter 10.
- 10 Metering is not always necessary where the charge to each user is a flat rate rather than a charge based upon water actually used.
- 11 Conversation with Michael Slota, Water Rate Specialist, Public Service Company of New Mexico, Santa Fe, November 13, 1979.
- 12 Arthur Young & Company and Boyle Engineering Corp, Special Draft Summary Report to City of Albuquerque, May 11, 1978.
- 13 Charles W. Howe and F.P. Linaweaver, Jr., "The Impact of Price on Residential Water Demand and Its Relation to System Design and Price Structure," Water Resources Research, III, No. 1, 1967.

FOOTNOTES  
(continued)

- 14 Steve H. Hanke, "Demand for Water Under Dynamic Conditions," Water Resources Research, VI, No. 3, 1970.
- 15 Conversations with Ms. Michelle Hymel, Senior Rate Analyst, Public Service Company of New Mexico, November 16, 1979.
- 16 See, for example, Steve H. Hanke and Robert K. David, "Demand Management Through Responsive Pricing," Journal of the American Water Works Association, LXIII, No. 9, 1971.
- 17 For a more extensive discussion of attitudes toward water use in Albuquerque see Peter A. Lupsha, Don P. Schlegel, and Robert U. Anderson, Rain Dance Doesn't Work Here Anymore, Division of Government Research, Institute for Applied Research Services, University of New Mexico, Albuquerque, New Mexico, December, 1975.
- 18 Arthur J. Young and Company and Boyle Engineering, op. cit.
- 19 Dr. Lee Wilson, Testimony before the New Mexico Public Service Commission, April 4, 1977.
- 20 It is unclear just who owns the water rights, i.e., the City or PNM. This matter is presently before the New Mexico Supreme Court.
- 21 Conversation with Mr. Michael Slota, Water Rate Specialist, Public Service Company of New Mexico, Santa Fe, New Mexico, November 13, 1979.
- 22 It should also be remembered that water from Buckman first became available in 1972. Since then price increases have dramatically reduced peak demand in Santa Fe and hence the need for this source of supply.
- 23 See Alan Randall and Joe Dewbre, Inventory of Water Diversions and Rate Structures for Cities, Towns and Villages in New Mexico, Agricultural Experiment Station Research Report 241, New Mexico State University, October, 1972.
- 24 Conversation with Michael Slota, Water Rate Specialist, Public Service Company of New Mexico, November 13, 1979.
- 25 Conversation with Mr. James Gill, Water Resources Department, City of Albuquerque, September 5, 1979.
- 26 Arthur Young and Company and Boyle Engineering Corporation, op. cit., Table II-10.
- 27 Council Bill No. F/S 0-81, Section 2, C.
- 28 P.L. 92-500, Section 204 of Federal Water Pollution Control Act of 1972: each user must pay its "proportionate share of the costs of operation and maintenance, including replacement of waste treatment."

FOOTNOTES  
(continued)

- 29 See Randall and Dewbre, op. cit., for Albuquerque water rates in 1970.
- 30 The level of the fixed system charge was raised for some nonresidential customers with larger meter sizes.
- 31 Council Bill No. F/S 0-81, City of Albuquerque, Section 5, p. 23.
- 32 Micha Gisser, et. al., AGUA Financial Analysis, report prepared for U.S. Corps of Engineers, Albuquerque District, July, 1978.
- 33 Conversation with Mr. Richard Aragon, Belen City Manager, Spring, 1979.
- 34 See Randall and Dewbre, op. cit., for the Belen water rate structure in 1970.
- 35 Conversation with Mr. Augustine Archuleta, City Clerk, Los Lunas, New Mexico, Spring, 1979.
- 36 See Randall and Dewbre, op. cit., for the Los Lunas water rate structure in 1970. It is essentially the same as in 1979 except for different rate levels.

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