Back to the Future: A Willingness to Play Reexamined

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As the Central Arizona Project is being completed and contracts are being negotiated, economic analysis continues to show that neither agriculture nor municipalities would benefit from the project if repayment actually is required according to previously suggested schedules. Earlier analyses were either ignored or condemned as farmers were willing to play a water development game in the face of uncertain future repayment requirements. The game of playing for subsidized water continues even as the buyers now face real costs rather than just some future possibility of incurring costs. Recent analysis is being used to help negotiate favorable delivery and repayment contracts. Experience has shown that once the physical development is in place, costs are negotiable.

Key words: irrigation development, repayment strategies, water development.

Six years ago in this *Journal,* Martin, Ingram, and Laney developed the concept of "willingness to play" the water development game. For years, Arizona farmers have supported a plan to bring additional surface water to Arizona despite the potential enormous repayment costs. The farmers were ignoring the potential costs for which they had no particular "willingness to pay" and were simply keeping their options open at no cost.

Other authors have documented the general experience that once water actually is conveyed to a community, local interests will have a great deal of control over the conditions and amount of project repayment (e.g., Young 1978; Maass and Anderson; Mille and Underwood). In Arizona, the new water currently is beginning to be available and payment has become a real issue. In this article the continuing game is examined.

History of the Project

The Central Arizona Project, currently under construction by the U.S. Bureau of Reclamation, will develop the last remaining surface water supply available to the state. The project will transport an allotted 1.2 million acre-feet of Colorado River water from Arizona's western border to the central agricultural and metropolitan areas.[1] Water reaching the Tucson area, at the terminus of the canal, will have traveled 300 miles and been pumped 2,000 feet uphill through a series of fourteen pumping plants. Construction is nearing completion. Some water has already been delivered to the Phoenix area. Water should reach the Tucson area by 1991.

The project has been a long time in coming. It was conceived originally in the early 1920s as a way to develop Arizona through expansion of agricultural acreage. But, by the time of its authorization in 1968, the declining water table in the groundwater pumping areas of the state had turned it into an agricultural rescue project. No new areas of land could be irrigated, but agriculture would be "rescued" by having surface water to use instead of groundwater that was perceived as becoming more expensive as the groundwater table fell. An important condition in the authorization act was that for every acre-foot of CAP water de-

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[1] The canal is being built with an annual capacity of 2.0 million acre-feet. Arizona's unused allotment from the Colorado River is 1.2 million acre-feet. More water actually will be available in the early years of project, and less will be available later.

livered for irrigation, one less acre-foot of groundwater could be pumped.

By the late 1970s the CAP was being viewed more and more as a rescue project for the growing nonagricultural economy. Agriculture will still be a water recipient, but the quantities received will be reduced as the state's population grows. Under the current plan, in the early years of the project much of the water will be delivered to agriculture since there will be too much water available to be all used by nonagriculture. In the later years of the project, as municipal and industrial uses grow, a much smaller quantity will be available for irrigation. Individual irrigation districts will not own a given water quantity but will contract for a percentage of the water declared to be available for agriculture. The total agricultural allocation will decline over time.

Farmers in the state always have been loyal supporters and advocates of the project. They remained so despite economic analyses (and widespread publicity about those analyses) in 1967 (Young and Martin), 1973 (Kelso, Martin, and Mack), and 1977 (Boster and Martin), showing that farmers would be better off economically without the project. In 1967, they, as well as others, were so incensed about the Young and Martin analysis that the then dean of the College of Agriculture arranged to have the analysis rebutted in the state's newspapers in an effort to "save" the university and college (*Arizona Daily Star*). These were analyses of costs and benefits to Arizona farmers themselves, not analyses of national economic benefits. A problem with all of these analyses was that they were based on projected (i.e., hypothetical) prices of CAP water to the farmers and were not specific to a particular irrigation district with that district's specific conditions.

The support by farmers of the project led Martin, Ingram, and Laney to study the farmers' perceptions, motivations, and access to information. Their conclusions were that farmers simply had a "willingness to play" the water development game. After all, even in 1980 at the time of the survey, although a number of districts had engaged consultants to design and estimate costs for distribution systems, no final water allocations had been made and no irrigation district or farmer contracts had been signed. They concluded by positing the rules of the game. "Basically the game is simply to keep your options open. As long as the costs of doing so are minimal and there is possibility of benefit in the future, farmers need not take action now to avoid uncertain future costs. Even if future developed water costs presumably will be greater than it would be economically rational for them to pay, experience has shown them that once the physical development is in place, the cost of the water will be negotiable" (Martin, Ingram, and Laney, p. 139).

While the rules were posited based on observation of farmers' behavior, recent observations (to be discussed later) indicate that potential municipal and industrial (M and I) users, who also have been firm project advocates, also can play the game.

Current Status of the Project

On 24 March 1983, the "final" water allocations to applicants for the new water were published in the *Federal Register*. M and I applicants and Indian reservations, were assigned actual quantities to be available in various time periods. Agricultural applicants were assigned percentages of what would be left over, given supply variability. In years of shortage, each agricultural allocation would be reduced proportionately before the M and I and Indian allottees had their allotments reduced. An initial contracting period of six months was set, until October 1984, to sign contracts with the repayment agency, the Central Arizona Water Conservation District (CAWCD)—a three county district which buys the water from the bureau and subcontracts with the actual users. The CAWCD actually sets the water prices and has a general property taxing authority.

In the CAWCD subcontracts, repayment of construction costs by agricultural users was set at $2 per acre-foot, with operations, maintenance, and repair (O, M, and R) costs to be paid by all users at the current actual cost to the bureau in each year. M and I user contracts were not yet available, but M and I users were to be allocated a much higher construction cost, and raw water was expected to cost at least $100 per acre-foot (Martin et al.).

The 1984 Bureau of Reclamation estimate for the canal-side delivery of CAP water for agriculture, were it available in 1984, was $58 per acre-foot. Expected efficiency losses in transporting the water from the main aqueduct through local distribution networks to the individual farm headgate ranged from 5% to 15%.

The effective marginal unit cost for CAP water would therefore range from about $62 to $67 per acre-foot, or an average of about $65 per acre-foot postage stamp price at the main canal.

The 1984 estimates of the unit cost of CAP water were considerably above the marginal demand for either supplemental or substitute irrigation water in central Arizona. Only those farmers for whom the marginal value product of irrigation was greater than $65 per acre-foot would want to buy additional supplies of water via the CAP. But buying additional supplies will not be legally permissible. Only those farmers for whom the existing marginal unit costs of irrigation water were in excess of $65 an acre-foot would want to replace some of their existing supplies with CAP water. For most farmers, both the marginal value product of water and the current marginal unit cost of groundwater ranged from $35 to $50. The conclusion from this simple anlaysis was that at least in the short run, and when considering only the private costs and returns to irrigation water and disregarding distribution system costs, CAP water could not be used profitably by most farmers in central Arizona.

But farmers were moving toward signing contracts. Possibly they perceived other economic benefits to accure from the substitution of new surface water for groundwater. Principal among these potential external benefits could be reductions in the rates of increase of future fixed and variable groundwater pumping costs and in the level of damages associated with land subsidence associated with a falling groundwater table or with associated deterioration of water quality as the water table fell.[2] The CAP might be economic in the long run even if it did not appear economic in the short run. Using the newly available pricing data from the CAWCD and the consultants' reports for the cost of distribution systems, a long-run analysis including external costs and benefits, and based on presumably firm price information, was now feasible on an individual irrigation district basis. Details of this analysis are in Bush and Martin. Major results are reported here in order to set the stage for a description of the current game being played.

[2] Water quantity is not an issue. The cost of pumping groundwater would become prohibitive long before the aquifer would be totally depleted.

External Benefits of Reducing Groundwater Overdraft

The land subsidence and water quality issues in reality are not important, regardless of how they may be perceived by many people including nonfarmers. McCauley and Gum assessed the annual costs of subsidence-related damages in western Pinal County, Arizona, an area that has experienced some of the most severe groundwater overdraft conditions in Arizona, and continues to receive a great deal of publicity in the state over its subsidence-related problems. Their estimate of the total annual cost of the repairs for subsidence-related damages to land, wells, irrigation ditches, roads and transportation rights of way, and urban and domestic structures, equaled about $.50 per acre-foot of overdraft per year in constant 1984 dollars. The annual marginal cost of subsidence equals about $.10 per acre-foot of water per foot of groundwater decline, clearly a trivial consideration.

It is difficult to describe any general relationship in Arizona between groundwater quality and the pumping depth to lift. Water quality can vary greatly among different areas regardless of the pumping lifts. Some of the lowest quality water used for irrigation in central Arizona comes from some of the shallowest wells (Conovaloff). Boster and Martin reported that the estimated salinity of CAP water would average about 940 parts per million (ppm) when deliveries were to begin in 1986. Locally the salinity may range from 400 ppm up to 1,200 ppm, while the area-weighted average salinity of groundwater in Pinal County is 670 ppm. Their conclusions were that water quality was not a significant issue, but CAP water was likely to be of lower quality than groundwater in most areas. It is clear that there are confused perceptions about the quality issue in that many people believe that lower quality is associated with lower water depths; but again, in reality, reducing the groundwater overdraft would not improve water quality to agriculture.

The progressive increase in pumping depths to lift clearly could be a real source of concern about groundwater overdraft. The effects of overdraft on groundwater pumping are permanent and cumulative. In Bush and Martin the additional fixed and variable pumping costs associated with a unit increase in pumping lifts is represented by a perpetual stream of equal

Table 1. Estimated Marginal Social Costs of Groundwater Pumping and Overdraft in the CAP Service Area of Central Arizona in 1984

District	Lift (feet)	Projected Groundwater Decline 1984–85 (feet)	Unit Energy Cost (mills/kwh)	Projected Real Unit Energy Cost Increase 1984–85 (pct)	Estimated Marginal Social Pumping Cost ($/af)
		Maricopa County			
Harquahala	600	8	52.42	2	122.49
Queen Creek	600	3	35.00	1	63.99
Tonopah	350	3	52.42	2	66.00
		Pima County			
Avra Valley	375	3	79.61	2	102.89
Cortaro-Marana					
(Cortaro)	120	1	17.00	0	6.83
(Marana)	325	2	17.00	0	17.37
		Pinal County			
Central Az	620	3	25.00	1	49.74
Hohokam	410	3	25.00	0	30.04
Mar-Stanfld	600	4	36.50	1	68.84
New Magma	600	4	23.00	1	47.08
San Carlos	300	0	25.00	0	17.65

Source: Bush and Martin.

annual payments, or increased costs. Changes in variable pumping costs over time are dependent upon two factors, the energy cost of pumping and pump maintenance. Both costs are functions of the depth to lift.

For example, in the Central Arizona Irrigation District (CAID) the present value of the additional variable pumping costs associated with a decline in pumping lifts of one foot, evaluated at 4%, would be about $1.47 per acre-foot of groundwater pumped. A change in the real price of energy of 1%, assuming that groundwater conditions in the CAID remained static, would be equal to $.2939 per acre-foot, per foot of lift, equal to a present value of $7.35 per acre-foot.

As pumping lifts increase, eventually additional fixed capital investment is needed. Fixed cost estimates were developed for pumping lifts ranging from 200 feet to 1,000 feet and well capacities from 800 to 1,600 gallons per minute. Fixed pumping costs appear to increase at an average rate of approximately $.80 per acre-foot per additional 50 feet of pumping lift, or $.016 per acre-foot per additional foot of lift. The present value of the stream of additional future fixed costs of an increase in pumping lifts of one foot is equal to $.40 per acre-foot.

Marginal Social Cost of Groundwater Pumping and Overdraft Compared to the Variable Cost of the CAP Water

The marginal social cost (MSC) of groundwater pumping and overdraft at any given rate of pumping is the sum of the private costs of groundwater pumping and the external costs of groundwater overdraft.

Table 1 shows the estimates of the marginal social cost of groundwater pumping and overdraft in most of the major agricultural irrigation districts in central Arizona. Projected groundwater declines and real energy cost escalations were derived from examining historical groundwater records and rate histories and from conversations with irrigation district managers. Because the rate of pumpage is unlikely to increase in agricultural areas, the estimates may be considered conservative.

At an average variable cost for CAP water of about $65 per acre-foot at the main canal and neglecting any distribution costs from the canal to the district, only farmers in the Harquahala Irrigation District would find CAP water cheaper than their private costs of groundwater pumping. If farmers considered the full social cost of groundwater pumping,

the CAP begins to appear competitive in several areas including the Avra Valley, Queen Creek, Tonopah, and Maricopa-Stanfield irrigation districts. Elsewhere, however, pumping depths to lift and energy costs would have to be far more severe than they are now before CAP water would be less expensive than groundwater.[3]

A Long-Run Analysis of Investing in the CAP

Comparative projections of irrigation water costs were made under alternative project and no-project conditions for each of seven major irrigation districts planning to receive CAP water and for which estimates had been made of the costs of the necessary distribution systems. They are the central Arizona, Hohokam, Harquahala, Maricopa-Stanfield, New Magma, Queen Creek, and Tonopah irrigation districts. Allocations of CAP water to these seven districts constitute almost two-thirds of the total amount of project water designated for non-Indian agriculture.

The cost of electricity, the groundwater pumping depth to lift, the volumes of groundwater pumped and CAP water purchased, and the total fixed costs for groundwater and CAP water were varied over time in a model incorporating reasonable projections. In each year from 1984 to 2034, the weighted-average total cost of water per acre-foot with and without CAP water were compared. The analysis was run several times for each irrigation district to investigate the sensitivity of the results to alternative discount rates, energy cost escalation rates, and rates of groundwater decline.

In general, the progression of average total water costs over time under project and no-project conditions are as follows. During the early years of the project, CAP water will be expensive relative to groundwater. The hydrologic benefits from reduced groundwater pumping will not be significant enough to induce large savings in pumping costs. Fixed pumping costs will actually be higher under project conditions because of the underutilization, and hence inefficient use, of the pumping facilities. Average total water costs therefore tend to be higher under project conditions than they would have been in the absence of the project.

In later years, the cumulative hydrologic benefits of the project begin to induce significant cost savings in groundwater pumping. Increases in groundwater pumping costs grow more slowly as the facilities are used more fully and, therefore, more efficiently. Meanwhile, the stability in the variable cost of CAP water continues to make it a more and more favorable alternative to groundwater pumping. Average total water costs under project and no-project conditions begin to converge. In some future year the cost paths cross and water costs are thereafter cheaper with the CAP than they would have been without it.

Whether the turnaround in average total water costs would be significant and whether a stream of positive net benefits would occur soon enough in time to generate a positive net present worth for the CAP was the analytical question. Results of the fifty-year present-worth analysis for each of the seven irrigation districts are shown in Bush and Martin. Only farmers in the Harquahala Irrigation District should expect to realize a positive net benefit from the CAP. The variable cost of CAP water will exceed the variable cost of groundwater pumping in every district except two throughout nearly all of the project planning horizon. The hydrologic effects of the CAP will not create a large savings in groundwater pumping costs early enough in the project to make much of a difference. Groundwater pumping costs will rise dramatically everywhere, regardless of whether the CAP is in operation or not. In every area the CAP will cause the rate of groundwater decline to slow, moderating pumping costs, but the savings will be no match for the steadily increasing cost of energy. Even in the Harquahala district, where the savings in groundwater pumping lifts will be the greatest, the rising cost of energy dominates the trends in the variable cost of pumping. The

[3] It is not of interest to the farmers, but the CAP appears competitive with groundwater in some areas not only because it is free of the external costs associated with groundwater overdraft, but also because it has access to cheaper energy than that available for most groundwater pumping. Electricity rates from the Navajo Power Station, the exclusive source of energy for the CAP, are significantly lower than the rates paid by almost all groundwater users in Arizona. The cost of electricity from the Navajo station in 1984 was about 20 mills per kilowatt hour (Hine). In contrast, most farmers in the irrigation districts studied paid between 25 mills and 75 mills per kilowatt hour for electricity to pump groundwater.

If groundwater were pumped using a power source as cheap as that allocated for the CAP, no district would find the CAP an advantageous purchase. Even in the Harquahala Irrigation District, where lifts are increasing at the rate of 8 feet a year, the marginal social cost of groundwater pumping and overdraft would be more than $20 an acre-foot less expensive than the CAP alternative.

principal factor influencing the increasing cost of groundwater pumping is the cost of electricity and not the rate of groundwater decline.

Contract Actions

At the same time that the Bush and Martin analysis was being made, both municipal and industrial districts and irrigation districts were signing contracts with the CAWCD. By July 1984, ten irrigation districts, including the seven studied, had signed for 70.7% of the agricultural allocation (CAWCD, 21 Oct. 1986). The Harquahala district signed first for 7.67% of the total allocation or 10.8% of the agricultural water accepted. No additional irrigation contracts have been signed since July 1984. Seventeen percent of the agricultural allocations have been declined, while three districts have yet to make up their minds about the remaining 12%.

By August 1985, fifty M and I districts had signed contracts for 72.6% of their allocation. The first contracts, including that for Phoenix, were signed in October 1984. Tucson, presumably the most water-short M and I area in the state, was one of the later signers, in February 1985. Tucson and Phoenix together contracted for 41% of the total allocation. Twenty-seven percent of the M and I allocation is still available, part of which has been officially declined by entities to which it was offered. Other entities have yet to make up their minds (CAWCD, 21 Oct. 1986).

Playing the Water Game

The irrigation districts were the first to be offered contracts by the CAWCD. They had long been backers of the project, but had done little analysis of its potential costs and benefits (Martin, Ingram, and Laney). Even at the time of signing, their major analytical actions had been to hire consultants to investigate how to build and finance distribution systems as contrasted to investigating the economic benefits and costs of the systems. Contracting ceased with 29% of their allocation still available.

Contracts then were offered to potential M and I users. But by January 1984 the major potential M and I contractors, watching irrigation district contracts being signed, decided that if agriculture could buy the water at $58 per acre-foot, they ought to be able to do so too (Meissner). Why should they subsidize agriculture by paying $100 or more per acre-foot when their current opportunities were about $45 per acre-foot for groundwater in Tucson and less elsewhere? In order to sell the water the CAWCD agreed to deliver CAP water for the same price as to agriculture users, at least in the early years of the project (Meissner). Tucson finally agreed to this price in February 1985 (CAWCD, 21 Oct. 1986).

But water was still available and had finally begun to flow in the completed part of the canal from the Colorado River, reaching about halfway between Phoenix and Tucson. The CAP aqueduct is being built with a capacity to carry 2 million acre-feet of water per year—more than the legal allocation of 1.6 million acre-feet. One and one-half million acre-feet currently is available for use. By October 1986, water prices under the signed contracts had fallen to roughly $47 for farmers and $50 for cities, to be renegotiated in 1991 when the project is to be fully completed (Volante). But delivery contracts were for only 500,000 acre-feet.

An 14 October 1986 CAWCD memo stated:

> CAWCD has established the overall goal of maximum utilization of Arizona's entitlement to Colorado River water through diverting and delivering to the Project area as much CAP water as practicable. However, it is anticipated that during the early years of the Central Arizona Project operations, the availability of Colorado River water will exceed the capability of CAP water users to directly use all of the CAP water available.
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> Due to water user's inability to accept water under prices reflecting full operating conditions and the resultant impact on CAWCD's overall goal, CAWCD is exploring price incentives as a means of encouraging early use of project water.

Given that far more CAP water was going to be available in the near future than holders of long-term water service subcontractors were willing to accept, federal and state authorities decided to attempt to sell CAP water on at least a temporary basis, not only to those entities who had contracted for long-term service but to anyone who wished to buy it. The concept of an "interim" service period was devised, where interim is defined as the period of time between the beginning of CAP water deliveries and the declaration by the Secretary of the Interior that the project is "substantially complete" (presumably after Tucson starts getting water).

During the interim period, surplus CAP water will be sold by the CAWCD to anyone within the service area of the district who wants to buy it. These contracts are one-year agreements, renewable at the discretion of the CAWCD. Water delivered under these contracts will be available on an "interruptable" basis only, i.e., it will be available only after all other contractual claims to CAP have been satisfied. However significant quantities of CAP water are unallocated and available for delivery.

The price for CAP water consists of the energy costs for pumping, the operation and maintenance costs, and capital repayment costs. During the interim period charges presumably will be lower than after project completion. Regardless of the class of water use (M&I, Indian, or non-Indian agricultural), users will be charged in the same fashion. The charge for the energy cost of pumping will be determined by the user's location along the CAP aqueduct. After the interim period is over, all users will be charged a flat rate to include both operation and maintenance and energy cost of pumping charges regardless of their location along the aqueduct. During the interim period, the full operation and maintenance cost has been declared to be $10 per acre-foot. Not all users will pay the full cost.

During the interim period, no capital repayment charges will be assessed against any user of CAP who holds a long-term water service subcontract. Users of CAP water who do not hold long-term water service subcontracts will be assessed a capital repayment charge during the interim period only if they do not intend to use the CAP water to substitute for groundwater pumping. Following the end of the interim period, capital charges will be assessed at varying rates, depending upon the type of user. For M and I users, the capital repayment charge will increase over time.

Energy costs of pumping are determined for each location along the CAP aqueduct on the basis of number of pumping stations through which the water has to pass before reaching each particular user. The current schedule varies from $23.50 per acre-foot up to $87.10 per acre-foot near the canal's terminus. The long-term contract price for CAP water, excluding capital repayment charges but including the energy cost of pumping and operation and maintenance charges, will be about $55 to $60 per acre-foot. For locations along the aqueduct beyond central Pinal County (about two-thirds of the canal's total length), CAP water under this interim plan would be more expensive than it would under the standard (long-term) contracting arrangements. But CAP users in southern Pinal County and Pima County either will never buy CAP water under an interim contract, or else a different pricing structure will be worked out for them. Water currently is not available along this stretch anyway, so the pricing schedule is basically hypothetical.

The operation and maintenance costs vary on a sliding scale up to the "full cost" of $10 per acre-foot. Users are given a price break while they are "testing" their water delivery systems and bringing them up to full operational level. Full operational level is defined as either the third year after water service begins or the point at which a cumulative quantity of CAP water equal to one full year's allocation (otherwise known as the "threshold" quantity) has been taken, whichever comes first. From the beginning of the third full year of water service, users will pay the full O and M charge of $10 per acre-foot, regardless of whether or not they have already reached their threshold level of use.

In terms of the water game, this interim policy illustrates the necessity for the CAWCD to open negotiations with all potential users of CAP water—both those who have contracted for water and those who have not. The policy itself is designed to dispose of excess water by offering price concessions while appearing to rigorously cover costs. Thus, the policy contains language about the full cost of operations and maintenance and includes relatively high energy charges on the highest reaches of the canal. But full O and M charges are to be phased in and water is not available in the high-reach areas anyway. Presumably the interim policy is to be changed as the canal is completed, but the precedent for price negotiation has been set.

So far the interim policy is not disposing of a great deal of water. As of the summer of 1987, two developers and an RV park have been offered interim contracts for water to use on their golf courses. The total quality would be about 1,200 acre-feet per year.

The water game continues to be played even as contracts are being signed and water is available for delivery. Although both agricultural users and M and I users declare that water is a scarce and "precious" commodity, neither

agriculture nor M and I is willing to pay the real marginal cost. They are not even willing to pay the highly subsidized prices at which the new water is being offered. Consequently, the offer price continues to fall. With the project almost complete, the water must be used. Not to use it would be politically embarrassing to both state and federal officials, it would allow the California to continue to use "Arizona's water," and would return even less to the federal treasury than use at a highly subsidized price.

But the game has become serious now, particularly for agriculture where contract enforcement could result in serious financial difficulties. Almost all farmers have water available at lower costs than the Bureau of Reclamation expected the CAWCD to charge. Only areas with very high energy costs would find the CAP an attractive alternative for many years to come at those costs. Even the external costs of continued groundwater pumping do not make the CAP economic.

The author has received reports that the Bush and Martin bulletin is being shown by farmers to the CAWCD to support arguments for reduced water cost. One farmer contacted the dean of the College of Agriculture (not the same dean as in 1967) with the bulletin in his hand. He needed help that neither the dean or the author could supply. We could only counsel him to continue to talk with his lawyer. His entire farm, including Arizona State leased lands as well as his private lands, is within one of the irrigation districts studied. The pumping costs for his wells range between $5.93 and $15.35 per acre-foot—far below proposed charges for CAP water. But that difference was not his main worry.

The main worry was the proposed irrigation district assessment on both his state and private lands of $1,100 per acre in order to build the distribution system to move the water from the main CAP canal to the farmers in the district. This assessment would essentially be equal to the original value of the land. Further, by accepting CAP water, he would come under the Reclamation Reform Act of 1982 and be limited to only 960 acres.

A letter to this farmer from his attorney summarizes his dilemma:

> My clients have been quite concerned about the fact that they may only have 960 acres which may receive CAP water. Since the individuals own 3 to 4 times the maximum number of acres allowed under the Reclamation Reform Act of 1982, we are in the process of establishing trusts and other devices to qualify additional land as non excess land.
>
> While I understand that at this point you do not wish to be included in the Central Arizona Project and be forced to receive their water, it may be best to try to preserve your rights for as much irrigable land as possible. Also, it is interesting that you will be assessed $1,100.00 per acre for the irrigation system to be placed on your property while in fact none of the land may be entitled to CAP water due to the 960-acre limit.

This farmer has been attempting to get his farm excluded from the irrigation district, so far without success. Neither district nor CAWCD officials wish to see any defections. The potential effects on repayment ability on the district distribution system bonds is obvious. The farmer himself sees the specter of bankruptcy if he is forced to fulfill his contracts.[4] The irrigation district president, also a farmer, is more sanguine. He assured the farmer that the government would never make them repay the bonds if that would really mean economic difficulties. The bonds are 20% privately and 80% federally financed. The 20% is to be paid off first. The game will require reaching the federal portion while still remaining solvent.

It really is not surprising, however, that many Arizona farmers simply do not believe that they will eventually have to pay the full cost of the project. After all, Arizona was the site of the very first reclamation project when Roosevelt Dam was built to create the Salt River Project. Smith has documented farmer and Reclamation Service actions in the mid-1910s. She reports that as the project neared completion and repayment was to begin, the farmers suddenly realized that they could not afford to meet the agreed-upon repayment schedule. Salt River Project farmers "joined other water users nationally in demanding a change in the repayment section of reclamation law. They wanted not only a different repayment schedule but also an alternative method of assessing construction charges and greater federal subsidy" (p. 93). Farmers had discovered that despite the "lively propaganda of the early years" (p. 95), for many farmers farming would be more expensive with federal reclamation than

[4] The fear of bankruptcy due to water contracts is not only in this district or even only in Arizona. Farmers in the Dolores Water Conservation District in southeast Colorado are suing their district to release them from contracts signed ten years ago. The district is refusing to do so (*U.S. Water News*).

without it. Many farmers felt "swindled" (p. 141). By 1913, the Secretary of Interior set in motion a process to include project landowners in the decision-making process. The eventual outcome of this process was that "for all intents and purposes, in 1917 the Salt River Project belonged to the water users" (p. 145). Repayment policy had been substantially modified. The idea that the Users' Association should pay only the "proper" cost rather than the actual costs had basically been accepted and was the precursor of the more recent reclamation policy of farmers only reimbursing the Bureau of Reclamation according to their "ability to pay." The repayment period—at no interest—was substantially extended. A reinterpretation of reclamation policy allowed profits from the sales of power generated by the project to be used to help pay the general project debt including the irrigation facilities. The Salt River Project was on its way to being considered the success it is generally felt to be today. By 1922, farmers were already busy promoting a plan to bring Colorado River water into central Arizona to expand the Salt River Valley area (Johnson).

With knowledge of the Salt River Valley experience, it is certain that negotiations over price and delivery conditions for CAP water will be continued by both agricultural and municipal users. As economists we should not expect otherwise. The negotiations are simply an expression of the interaction of supply and demand. It is ironical, however, that while the earlier economic analyses were either ignored or condemned because they showed the CAP to be uneconomic, the latest analysis is being used to support potential users' negotiations because it shows that farmers cannot afford to pay their allocated costs.

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