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Information, the Decision Forum, and Third-Party Effects in Water Transfers

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Transfers of water from irrigation to municipal and industrial uses are seen as a low-cost approach to the water supply problems of western cities. Rural areas of origin protest that market transfers ignore indirect economic, political, social, fiscal, and environmental effects of changes in water use. The capacity of five different water transfer institutions: the market, courts, legislature, special purpose districts, and administrative agencies, to develop and weigh information about indirect and nonuser impacts is analyzed and compared. All five forums are found to have biases regarding the type of information used. Markets process information on direct economic costs and benefits well but ignore third-party costs; legislative bodies are sensitive to information about indirect and nonuser impacts but distort information on direct benefits and costs; neither the judiciary nor the water agency is likely to consider community and social impacts of water transfers. Special districts could consider both direct and indirect values but are often controlled by a leadership elite, pursuing narrow goals with minimum membership participation. The appropriate forum for decision making depends upon our priorities among values and on the values that are at stake in particular issues.

1. WATER TRANSFERS: A SOLUTION WITH A BUILT-IN PROBLEM

Transfers of water from irrigation to urban use are part of a contemporary change in the face of the west. From the perspective of economic efficiency these transfers are part of a solution to the problem of supplying water to a growing economy in an arid region. The removal of legal and political impediments to market reallocation of water has been widely recommended to promote efficiency in regional water allocations by allowing the resource to move to its highest and best economic use. At the same time, rural/urban water transfers may raise serious equity problems when they shift resources out of economically weak areas into strong ones, widening the gap in income and public sector capacity between urban and rural counties and eroding the ability of rural communities to cope with their fiscal, economic, and social difficulties.

A compromise between the efficiency and equity objectives of regional water policy might seek to facilitate rural/urban water transfers on terms consistent with the support of a viable community in the rural source areas. Such a policy is information intensive because minimizing the area-of-origin cost of transfers requires that the costs be understood at a fine level of detail. Some of these costs, the direct economic benefits of the current rural water user, are well represented in market transactions; others are "external" costs which are borne by private parties who are not agents in the sale or by the community as a whole. This paper is concerned with how different water transfer institutions collect and process information on "external" costs of a water transfer. These area-of-origin costs may be reduced by choosing terms that satisfy the water supply objectives of the importing community at least

overall cost to the exporting community and that strengthen rather than erode the rural capacity for self government. Examples are: intergovernmental agreements or legislation to protect the local tax base; contingency transfers, where water moves only when alternative sources of urban water are in short supply; joint development contracts, where the urban importer agrees to develop the retired lands; linking the transfer to water conservation investments which offset the reduction in water supplies; and finally, barring the transfer altogether. There is no generalized rule for when one or another of these modifications in terms will be effective in reducing area-of-origin costs; good information on the particular rural economy, its potential and its needs, is needed to choose the appropriate policy.

Water allocations come from decisions by interested parties based on their objectives and the information available to them. How and by whom the decision is made, the institutional forum for the transfer decision, will determine both how efficiently the resource is used and how well information on external costs is developed and applied. The next section outlines a condition for improvement in allocation efficiency, including the external cost items. Section 3 discusses the nature of these external costs. Section 4 considers how five different institutional forums behave relative to these conditions, focusing on how each treats the external area-of-origin costs. The forums considered are market transactions, legislatures, courts, special purpose districts, and public administrative agencies.

2. CONDITION FOR SOCIAL IMPROVEMENT

As a first step in investigating the informational environment of transfer institutions, consider the conditions for a water transfer to result in an improvement in allocation efficiency. Young [1986] expresses this condition in a particularly useful way, and we borrow his notation and conditions.

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The values that will concern us are the direct benefit, or willingness to pay of the importer or buyer (DB); the foregone direct benefits of the pretransfer water user or seller (FDB); the conveyance and storage costs of the transferred water (CC); the public and private costs of carrying out the transaction (TC); the cost of the least expensive alternative supply source (AC); the indirect user benefits, such as return flows which are available for diversion or for instream uses (IB_d and IB_s , respectively) that will be realized in the importing region; the foregone indirect user benefits that are lost to the exporting region (FNB_d and FNB_s for foregone diversionary and instream indirect benefits, respectively); nonuser benefits (NB) which accrue to persons in the importing region, including pecuniary or secondary benefits; and nonuser benefits foregone in the exporting region (FNB).

The values a policy of rural area protection seeks to minimize within the context of an overall efficiency improvement are the foregone direct, indirect, and nonuser benefits in the exporting region. The conditions for a transfer to result in an improvement in allocation efficiency are [Young, 1986, p. 1146]

$$DB + IB_d + IB_s + NB > FDB + FIB_d + FIB_s + FNB + TC + CC \quad (1)$$

$$FDB + FIB_d + FIB_s + FNB + TC + CC < AC + (IB_d + IB_s + NB) \quad (2)$$

Condition (1) requires that the total benefits of importing water (direct, indirect, and nonuser) exceed the total benefits foregone by the exporting area plus the costs of the transaction, conveyance, and storage of water.

Condition (2) requires that the real social costs of the transfer, foregone benefits and transactions and conveyance costs, be lower than the cost of the best alternative, adjusted to count indirect gains from the transfer.

3. NATURE OF INDIRECT AND NONUSER EFFECTS

3.1. Physical Effects (IB_d and FIB_d)

The most obvious indirect effects of a transfer on other diversions are physical. These include changes in downstream flows as well as changes in the water table as a result of a change in groundwater pumping patterns. The loss of return flows due to surface water transfers is often incorporated into direct costs by defining property rights to return flows and limiting the amount of water that may be transferred to the amount consumptively used by the rightholder. However, the indirect benefits felt by those whose water supply is augmented by return flows from the importing use could only be internalized by allowing the importer to sell rights to the return flows [Hartman and Seastone, 1970]. Physical effects of a water transfer are entirely site-specific; flow levels on affected streams and water tables may either rise or fall.

Groundwater and surface water are often hydrologically interrelated. A groundwater transfer may affect related surface flows or alter the rate or direction of change in the associated water table. As in surface water transfers, these changes may be in either direction and are site-specific. The costs resulting from the effect of a transfer of groundwater right on pumping lifts or future supplies in the exporting area have been acknowledged in the water administration procedures of several states. In Arizona before 1977, under the doctrine of "reason-

able use," groundwater could not be transported off the land from which it was pumped if the rights of other pumpers would be injured. In a designated Critical Groundwater Area, injury was presumed; neighboring pumpers did not have to show that they were damaged. The 1977 amendments to the Critical Groundwater Act of 1948 eliminated injunctive relief for injured parties; the claim of such parties is now limited to a claim for damages, which must be proven [Connell, 1982]. This change in Arizona law is an example of a reduction of the rights of third parties in groundwater transfers to increase flexibility in water allocations.

3.2. Indirect Instream Flow Effects (IB_s and FIB_s)

These effects stem from reducing (or augmenting) the flow of the stream, changes in stream temperature, in water quality, in the path of the streambed, or in the seasonality of streamflow. The values impacted by these physical effects include environmental degradation, loss of wildlife habitat, loss of recreational opportunity, economic and environmental losses due to degradation of water quality, and increased (or decreased) flood hazard.

Policies to limit the external impact of reductions in instream flows have employed most of the institutions that will be considered later. A market approach provides for the appropriation or purchase by the state of water rights for instream flows [Tarlock, 1979]; state water agencies may be authorized or ordered to reject applications for appropriation or transfer of water if they are not in the public interest [Wilkinson, 1987, pp. 23-27; Robie, 1977]; the courts have protected instream flow rights through the public trust doctrine [Dunning, 1985; Ausness, 1986; Lazarus, 1986], and legislatures have imposed instream flow requirements through the federal Endangered Species Act and state wild and scenic river designations.

3.3. Nonuser Benefits and Costs (NB and FNB)

These include any secondary income effects as well as the social effects of the transfer. A water transfer often involves a reduction in economic activity in the exporting region. The region loses not only the incomes represented by the direct benefits but also the incomes which depend on the activities which produce direct benefits. If agricultural land goes out of production, sales in the agricultural supply sector and production in agricultural processing industries are also reduced; on the other hand, importing regions gain production in municipal service sectors and urban industry. Even where the net effect is positive, the transfer represents a regional redistribution of indirect incomes from rural to urban areas that may not be desirable from a policy standpoint. It is entirely possible that the income to sellers of water, reinvested in the exporting area, may produce secondary benefits equal to or greater than those that have been lost. For this to happen the revenues of the sale must stay in the water-exporting area, meaning that local investment opportunities must exist or be created. The potential for local investment is one of the areas in which local information, if it is generated and used, may be effective in mitigating or eliminating external costs.

The loss of secondary incomes in Owens Valley as a result of Los Angeles' purchase of water rights in that area amounted to a localized depression. The area of Laws, Round Valley, and Bishop, California, within the valley, suffered a 20% de-

crease in population between 1920 and 1930; six elementary schools were closed and six others were consolidated; sales volumes in Bishop fell by more than 50%. The reparation claims against Los Angeles included claims for damages due to loss of income from mechanics, laborers, barbers, Indian farm laborers, and medical personnel, etc. These claims were eventually settled by Los Angeles buying most of the town properties as well as the agricultural lands to which the water rights were attached [Ostrom, 1953].

An important related nonuser loss is the exporting region's loss in tax base. This loss has two sources. First, many water importers are municipalities so that the lands or real property rights they hold are not taxable. Because of economies of scale in transportation, water rights purchases, or purchases of land for its water rights, tend to concentrate spatially. A large municipal purchase in a localized area can eliminate a significant share of the local tax base in a single transaction. Phoenix's purchase of the McMullen Valley area of La Paz County in December of 1986 took 10% of the county's taxable land off the tax rolls; up to 32% of the private land in La Paz County could be purchased for its water rights [Nunn and Checchio, 1987]. The threat to school districts, fire districts, and irrigation or water conservancy districts near a large municipal purchase is even greater because the districts are smaller. In 1945 the city of Los Angeles owned 98.84% of the private farmland in Owens Valley and 88% of the town property [Ostrom, 1953, p. 127], creating obvious problems for local government revenues. This situation eventually led to the passage of a constitutional amendment making municipal property owned for water rights taxable [Ostrom, 1953, p. 135].

A second impact on tax revenues comes from the reduction in the level of economic activity or in the rate of growth of economic activity in the exporting area, reducing assessed values, sales, and income, and consequently, tax revenues. Assessment rates are often limited by law, so that loss of tax base cannot be made up by raising taxes. For rural areas that are not yet incorporated the loss of potential tax base can foreclose the opportunity for self government. Without taxable property a town cannot incorporate, hire administrators, and make collective decisions on matters that affect their lives.

The viability of water-related institutions may be threatened by transfers, giving rise to a third class of nonuser loss, loss of social infrastructure, with a significant impact on quality of rural life. The Middle Rio Grande Conservancy District in central New Mexico is contesting the right of its members to sell their water rights as individuals. Such sales threaten the political viability of the district in an era of high demand for water rights [Gisser and Johnson, 1983]. If the district is no longer an important element of the local social fabric, weakening its power may be appropriate. This, however, is a political and not a market decision.

Culture itself may be seen as a water-related institution. A recent New Mexico court decision barred a transfer of agricultural water rights to a ski resort on the basis that the transfer was contrary to the public interest. Judge Encinias of the New Mexico Court of Appeals said (in the matter of Howard Sleeper et al., Rio Arriba County, cause RA 84-53(C), 1986):

This region of northern New Mexico and its living culture are recognized at the state and federal levels as possessing significant cultural value, not measurable in dollars and cents. The deep-felt and tradition-bound ties of northern New Mexico families to the land and water are central to the maintenance of that culture. . . . I am persuaded that to transfer water rights, devoted for more

than a century to agricultural purposes, in order to construct a playground for those who can pay is a poor trade, indeed.

Redistribution of political authority over resource use from the area of origin to the importing region is a fourth nonuser effect. A public agency's ability to implement rational water use policy and planning may be seriously impaired by export of resources outside of the political jurisdiction. In New Mexico, for example, where the state takes an active facilitating role in water management, appropriators are under the jurisdiction of the state engineer, who issues permits, allows transfers, and sets conditions for water users in accordance with his powers under state law. In 1980, El Paso sought to appropriate water from the undesignated Mesilla-Bolson basin in southern New Mexico, and the federal District Court in El Paso versus Reynolds (1983) decided that the provision of New Mexico law which prohibited out of state exports was in violation of the Commerce Clause of the U.S. Constitution. The decision placed New Mexico in a situation where an appropriator whose water uses are not under the jurisdiction of the state engineer sought water rights under state law. The ability of the state engineer to implement water planning and policy with respect to the water appropriated by El Paso is severely limited relative to instate water users. The decision has given rise to changes in the New Mexico law and to an ongoing reconsideration of state water policy to determine how to protect New Mexico's interests under the new situation.

Finally, important social effects on nonusers depend on whether the transfer is perceived as following due process. The essential elements of due process are (1) notice to those affected, (2) an opportunity to be heard and to question others who are heard, (3) access to professional advice and counsel, (4) an impartial arbiter, (5) rational standards for decision, and (6) a public announcement of the decision with its rationale. In a market transaction, most of these elements are absent for third parties. Market transfers are often perceived as unfair or underhanded, because there is no notice to affected parties, nor do they have an opportunity to be heard. Where this is the case, exporting communities may be torn by internal conflict and a pervasive feeling of helplessness and victimization. In Owens Valley this phenomenon reached its apogee. A 1928 report observed [Ostrom, 1953, p. 130]:

... the Valley is, even today, a hotbed of suspicions, prejudices and hatred. Suspicions are mutual and widespread. The Valley people are suspicious of each other, suspicious of newcomers, suspicious of city men, suspicious, in short, of almost everybody and every thing. . . . Owens Valley is full of whisperings, mutterings, recrimination and suggestion of threat of one kind or another

3.4. Summary

Many of these external costs cannot be quantified. The loss of community trust that comes from the perception that due process has been violated, erosion of political authority, and deterioration of social infrastructure cannot be captured as dollar values. Others, secondary income effects, and declines in tax revenues, for example, are capable of quantification but may have values which are small relative to the benefits accruing to the importer. The magnitude of these costs speaks to the efficiency of the new allocation. However, in equity terms these costs should be given weight if they are important in the context of the small rural economy, regardless of whether they are counterbalanced by benefits elsewhere.

4. ALTERNATIVE INSTITUTIONAL FORUMS

Information on the value of benefits and costs is developed when decision makers compare alternatives; which benefits and costs are defined by this process and which alternatives are included depends on the institutional context of the transfer. In a market transaction the buyer and seller compare the purchase with the next best use of the funds to be invested or realized in the transaction and each decides to transact or not. Before this decision is made the value of the water cannot really be said to have a magnitude; the decision itself creates the scale on which benefits and costs are measured.

Similarly, decisions made in the legislature, the judiciary, special purpose districts, and state or federal administrative agencies involve a comparison of the transfer with alternatives. Since both the decision makers and the alternatives considered differ among these forums, the information generated by the choice process will be quite different for each. We are particularly interested in the capacity of these institutions to generate information on the foregone direct, indirect, and nonuser benefits, the values which are lost to the area of origin. In the sections that follow the conditions for a transfer to take place in each of these forums will be considered briefly as they affect the information developed and applied by the decision makers.

4.1. Market Forum

Staying with Young's notation and conditions [Young, 1986, p. 1146], a market transaction can take place when

$$DB > FDB + CC + TC \quad (3)$$

$$FDB + CC + TC < AC \quad (4)$$

4.1.1. *Biases of the market forum.* Equations (3) and (4) are much simpler conditions than (1) and (2), since the indirect or nonuser benefits and costs carried by nontransactors or "third parties" do not influence the decisions of the buyer or seller. The market forum is therefore biased in favor of direct benefits and costs and against indirect or nonuser benefits and costs. On the other hand, transactions costs can be expected to be low when indirect and nonuser effects are neglected.

4.1.2. *Information and the market forum.* Rational transactors in a market context will not look for or respond to the missing information. Moreover, third parties have no incentive to invest scarce time and resources in evaluating and communicating information on these "external" costs, since transactors will not consider such information.

4.1.3. *Summary.* There are then three consequences of the exclusion of third party or external effects from market decision making. First, there is no "automatic" balancing of benefits and costs in the decision, so there is no guarantee that the transfer will result in an efficiency improvement. Second, choice, the mechanism that creates information on values, is missing for third parties; and third, transactions costs, at least those associated with litigation over third-party effects, are reduced by the exclusion of third parties from the transaction. If external effects are small, the exclusion of third parties may reduce costs with few ill effects; if they are large, the exclusion of third parties introduces a potential for misallocation due to lack of information and poor structuring of incentives. In either case, excluding third party costs from the compensation to the area of origin and failure to charge for third party benefits in the importing region accentuates the distributional or equity problem of transfer from the "rural poor" to the "urban rich."

4.2. Legislative Forum

In a legislative forum like Congress or state legislatures the condition for a transfer to be accepted hinges on the voting power of the interests. If V is an operator that carries benefits into votes, this condition might be expressed:

$$V(DB, IB_d, IB_s, NB) > V(FDB, FIB_d, FIB_s, FNB) \quad (5)$$

4.2.1. *Information and the legislative forum.* The legislative information-gathering institutions, especially committee hearings at which testimony from interested parties and reports from state or executive agencies are solicited, introduced, and considered, form a national repository of information on the costs and benefits of legislative proposals. A wide range of information is successfully elicited and produced, in the hope that it will influence legislative decisions. While legislators have complex motivations in deciding how to vote on legislation, including career ladder advancement, institutional loyalties and partisanship, concern with constituency support is a major influence because without reelection, other goals generally become irrelevant. Constituency support is especially important in water resource policy because the subject tends to be perceived in highly particularistic and localized terms [Ingram et al., 1980]. Legislators are especially attuned to constituency pressure when it is organized and intense. Consequently, direct benefits are not favored by the legislative forum, since indirect and nonuser beneficiaries have the same access to elected representatives as direct beneficiaries. In fact, the political process of representation is particularly sensitive to issues affecting grass roots interests such as community well being, security, and control that prompt high levels of political participation.

4.2.2. *Biases of the legislative forum.* The incentive to satisfy constituency pressure creates distortions in comparing alternatives in water resources decisions. Water development solutions involving the construction of new projects have in the past been highly favored. Traditionally, interests that benefit from a legislative proposal (the left-hand side of (5)) build support by adding elements to the project to "buy" support for the proposal and to compensate interests that are damaged, a process that has been called "consent building," "distributive politics," or logrolling [Ingram, 1969; Lowi, 1966]. Logrolling puts a thumb on the scale of the efficiency balance by consolidating alternatives that are, in fact, not dependent on one another.

Distortions in the legislature's efficiency accounts may also occur when the environmental, regional, or conservationist opponents of a water resource project (the right-hand side of (5)) seek support by broadening the conflict. This is done by identifying the interests threatened by the project with a class of similarly situated interests that are not actually affected by the particular project. This approach may take the form "Project A threatens the existence of species X. The extinction of all endangered species would have an infinite cost to society. Therefore Project A has an infinite cost to society." This has been called "regulatory politics" (because the mechanism it employs is to secure a regulation that, for example, prohibits projects that threaten endangered species) [Lowi, 1972]. However commendable on other grounds, the practice of regulatory politics, like that of distributive politics, scrambles the efficiency accounts.

Finally, costs that involve expenditures of public funds may not be counted as costs at all in the legislative decision and may even be counted as benefits. (Agencies support projects that will enhance their budgets and prestige regional repre-

sentatives support projects that will bring federal dollars into the area.) If the general taxpayer is not organized and represented, the expenditures may not be counted as costs [Cuzan, 1983].

There is a strong bias in the legislative process toward interests that are easily mobilized into political action. Mobilization is more apt to occur when the impacts of a proposed policy are immediate and focused upon particular, identifiable groups. That is, "V" weights values that are concentrated on special interest groups more heavily than values that are dispersed among the general citizenry. Political activity is also likely to be associated with issues which have a strong symbolic and emotional appeal. The widely shared, diffused impacts which leave no identifiable group perceivably better or worse off than any other group are far less likely to generate political activity. Consequently, proposals that offer specific benefits to a coalition of minority interests often prevail in spite of large costs borne by a disorganized majority that is affected negatively but in a diffuse manner. For this reason, Congress historically has authorized packages of specific projects which help local areas but are environmentally and economically costly for the public at large. At the same time the structure of legislatures may protect some insular interests. A small rural state which is the area of origin for a proposed transfer has the same number of votes in the Senate as the more populous urban state that will receive the water.

4.2.3. *Summary.* Indirect and nonuser costs and benefits are not slighted in the institutional context of the legislature as they are in the market. Incentives are present for "third parties" to develop information about these costs and to innovate arrangements and compromises to minimize them. However, dispersed costs and benefits, such as capital costs paid for by general tax revenues or environmental amenities enjoyed by the public at large, are not necessarily well represented in this forum. For this reason there exists no automatic balancing mechanism in the legislature that tends toward efficiency.

4.3. *Judicial Forum*

In deciding a particular case the judicial forum is not charged with maximizing net social benefits but rather with the protection of legally established interests. The way courts perform this function is to interpret facts in the context of a rule of law so as to define the rights, duties, powers, and immunities of public and private decision makers.

Since courts do not make transfer decisions, but rather decide what the authority of private or public decision makers is, the condition for a water transfer to take place in the judicial forum has two stages. In the first the court determines in what forum the transfer decision should be made and what the rights, duties, powers, and immunities of the parties are. The allocation of rights, etc., essentially determines which benefits and costs will be counted and which will not influence the transfer decision. The second stage, the actual transfer decision, is carried out in some other forum as stipulated by the court.

If *R* is the rule of law which translates the situation of the parties of interest into a definition of the rights, duties, powers, and immunities of the parties, stage one might be represented by

legal standing		
historical use		rights, duties,
resource conditions	→ [R] →	powers, immunities
contractual history		of the parties
statutory law		

(6)

In the application of *R* the court does not generally weigh the magnitudes of the direct, indirect, and nonuser effects, though an interest must reach some threshold level in order to be recognized as having legal standing. In the evolution of judicial doctrine, however, courts do consider the public welfare effects of the rule that is being promulgated. The judicial adoption of the doctrine of prior appropriation, for example, was justified by its desirable economic effects. The Supreme Court of Colorado argued that "To apply the [riparian] rule contended for would prevent the useful and profitable cultivation of the productive soil and sanction the waste of water upon the more sterile lands." (Coffin versus Left Hand Ditch Co., 6 Colo. 443, 1882). This suggests that *R* evolves in the direction of defining protected interests so that conditions (1) and (2) will be satisfied in the "typical" cases, subject to the constraint that previously protected interests not be unreasonably damaged. Over time, previously unprotected indirect and nonuser benefits and costs would tend to acquire judicial recognition as they become large and/or the transactions costs of protecting them become smaller.

4.3.1. *Information and the judicial forum.* Information is developed by and for the judicial forum in the form of evidence. In a judicial proceeding, parties marshal evidence to make their case; information that is extraneous to or incompatible with this end is not brought before the court. When parties who experience significant effects are not represented in the proceeding, either because they do not have standing or because they have not identified themselves and come forward, the information on the value of these effects is not heard by the court.

4.3.2. *Biases of the judicial forum.* It is frequently true that a rule of law defining certain legally protected interests develops before some class of affected parties has identified itself and come forward. Such rules are hard to modify without injury to the interests that are established by the rule. In the interest of social stability and protection of property, courts are reluctant to change established rules of law. The rule of absolute ownership in groundwater is an example. Before the external effects of pumping groundwater were well understood, courts developed and followed a rule which allowed landowners to take water from beneath their land in any amount and for any purpose. Once a better understanding of the resource showed that neighboring landowners may be severely damaged by unconstrained pumping, courts found it difficult to recognize these interests without damaging the property interests which had been granted under absolute ownership.

When new information makes an existing rule of law obsolete, legislatures, under their police powers, have a broader authority to change the law than do courts. However, while legislatures have the authority to protect the newly discovered interest, their sensitivity to concentration of interests may make them reluctant to do so if the existing interests are more concentrated than the emerging interests.

4.4. *Special Purpose District as a Forum for Transfer*

The special purpose district (irrigation district, water conservation district, municipal water supply district, flood control district, etc.) differs from the legislative forum in that its boundaries have been drawn to include those who are affected by water-related decisions. Within the geographic boundaries, voting rights in the district may depend on whether one is a

water user, and the weight of the vote may be related to the number of acres irrigated (that is the district may focus representation on direct beneficiaries). Another difference between transfers among special purpose districts and legislative transfers is that interdistrict transfers involve transactions: The exporting district is a seller, the importing district a buyer.

Contrasting the decision of an individual to sell water rights or commodity water with the same decision made by a district, we expect either one to require that their foregone direct benefits be compensated. For the district, minimum acceptable sale price may also reflect any foregone indirect benefits from diversions and instream flows as well as the foregone nonuser benefits felt by members of the district (indicated by superscript d in (7), below). If S is a function that translates costs felt by members of the district into willingness to sell, then

$$WTS \geq S(FDB^d, FIB_s^d, FIB_d^d, FNB^d) \quad (7)$$

For districts buying water rights we expect the district's willingness to pay to include direct benefits and also the indirect benefits of diversions and instream flows and nonuser benefits that are felt by members of the purchasing district (indicated by superscript d in (8), below), net of transactions and conveyance costs. Indeed, municipal water providers are the buyers in many contemporary purchases of water rights, and their offer price sometimes exceeds their expected revenues from water sales, perhaps because these indirect and nonuser benefits push willingness to pay up. If D is a function that carries benefits felt by district members into the district's willingness to pay, then

$$WTP \leq D(DB^d, IB_s^d, IB_d^d, NB^d) - TC - CC \quad (8)$$

If district decision making provides incentives to develop and present information on the effects of the transfer, and S and D are unbiased and most of the direct, indirect, and nonuser values affected by the transfer are felt by district members, the transaction in water between districts is likely to meet the efficiency condition (1).

4.4.1. *Information in the special purpose districts.* All voting members of the special purpose district have a right to notice and some means to influence water-transfer decisions that affect the district. To the extent that the jurisdictional boundaries include affected parties, there is notice and influence. Incentives are present for affected parties to develop and present information to their district board on the magnitude and nature of these effects, and to use this information in an effort to rally support and affect district policy. However, the translation of these interests into district policy (S and D) depends on the political dynamic of the district.

4.4.2. *Biases and the special purpose district.* A special purpose district is a political entity with semigovernmental powers organized for a special purpose. This apparent redundancy is not as trivial as it seems. The purpose which motivates the formation of the district will be reflected in the district's constitution and bylaws, in the active constituency in district politics, in the backgrounds and orientation of district staff, and in the definition of district function and tasks. It may also be reflected in the voting procedures of the district. Where voting privileges in an irrigation district, for example, are based on acres irrigated rather than a one-person/one-vote system, the values counted by a water-selling district are more likely to exclude foregone indirect and nonuser benefits. Conversely, the one-person/one-vote district gives greater weight to dispersed effects.

Studies of these two classes of water districts in California have found that in districts in which all resident registered voters are eligible to participate in elections for the board on a one-person/one-vote basis, "Elections ... are more competitive and incumbency periods are shorter." Consequently, "such an electoral process is more likely to produce fairly representative, broad-based opinion on the district's governing body" so that "there is a possibility that competing interests can be represented and eventually compromised and harmonized." [Goodall et al., 1978, pp. 97-98; Goodall and Sullivan, 1984, p. 76].

In contrast [Goodall and Sullivan, 1984, pp. 77, 97],

In a property-weighted electoral system, where private and public interests are inseparable, owners of small holdings are likely to find it difficult or even impossible to appeal the decisions of a governing board.

It means also that the distinction between political and economic power, and between public and private considerations of welfare and of advantage, have been blurred. Authority in many of the state's larger water districts has been transferred to privately organized interests.

At times the control of public government, in this case the water district, by private organizations may be complete.

Even a one-person/one-vote district tends to be biased toward interests which identify with the special purpose of the district: These interests will in general be better informed, have closer relations with the district staff and with the personnel of federal and state agencies whose decisions affect district policy, have a better working knowledge of the details of district operation as they affect the special purpose interests, and consequently, will be influential out of proportion to their numbers. The nature of S and D will depend on how decisions are made and how benefits and costs are distributed.

4.4.3. *Summary.* Depending on the design, jurisdiction, and political structure of the special purpose district, these entities have potential to incorporate a wide range of values into their decisions and to provide incentives to develop and implement information as to the value of alternative uses of water. The relation between the political structure of the district and its informational capacity is a topic that deserves further study. Existing work strongly suggests that the basis of voting privileges strongly influences the district's response to information on indirect and nonuser benefits and costs.

On the other hand, the combination of a political decision-making process and a transaction forum does seem to have promise for exploiting the transaction's flexibility while adapting terms of transfer to area-of-origin concerns. Water districts have developed quite complex types of transfers, contingency sales in which the importer takes water only under conditions of drought; transfers of water conserved through investment by the "buying" district; sales in which the buyer assumes district debt and leases back the right to use water to the exporting irrigation district. Exporting districts have searched for terms which provide the buyer with a real water supply, while retaining some rights and power in the selling area, which may be of relatively little importance to the individual irrigator while it is very important to the maintenance of the district and of the community.

4.5. *Administrative Forum*

It is not entirely possible to separate the administrative forum, the state or federal water allocation agency, from the others discussed, because to some extent agencies act as agents

of the other decision-making bodies in implementing their allocation decisions. Yet agencies have a great deal of influence upon decisions made by legislatures and courts because they provide the information and technical expertise that undergirds these decisions. Further, the policies made in other forums are often vague and general, allowing a great deal of leeway to the implementing agency. Administrative agencies are not simply bland and unbiased instruments; they have their own organizational doctrine and institutional interests and their own clientele. Agencies depend upon the interests they serve for support for continued funding and maintenance and expansion of agency missions. At the same time, agency officials, especially in the field of water, are professionals in a field of expertise, and their disciplinary attachments dictate that decisions be rationalized in professional terms and meet certain scientific criteria.

4.5.1. *Information and the administrative forum.* More than any other forum except for courts, administrative agencies must justify their decisions on the basis of explicit formal analysis. If the rules and regulations under which agencies operate dictate a consideration of indirect third party effects, such information will be formally considered. Whether the information actually affects decision making depends upon the political setting within which the agency operates. Agencies have become highly sensitive to information about the impact of allocation decisions on efficiency due to pressure from the Office of Management and Budget (OMB) and the discipline of the budgetary process; they have become sensitive to environmental effects due to the institutionalization and growing influence of environmental concerns. In comparison, social impacts of water allocation decisions have been downplayed in agency analysis. For instance, multiobjective planning for water resources as it evolved to its zenith during the Carter Administration emphasized national economic efficiency and environmental quality and put regional effects and social well being in a secondary position.

4.5.2. *Biases of the administrative forum.* Historically, the federal construction agencies such as the Army Corps of Engineers and Bureau of Reclamation have been heavily biased in favor of information that supports their engineering-oriented missions. Large-scale construction projects were recommended and implemented by agencies which were both inefficient and environmentally damaging. Agency biases have been modified to some degree through the rules for project evaluation, particularly the requirements for cost/benefit analysis and environmental impact statements. To be influential, such reforms cannot be limited to the adoption of formal rules; a policy review structure in which advocates of the protected interests enter into the decision process has been necessary to make the rules effective. To illustrate, until recently, cost/benefit analysis was used by the federal construction agencies to dress bureaucratically desirable projects in the "fig leaf" of economic respectability. The introduction of review by other agencies within the executive branch such as the OMB and the Environmental Protection Agency was the catalyst for incorporation of the new information on economic and environmental values generated by the cost/benefit and environmental impact studies into the decision-making process [Ingram and Ullery, 1977].

The biases of state administrative agencies, which are usually water management rather than construction agencies, are different from those of federal agencies and from one another. While we will not attempt an analysis of these here, it is a subject that merits study.

4.5.3. *Summary.* Administrative agencies, like the other forums, have biases toward certain types of information in water allocation decisions. Agency receptivity to information is affected by agency missions, expertise, the disciplinary background of personnel, and the kind of analysis required by the rules and regulations under which agencies operate. In general, agencies have not been especially sensitive to indirect and third-party effects of water allocation.

5. CONCLUSIONS

This paper has addressed the question of the type of forum that is likely to be most sensitive to the equity implications of rural to urban water transfers. Five different types of forums: markets, courts, legislatures, special purpose districts, and administrative agencies, were analyzed in terms of their capacity to generate and consider information concerning indirect and nonuser impacts of water transfers. All were found to be biased in the type of information generated and considered in decision making. Therefore the appropriate forum for decision making depends upon our priorities among values and on which values are likely to be at stake in particular issues.

To the extent that rural to urban water transfers have significant indirect and nonuser impacts, reliance upon markets will not serve broad social efficiency, since markets, while admirable processors of information on direct economic costs and benefits, tend to minimize and ignore third-party costs. Under current conditions neither the judiciary nor the administrative agency is likely to be especially sensitive to indirect and nonuser impacts of water transfers. The standing to sue and justiciable rights of nonusers and third parties are not well established. Social impact assessment as performed by agencies is still primitive, and those who suffer indirect and nonuser effects of water transfers are rarely members of administrative agency clientele groups. Formalizing requirements for social impact analysis could make administrative agencies more sensitive to such concerns, particularly if reinforced by an oversight body representing those interests. Legislative bodies are better designed to register information about indirect and nonuser impacts but often systematically distort information on the direct benefits and costs that markets measure so well. Special districts have the potential to reflect both efficiency and equity concerns, depending upon their jurisdiction and structure; however, many special districts become the tools of a fairly restricted group of members and pursue narrow goals with low levels of membership participation. Mediation or negotiation arrangements in which special districts, counties, cities, and state agencies all have an opportunity to be heard and to influence a transfer decision are an alternative to all of the traditional political forums [Cox and Shahman, 1985; Eden, 1987]. One argument in favor of the "negotiated-agreement forum" is that it develops a richer information base. These flexible institutional mixtures merit special consideration as alternative forums.

No general statement can be made about the external effects of water transfers; their magnitude, incidence, and even their direction depend on the particular circumstances of a given transfer. We observed that in addition to physical, economic, and fiscal effects, water transfers may have a negative impact upon such important values as political representation and self determination in rural areas, community well being, security, and opportunity. Appropriate political forums provide affected communities with an opportunity for participation and self determination; in addition, the information that is obtained through the political forum is needed to evaluate the

indirect and nonuser costs and to identify least cost mitigation strategies.

The flaws of the political forums in evaluating information on direct costs and benefits have made us enthusiastic about the good qualities of markets in this area; we should balance our enthusiasm with an awareness of the flaws of markets in collecting and evaluating information on equities and indirect costs and benefits.

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