

Commentary

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Leo Eisel and Richard Wheeler (EW) have presented a useful and broad-gauged paper on financing water development projects. Quite appropriately, they have touched on the legal, institutional, and political as well as economic aspects of the developing situation. My consideration of their arguments will be admittedly narrower and unabashedly more partisan, i.e. from a strictly economic point of reference. I have chosen this course, knowing that I will not be quite fair to them, to get many of the more controversial issues squarely before us where they can be debated.

In their opening paragraphs on financing and cost sharing, EW argue that in theory cost sharing and financing are distinct, whereas in practice they are blurred. Then, in the second paragraph, they assert that cost sharing does not rest on an elegant theoretical basis. I have several comments that in general take issue with these assertions.

Yes, there is an important distinction in principle between financing and cost sharing. Financing has to do with who provides the up-front financial resources to get the project built, whereas cost sharing determines who bears the ultimate burden of giving up real resources incorporated in building and managing the project. The reason the distinction becomes blurred is that the federal government often finances the entire project, including, of course, its share of the real resource costs. The share ultimately assumed by the water users and beneficiaries of the project is usually paid at a later time when the government is reimbursed for the share of project costs assigned to the users. It can be argued that this process is economically both efficient and equitable. It is efficient because were it not for

the tremendous financial reserves that are available for project construction to the federal government through taxation and borrowing, projects that meet rigorous benefit-cost tests might never be built. It is equitable, because the project beneficiaries do not reimburse the government until the flow of benefits from the project enhances their income and wealth positions.

It is possible that we accept these arguments without subjecting them to sufficient scrutiny. First, what about the necessity of federal financing? Few, if any, water projects require such enormous up-front financial resources as the Alaskan pipeline, a project financed largely with private sector funds. Many private firms, such as public utilities, finance projects running into the hundreds of millions of dollars. It may not be the size of the projects per se that requires federal financing so much as it is the class of users from whom it may be difficult to collect large sums of up-front money. For example, it could be argued that even if an irrigation project is economically feasible, it may be prohibitively costly—if possible at all—to collect the necessary front-end financial resources from hundreds of farmers, to say nothing of thousands of recreationists or water consumers. Once again, it may be a mistake to jump to this conclusion without some investigation. It is conceivable that lending agencies in the private sector, such as the commercial banks and insurance companies; would be quite willing to lend money on project development that offered potential profits. Projects that are heavily into electric power production obviously could be privately financed if they were economically feasible since so many already are.

My own speculation for why federal financing of water projects exists is quite different from the "size of project" and "capital rationing" issues. There are two basic reasons: (1) many of the proposed projects are not economically feasible and therefore the private market would not generate the funds because losses would ensue and private firms cannot stay in business and make a habit of incurring losses, and (2) some of the outputs from water projects are "collective" goods and thus entrepreneurs in the private market will not have sufficient incentives to invest. I will elaborate

more on this second point below.

It is quite true that the question of economic feasibility is very complex when it is removed from the stratosphere of economic theory and made operational. Quite apart from the collective good issue, there is the question of national goals that EW raise. Their discussion implies that the existence of national interests justifies federal involvement in water development. Is this supposed to mean that private investment does not also further national goals, or that some incompatibility exists between private economic activity and national interests? Does it even suggest that governmental activity is more efficiently directed towards national goals than private activity is? I believe these notions are fundamentally mistaken. We must not forget that the nation is simply the sum of the individuals composing it and that individual interests are the nation's interest. Policies and projects that on balance enhance individual interests are by definition in the national interest. This is really what we mean by economic feasibility of a project—that having it enhances the sum of individual interests and thus the national interest more than not having it.

Perhaps these issues can be more easily analyzed and understood in a different context. What rationale can be given for governmental intervention in financing and bearing the real resource costs of water development? We might begin answering this question by asking another one: if water were expropriable and firm property rights in its use were created so that incentives for private investment in development and use were present, which of North's justifications for federal involvement mentioned by EW would be valid?

I have already indicated why I believe that "national priorities" per se do not justify governmental as opposed to private actions. If the national priority represents a commitment to provide a collective good, however, then a case for governmental action can be made. Collective or public goods are those that are nonrival in consumption (meaning that person A's consumption does not diminish the amount available to person B) and individual consumers are not excludable from the consuming population. A good example is national defense.

It must be obvious that many outputs that result from the use of water are not public goods: food and fiber, power, most industrial products, and the utility derived from domestic water consumption. Thus the public good argument cannot justify their production. Flood control, navigation, some forms of recreation, and environmental goods are public goods, however, and the private market cannot be relied upon to allocate water to those uses in socially optimal quantities. Some governmental decision to provide them may be therefore required.

The question of providing reservations of water for the future and in times of emergency and critical needs are not of a different class from national priorities. There is no reason, in principle, why the private sector would not adequately provide if water were market allocated, providing the goods that are produced are private goods, and no other classes of market failure are found to be significant.

But, as we all know, water is not market allocated and therefore is not this entire discussion sterile conjecture? I do not think so. We probably have federal financing of water development because we have never created property rights in water as we have in land. Part of the reason for this is that water is a fugitive resource and moves from place to place unless it is consumptively used. This interdependence of water use creates external effects: the use by one party affects the availability and value of water to other users. These effects are difficult to include in normal water transactions that a water market would entail. Some have concluded, therefore, that these effects can be more adequately considered in political allocations than they possibly could by a market. A complete evaluation of this issue would take us far afield. Suffice it to say, political allocations of water by our water rights law have been shown to be economically highly inefficient and thus it is not obvious that political allocations that supposedly take explicit account of externalities have induced more efficient water allocation than would a water market.

A second reason for the absence of water markets is even more fundamental. Because land in the West is of limited value without water, particularly irrigible land, agricultural development and successful settlement could only occur if water were

applied to the land. At the time of settlement no great urgency existed to conserve water or to worry about its efficient use. It was rather security of tenure that was needed to induce development and the water right doctrine of prior appropriation admirably met this need. No doubt the "ability-to-pay" doctrine of cost sharing that came into use by the Bureau of Reclamation was justified in the same way. Irrigators would not be willing to put developed water to use if they had to pay more for it than it was worth. Therefore, even if water charges had to be set below supply costs, the important thing was to get it used so the region could become developed.

Regardless of whether or not this policy was once justified (I doubt it ever was) the situation is far different today. Most of the best dam sites and irrigible land have been developed, and in many places competing uses for water have made it scarce and very valuable. A set of water allocation institutions is needed now that can come to grips with scarcity. Nothing would serve us better, in my opinion, than a change in institutional rules that would permit a water market that could be responsive to changing demand and supply conditions. What we have instead is a set of obsolete institutions bequeathed to us from another time, established to accomplish goals no longer valid. Indeed, federal financing of water development and ability-to-pay cost-sharing rules are an important component of these obsolete institutions. Thus, to induce development the federal government assumed the financial responsibility to build projects. It then allocated (sold) the water to classes of users through long-term contracts, and the question became, How much should be charged? Where the beneficiaries could be identified and use resulted in private marketable goods such as power and food, the users paid, although because of the ability-to-pay rule the irrigators have seldom paid the full separable costs. The beneficiaries of collective goods have generally paid nothing. Thus, the Reclamation Act of **1902** and the Water Supply Act of **1958** have cost sharing provisions consistent with their emphasis upon private good supply, whereas the collective good statutes, the Rivers and Harbors Act of **1884**, and the Flood Control Act of **1936** do not require cost sharing.

The goals of federal cost sharing get major treatment in EW

as well they should. I heartily agree with the National Water Commission statement that cost sharing should "promote the efficient use of water and water related services by users." Presumably, if all goods derived from water use were private goods, water users would pay the full supply costs of water rather than go without it, providing they valued water more than its cost. In fact, one way of insuring that resources would be efficiently utilized in water development would be to sell contracts that would obligate the users to pay the full supply costs in advance. If they were unwilling to pay these charges there would be at least prima facie evidence that resources were not being efficiently utilized in the proposed development. Introducing collective goods does not alter the logic as applied to private goods and their separable costs. In reality, irrigation water users have not been required to pay the full separable costs of irrigation development. It is not surprising, therefore, that allegations of wasting resources cannot be put to rest.

In this connection, there is a very mysterious paragraph in the paper. EW argue that requiring the beneficiaries to bear the cost of providing benefits is conceptually sound, providing beneficiaries and benefits can be properly identified. They then say: "For example, the costs of irrigation projects have customarily been transferred to the recipients of the water, indicating a private benefit. However, in many cases the water is not priced at market value; hence the agricultural water supply has, in effect, been subsidized, indicating some sort of public benefit." The term "subsidy" could have various meanings, but usually society would be subsidizing irrigators if they pay less for the water than the supply costs, particularly if the water is worth more than the supply costs. It is the difference between user charges and costs that represents a transfer from the taxpayers to the water users and can be aptly called "subsidy." Of course, any surplus of water value over water charges will constitute a "rent" on water use that will probably be capitalized into land values, but it is confusing to call this "rent" a subsidy. In any case, comparisons of water charges, costs, and values tell us absolutely nothing so far as I can see about whether or not any public benefit exists.

The data in the EW tables are very revealing. It is one thing

that cost sharing might vary as between different water uses. As argued above, this might be expected given that some goods produced are purely private while others are largely public. But how can such geographic variation be justified for identical classes of use? For example, in the case of irrigation the non-federal share varies from 10 percent in the Missouri region to 66 percent in Alaska. The reason might be the extreme variation in costs between areas, since projects were built in different time periods, as well as the application of the ability-to-pay rule that has little or no relation to cost.

The data in Table 3 are particularly interesting and provocative. I would like to see an analysis of these data that would attempt to explain these extreme differences among agencies and among geographic areas in the percent of costs covered by nonfederal entities. No doubt much of the explanation must be sought for in the political market where votes are traded.

The discussion of industrial use of municipal waste water plants appears to be incomplete. On the one hand, EW point out that there is a significant subsidy captured by industrial firms to the extent of about 44 percent of the capital costs of waste water treatment, and this, coupled with favorable economies of scale, means that publicly owned treatment works are very attractive to industry. Presumably, industry would be eagerly participating. Yet a review of the program found that it was ineffective and recommended a continual moratorium on the cost recovery provision. It isn't at all clear why the program review found it to be ineffective given its apparent popularity.

I will close this discussion with several brief comments on the section in EW dealing with cost sharing and financing issues. Probably paper length constraints prevented EW from treating these issues as extensively as they would have liked. My focus will be on economic efficiency and overall resource allocation implications of the issues raised.

EW's discussion of rehabilitating urban water supply systems indicates the huge sums needed for this work. Perhaps some justification for federal financing can be found, although I for one, as discussed above, am skeptical. If the federal government does assist, however, it ought to be on the basis of full-cost recovery, and that includes interest over the period of the

loan. Furthermore, the local governments should obtain the repayment resources through direct charges on the water users. Only by following these rules are truly economically feasible investments likely to be made. All of these comments also apply to the need for federal involvement in developing water under the 1974 Safe Drinking Water Act.

I believe that EW somewhat overstate the competition over water likely to arise in the West between agriculture and energy. It is true that energy development could require large amounts of water. Still, many empirical studies indicate that there is high potential for finding the water for energy.¹ Where flexible transfer institutions exist, water rights can be purchased from farmers through purely voluntary transactions, leaving both farmers and energy developers better off. Other studies² show vast underground aquifers, presently underutilized, that could be tapped and carefully managed to yield valuable economic output. Most importantly, we must not overlook the possibilities for conservation that would follow increases in water prices. I hearken back to my earlier point that it is the rigidity of our water allocation institutions that prevents new and higher users from getting water, not an absolute shortage of it.

As for water pricing and agriculture, following my discussion of urban pricing above, efficient resource allocation would be enhanced if new irrigation water were priced at full cost. Only if this is done can premature and inefficient development of agricultural water be prevented. I will hasten to add, however, that full-cost pricing of newly developed water has very different efficiency and equity implications from the after-the-fact full-cost pricing of water from existing projects. In the case of existing projects, real resources have already been sunk into project development, and water rents resulting from underpricing have already been capitalized into land values. Many of these lands have changed hands, and thus the wealth losses suffered in the form of reduced land values resulting from increased water prices may be imposed on a different set of irrigators than those who captured the original wealth gains resulting from pricing water below its value.

The section in EW on the need for consistency in federal cost sharing policies raises the relevant questions. What is required

to answer them meaningfully, however, is an intellectual framework where the questions can be systematically analyzed. I believe the economist has a framework that offers great promise although space constraints will prohibit a full development here. The two important concepts in the framework are *economic efficiency* and *income distribution equity*. The latter may involve a perceived federal responsibility to alter the existing distribution of income and wealth via (1) transfer programs, such as unemployment compensation, welfare, medicare, etc., through a long list; and (2) federally financed and subsidized production activities, such as building weapons for national defense or building multipurpose dams. Transfer activities usually are negative sum games since the transfer itself involves use of scarce resources, only one of the reasons they are so vigorously opposed. Production activities will also be inefficient and negative sum unless they pass rigorous benefit-cost tests.

The real problem is that efficiency and equity goals will often, if not usually, be in conflict. If water development projects are utilized to redistribute income and wealth, among users of different classes or among geographic areas or both, and user charges are set below costs in order to accomplish some equity goal, the resulting resource allocation will almost always be inefficient. Simply stated, efficiency requires that resources be allocated in such a way that the net value of the resources at the margin be equal as among all areas and users and that the marginal benefits of expansion of production equal the marginal costs. Thus, large transfers from the taxpayers to western irrigators in the form of subsidized water may well result in premature and overextended (and thus inefficient) water development.

On the issue of who pays for inadequate groundwater management, EW state that either the residents of the depleted groundwater basin will pay, or the nation as a whole will. It is not clear what the national interest is in this issue. If common property use of the aquifer leads individual pumpers to take more water than is optimal in an efficiency sense, and there is every reason to believe this will ultimately happen, the aquifer will be utilized until it is no longer profitable to pump. Irrigated agricultural production will cease, land values will decline, and resources will need to move. The waste is obvious. The primary losers will

be the producers and the owners of land in the area. Of course, there may be many indirect effects regionally and even nationally such as small impacts on food prices and factor prices utilized in agriculture, but these are likely to be negligible in most instances. There could also be some national impact if declining water tables are used as an excuse to initiate new, costly, and inefficient water-replacement development projects at taxpayer expense. Perhaps this is what EW have in mind when they state that the nation will pay for groundwater depletion.

The root problem causing over-exploitation of groundwater is clearly the common-property ownership issue.³ This is inadequately dealt with in the paper. It is an issue that local district managers of groundwater aquifers must come to grips with. Groundwater pumping must be curtailed if the aquifer is being utilized beyond the socially optimal level. Many states have statutes now that attempt to deal with the problem. The two largest groundwater users, California and Texas, do not, however.

I found the discussion of the water bank immensely interesting. If there is a case for government providing up-front financing, the bank would serve the purpose and still provide a mechanism for full-cost reimbursement of loans along the lines needed to insure efficient water development.

Finally, I return to the plea made earlier that what is most urgently needed is an intellectual framework within which the need for federal intervention and alternative strategies for dealing with emerging issues can be evaluated. In my view, to justify governmental intervention in financing and cost sharing there must be demonstrable evidence of one or more of the following conditions: (1) significant externalities that negotiating parties cannot consider, (2) public goods that provide no incentives for private production, (3) common-property ownership of resources, (4) inefficient private monopolistic or monopsonistic control of resources. In addition, if there is to be federal cost sharing to provide private goods such as irrigation water, municipal and industrial water, and power, the likelihood is great that overinvestment will occur. This is tantamount to saying that if the state and local governments were required to pay the full costs of providing water for these purposes, we would have greater assurance that uneconomical projects would

not be built. If the federal government must redistribute income and wealth, then at least it should do so in the most efficient way possible. Given the present value of water and current levels of economic development, I seriously doubt that new subsidized water is an efficient redistribution mechanism. Efficient development and utilization of water should be given a higher priority as it becomes increasingly valuable.

Notes

1. For example, see B. D. Gardner, K. Lyon, and K. O. Tcw, "The Effects on Agriculture in Utah of Water Transfers to Oil Shale Development," PRJAE-028-1, Utah Water Research Laboratory, June 1976, pp. 1-57.
2. J. Noel, B. D. Gardner, and C. V. Moore, "Optimal Regional Conjunctive Water Management." Unpublished paper, Ag. Econ. UCD, June 1979.
3. B. D. Gardner, "Economic Issues in Groundwater Management." Paper presented at Twelfth Biennial Conference on Groundwater, Sacramento, California, September 20-21, 1979.