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Authors

Ingram, H
Martin, W E
Laney, N K

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Author(s): William E. Martin, Helen Ingram and Nancy K. Laney

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A Willingness to Play: Analysis of Water Resources Development

William E. Martin, Helen Ingram and Nancy K. Laney

Economic analysis shows that the Central Arizona Project will be a poor investment from the point of view of individual farmers. Yet farmers support the Project. In this study of the economics and politics of the CAP, farmers are questioned as to their information, perceptions and motivations. Farmers are willing to play — not necessarily to pay.

A central tenet of economic analysis is that people making market decisions pursue their own self interest. Public choice scholars have attempted to extend this reasoning beyond the domain of individual market decisions to collective choices in political and organizational settings. While falling far short of explaining all individual behaviour, public choice research indicates that the hypothesis of self-interested motivation provides the best grounds for predictions of how people will act [Mitchell]. However, what constitutes self-interest is often difficult to determine. People act on the basis of perceptions, and the way they see benefits may be very different from the way objective policy analysts might see them.

The behaviour of Arizona farmers relative to the construction of the Central Arizona Project (CAP) illustrates the gap that exists between self-interest as it is viewed by economic analysts and as political actors see it. While economic analysis by agricultural economists from outside the Bureau of Reclamation has indicated that the CAP would yield fewer benefits and larger costs to farmers than continued pumping of groundwater

[Young and Martin; Kelso, Martin and Mack; Boster and Martin]. Arizona agriculturalists have consistently believed it to be in their interest to take a position strongly favoring the project.

In fact, farmers in the state have been the CAP's most loyal supporters and advocates over its thirty year history. The project, first brought before Congress in 1948 and finally authorized in 1968, is a massive water delivery system which will transport Colorado River water to the central part of Arizona. It consists of a series of pumping plants and aqueducts which will lift the water over 2,000 feet in elevation and carry it more than 300 miles. Although originally envisioned as an agricultural "rescue" project, the focus of the CAP has since shifted toward urban and Indian users, both of whom will have priority over Anglo farmers in CAP water allocations. The project currently is under construction, but no final water allocations have been made and no irrigation district or farmer contracts have been signed. Initial deliveries of water are not expected before 1986 in the areas closest to the project's origin, and not until several years later elsewhere.

Since conventional economic analysis does not explain farmer actions, we turned to an examination of the farmers' *perceptions* of self-interest. This examination was accomplished through a field survey. From the observed attitudes and perceptions of the interviewed farmers, along with an examina-

William Martin is professor of agricultural economics, Helen Ingram and Nancy Laney are professor of political science and research associate, respectively. All are at the University of Arizona. Arizona Agricultural Experiment Station Journal Article No. 3600.

tion of the political environment over the years in which the project has been planned, a paradigm of decision making was developed that has characteristics similar to games where risk and uncertainty foster the pursuit of strategies. Thus, we refer to the farmers' "willingness to play" the game of western water resources development.

Propositions for Analysis

Our intent was to understand the benefits and costs associated with the CAP in the past and the benefits and costs as farmers currently see them. What are the perceived opportunities and risks created by their support for the project?

The CAP game has been in progress a long time and how the winnings are ultimately to be distributed and who the losers might be is becoming somewhat more clear. There is basis for farmers to fear that less CAP water will be available for a shorter time and at a higher cost than they had anticipated. Moreover, the rules and regulations associated with obtaining the water may place real constraints upon farmers' groundwater use. The federal government required new groundwater legislation in Arizona in return for funding the project. If Arizona farmers make choices on the basis of rational self-interest as we suppose they do, the change in expected benefits and costs should be reflected in their attitudes toward the project. Thus, we designed our survey based on the following hypotheses:

1. Farmers in the best position vis-a-vis the CAP — closest to the aqueduct, with a distribution system in place and earliest in line to receive water — would be most favorable to the project.
2. Farmers in a less desirable position vis-a-vis the CAP — remote from the aqueduct, and with no surface water distribution system in place — would be least favorable to the project.
3. Farmers would be interested and informed about the details of water price and distribution costs associated with

the CAP. We would expect this interest and knowledge because the farmers will be increasingly concerned about costs as the project approaches completion.

4. The higher the farmer's estimate of cost of CAP water, the less favorable the farmer would be toward the project.
5. Farmers would express concern over the regulations encouraging water conservation tied to receipt of CAP water. We assumed that these regulations would be viewed as costs imposed by the project.

Field Survey of Farmer Attitudes and Perceptions

Personal interviews were conducted in the 10 major irrigation districts in the state that had applied for CAP water. Twenty-nine farmers and four irrigation district managers who were not farmers were interviewed. Twenty-eight sets of questions were asked each respondent in an in-depth discussion that often took two to three hours. The respondents were not selected at random, but rather by making an initial contact in the local area and finding names of "substantial local citizens". Thus the respondents would be assumed to be better informed on CAP details than would a random selection.

Most irrigated crop farms in the CAP area have a typical cotton, small grain and forage crop mix — but some include vegetables or tree crops. In order to differentiate among the farmers according to their situations, they were asked about the size and crop mix of their farms, the level from which they were pumping, and their estimate of their pumping cost per acre-foot. The farmers were then asked a series of questions relating to water conservation activities. Farmers were also asked to estimate the cost of CAP water when it flows in 1986 and to compare that cost to estimated pump costs at that time. In addition, they were asked about different aspects of the CAP, from its effect on the value of their land to the conservation regulations tied to the project. These ques-

tions were included to test their knowledge about details of the project and their opinions as to how it will affect them personally. A copy of the questionnaire is displayed in Ingram, Martin, and Laney.

Since much of the resulting data was opinion about action, or statements of emotional commitment, analysis was necessarily somewhat informal. The responses were arrayed in a matrix of respondents vs. questions, and individuals were classified as to their relative position vis-a-vis the five hypotheses.

Findings

The following five findings relate, respectively, to the five hypotheses listed above.

1. Rather than their support for the project, what sets the "most-favored farmers" off from the others is their more balanced weighing of the costs and benefits associated with the CAP. Evidently these farmers see themselves in a good strategic position. The largest amount of CAP water is scheduled to flow in 1986 — at the beginning of the project. Agriculture is currently allocated more than half that water, and many districts that have applied for the water will not yet have the ditches to receive it. Those farmers in a favored position figure that they will be in a good position to receive water on their own terms. Past experience of farmers with federal water projects has taught them that the government will negotiate. The Bureau of Reclamation has been willing to adapt contracts to the farmers' situation rather than holding rigidly to original financial plans.
2. Rather than their opposition to the CAP (nearly all farmers are favorable) what distinguishes the "least-favored farmers" is their blind commitment to the project. The strength of the farmers' emotional commitment to the project seems to vary directly with the degree to which they feel threatened about their future. When they feel "their backs against the wall," they do not question the form in which "help" comes.
3. Typical of this view were the farmers in the Central Arizona Irrigation and Drainage District, and the Maricopa-Stanfield Irrigation and Drainage District. These two districts currently rely exclusively on groundwater and were formed specifically for the purpose of receiving CAP water. By 1986 about 60 percent of the wells in the two areas will be drawing from nearly 600 feet. These two districts are farthest of any from the main canal and will need to invest some \$1,100 per acre served just to get the water from the main canal to their fields [Beck and Associates].
4. When asked about these costs one farmer said they would be major but worth it. One answer was "Price doesn't matter. The point is we need more water. It is our last chance. The price of cotton is too low".
5. Contrary to expectations, a surprising lack of information and interest about details of the project was found. The project still seems very remote from reality. After all, in the past year the basic allocation schemes had changed several times and are still far from settled; nor has the likely cost of CAP water been finally determined. Estimates of state and federal water authorities vary widely. Even if details on allocations and price were known, unknown exogenous variables, such as other input costs, commodity prices, and the effects of inflation, cloud the picture. The farmers are simply "playing" the game rather than considering "paying" the costs.
6. The water price estimated by farmers does not appear to be closely related to their attitude about the CAP. Farmers who expressed very positive attitudes toward the CAP were as likely to estimate a high price as farmers who were

generally neutral or cynical about the CAP. However, most of the farmers felt that CAP water would be less expensive or at least no more expensive than pump water at that time.

There are at least two problems with this expectation. No district is to be allocated more than about fifty percent of its current water use. Therefore, the pumps will remain and have to be operated and maintained just as they are now. If the CAP water is spread over the whole district, as every interviewee stated it would be, all wells would have to remain in operation. The fixed costs of the wells will remain. CAP costs will substitute only for the energy cost of pumping.

The second problem is the confusion caused by inflation, rising energy costs, and the uncertainty about what costs will go into CAP water costs. A farmer stated that "It is not conceivable that CAP costs could be greater than pump costs because of power costs. By the year 2000 pump costs will be \$100 per acre-foot." Almost all farmers have the belief that CAP costs will be relatively constant, and seem to relate only to the highly subsidized repayment costs of construction. But the CAP will have pumping and operating costs as well. How these costs will be allocated is not known, but if pumping costs are spread evenly over the whole system as is likely, note that the end of the system at Tucson is some 2,000 feet above the beginning of the system at Parker Dam on the Colorado River. Few farmers will be pumping groundwater from more than 600 feet.

5. The farmers were aware of the restrictions associated with the use of the CAP water. They knew that regulations require them to trade off an acre-foot of pump water for each acre-foot of CAP water received. They were also aware of the existence of such regulations as the 160 acre limitation for federal

reclamation projects. However, most respondents envisioned strict enforcement of pump regulations as unenforceable. Experience with the 160 acre limitation explains why they may not believe rules will be applied as written. The possible, but not necessarily probable, regulations associated with the CAP were seen as a secondary matter to the central objective of bringing in new water at whatever cost.

The findings of our field survey suggest that the political support that agricultural interests have given to the CAP represents a willingness to *play*; not a willingness to *pay*. The paying of costs was not really relevant for the debate over authorizing, funding and starting construction of the CAP. In the bargaining and negotiation to build support, potential costs are purposely left vague and generally are ignored. When the choices were so structured, farmers' support simply signalled a willingness to stay in the game. Political support for the CAP cannot automatically be translated into concrete willingness to pay costs — such as the signing of repayment contracts, installment of distribution systems, and compliance with rules such as the abatement of groundwater pumping. Instead, we posit that farmers are pursuing a game that has the following rules.

Rules of the Game

The Prize

Water is a priceless possession, or, at least so it traditionally has been viewed in the West. As Kelso pointed out in his essay on the 'Water is Different' syndrome, Westerners do not calculate the value of water on the basis of its contribution to production as they do other renewable resources. Instead, water is believed to give rise to a Midas Touch, creating wealth and guaranteeing a prosperous future wherever it is present in ample quantities. This conviction is based on an interpretation of history rather than economic analysis. Arizonans, for instance, ob-

serve that the Salt River Project was fundamental to the enormously successful development of Phoenix. Whatever the development of water supply is estimated to cost, Westerners tend to think it is worth the price. They believe that if water becomes too expensive, everything else will become yet more dear, and were they to lack a sufficient supply of this basic ingredient, they would be unable to reap the profits that come with enterprise and development. In short, water is conceived by Westerners as a coveted commodity, a worthy prize for which they are willing to engage in demanding political games, where pay-offs may come only far into the future.

In saying that water is considered priceless, we do not suggest that potential users will pay any price. When it comes to signing a contract, starting a pump, or opening a headgate, users — especially commercial users such as farmers — will not purchase more of the water input than the price of the resulting product will justify. Rather, we are saying that Western water users will compete very hard to keep open the option of having water available as a basic ingredient to profitable activity.

The actual possession — the physical presence of water where and when it may be useful — is the ultimate prize in water politics. Thus one must distinguish between legal entitlement and actual possession. 'Wet' water, it is said, is much more valuable than 'paper' water. Western water law establishes a complex hierarchy of senior and junior entitlements based on treaty, compact, contract, and the historic record of use. While legal entitlement is an important resource, it is not immediately efficacious. Being in a position to actually use water is often much more significant than legal entitlement to it. Under the 1922 Colorado River Compact as interpreted by the Supreme Court and modified by Congressional legislation, the State of California is legally guaranteed only 4.4 million acre-feet of Colorado River water per year. Yet the actual annual use of Colorado River water by California has been closer to

5.7 million acre-feet, simply because California has had the physical structures necessary to convey and utilize it while other states have lacked sufficient means to divert their full quota of water from the mainstream. We thus had a prime confirming instance of the old adage that possession is nine-tenths of the law.

Further, once users acquire immediate access to water, they are in an excellent position to determine the conditions of its use as well as to thwart outside interference. After studying six irrigation communities in Spain and the United States, Maass and Anderson [p. 366] come to the conclusion that

"The most powerful conclusion that emerges from the case studies is the extent to which the farmers of each community have controlled their own destinies as farmers, the extent to which the farmers of each community, acting collectively, have determined both the procedures for distributing a limited water supply and the resolution of conflicts with other groups over the development of additional supplies."

The Strategy

Physical possession of water supplies, the goal of the water game, typically involves the construction of storage facilities and aqueducts that redirect water from its natural course to the location of water users. Because such water works are technically difficult, expensive, and often involve a number of political jurisdictions, they often require federal authorization, funding, and construction. The challenge presented to initial backers of such water development programs is to transform their localized support base into a national one which would be sufficiently wide to ensure Congressional majorities. Necessarily, obtaining such support means a strategy of coalition-building.

As with many games, winning the water game entails making some concessions to the other players. The benefits of potential water projects must be distributed so as to attract unified state as well as local backing. Through a process of log rolling, potential opponents must be placated by rewards great enough to warrant their support [Ingram]. If

initial backers of water projects refuse to concede some of their anticipated winnings, the game simply folds and no one profits. Thus project initiators, in building coalitions, are indeed wise to moderate their early hopes for large gains as the game continues: smaller winnings, from a rational standpoint, are surely to be preferred over none at all.

The Role of Analysis

Economic analysis of the benefits and costs of various proposals plays a very large role in the water game, but not that which analysts expect and prefer. Economists argue that the decision whether or not to construct a water project should be based on whether or not the benefits to the nation exceed its costs. Further, economic rationality dictates that any participant should calculate whether the expected personal benefits to be gained are larger than the expected personal costs before deciding to support a project. However, from the perspective of interests in the project area, the first rule is irrelevant and the second rule is difficult to apply. It does not matter if national economic benefits are less than costs. Interests in the project area focus upon the benefits that are heaped on their locality and ignore the costs which are distributed to a diffuse national public. Even economic analysis showing that recipients of project water may have to pay more than prospective benefits justify probably will not affect project sponsors' behavior. Actual future costs to the user are quite uncertain — especially when analysts must make predictions about projects which may take decades to complete and while the form of the project is continuously changing. Further, experience has indicated that once water is actually conveyed to a community, local interests will have a great deal of control over the conditions and amount of project repayment.

Instead of helping participants evaluate goals or determine strategies, economic analysis has most relevance to the process of negotiation among players. The logic of quasi-economics is a kind of diplomatic pro-

ocol through which participants bargain. Analysis is used by participants to support their own case, and convince others to make certain concessions or abandon certain positions. Having good “economic” arguments and skill at marshalling “economic analysis” are considerable resources.

Willingness to Play

In the game of water politics, participants sometimes strike bargains seemingly so detrimental to their interests that they appear irrational. In such cases the observer should ask what other alternatives were in fact available. Frequently, the only other possibility is to fold and withdraw from the game.

Whether or not to stay in the game is the only real decision to be made by players. Economic analysis of likely future benefits and costs has little effect upon this critical choice. Players have little faith that projected costs will be the real costs, and certainly staying in the game cannot be taken as an indicator that participants actually are willing to pay the costs that economic analysts predict will be necessary. Instead, calculations are based on an assessment of the value of having the *opportunity* to obtain additional water, and the *chance* that this opportunity will be offered under favorable conditions.

Summary and Conclusions

The senior author of this study and his economist colleagues have been studying the economics of the Central Arizona Project over the past 20 years. Their analytical posture has always been to examine the possible costs and benefits to Arizona farmers themselves, regardless of national economic development (NED) benefits; that is, a micro farm management rather than a macro welfare perspective was taken. They were researching within their role of offering assistance to the people of their state. The major results of these efforts are reported in Kelso, Martin and Mack. The qualitative results have not changed to this day.

The results were always that construction

of the CAP and use of CAP water for irrigation would yield fewer benefits and larger costs to farmers than would the continued pumping of groundwater without use of the supplemental CAP source. The Arizona population in general and farmers in particular have not been sympathetic to these results and the project is under construction. To economists, the farmers' attitude did not seem rational in that the purchase of CAP water did not seem to be in their own self-interest.

But perhaps when behavior diverges sharply from analysts' concept of what rationality seems to dictate, the fault may lie in the concept of rationality itself, and not with the observed behavior. To examine this general hypothesis, we designed a farmer survey to test five specific hypotheses about farmers' interests in and concerns about the Central Arizona Project. In each case, a hypothesis relating farmer interest in and concern about the project to a "rational" weighing of probable costs and benefits was rejected. An alternative model of farmer behavior was necessary.

To this end we posit the rules of the game in western water development. Basically the game is simply to keep your options open. As long as the costs of doing so are minimal and there is a 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.

Once these rules of water development are understood, the behavior of Arizona farmers with regard to the CAP — which seems on a superficial level to be irrational — makes

perfect sense. But whether farmers eventually will actually pay rather than just play remains to be seen.

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