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The Economics of Water Transfer

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THE ECONOMICS OF WATER TRANSFER*

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Rational development of water resources presupposes desirable consequences on real income, whether it be at the level of an individual, some local region, or the nation at large. While the parties affected will be concerned with those income effects which are incident upon them, policy decision for water development will invoke income criteria that correspond to the jurisdictional scope of the agency primarily responsible for development. The income consequences will be determined in part by the devices employed for project financing, repayment, and water transfer. The present discussion is concerned with the way in which water transfer arrangements affect the economic growth resulting from water resources development.

I

THE ECONOMIC SIGNIFICANCE OF WATER TRANSFER

A continuum may be envisaged through which water resources are developed, allocated to users, and finally committed to use. Development activities increase the quantity of water available for use over a given period within a service area,[1] which in turn is allocated to users through the transfer process. Transfer thus refers to ways in which users obtain water.

The process itself has three aspects, each of which is important for economic growth: (1) the legal, (2) the financial, and (3) the physical. The legal aspect includes the variety of ownership equities and forms of contract that are used to facilitate water exchange transactions. The financial aspect refers to the price or contractual payment arrangements that may be involved, while the physical aspect of water transfer includes the facilities and structures that permit the transfer to occur.

The terms "water development" and "water use" have been used in a way parallel, if not synonymous, with "production" and "con-

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1. This will involve a time-weighted quantity aggregate for situations in which the timing of water availability alone is affected.

sumption."[2] Although the analogy is of questionable validity for quantitative estimations of growth,[3] it provides a useful context for examining water transfer. A market context is suggested wherein transfer is analogous to a sales transaction. Parties to the transfer may be individuals or agencies, and the process may occur at different market "levels." Transfer between entities at the same marketing level may be termed "horizontal" as distinct from vertical transactions which typically might involve transfers of water from a district to its individual members or from a federal or state agency to a local district.

The concept of "market level" suggests different stages within the chain of agencies and organizations which stretch from those engaged in water development at one extreme to actual water use at the other. Each component in this spectrum theoretically adds to the value of water, and its activities represent investments either in the form of capital structures or the services of management, regulation, and maintenance. As water passes from the jurisdiction of one organization to the next, fees or other charges usually are made to finance the investment program represented at each particular level.

Primary emphasis is placed on vertical transfer procedures, although horizontal water transfers also have important implications for economic growth.

Economic growth may be viewed as a comparison of the real product emanating from an area at two separate points in time, or a rate of growth continuously changing over time. The interpretation one adopts is strategic for its relationship to water transfer.

From a comparative static standpoint, the transfer process may be considered as a mechanism through which production activities involving water are initiated. The economic function of transfer is primarily one of allocation, and customary efficiency criteria are conceptually valid. The bulk of recent literature on economic growth has been concerned with precisely this interpretation.

The other viewpoint considers economic growth and water transfer within a social environment characterized by continual change.

2. I. M. Lee, Optimum Water Resource Development: A Preliminary Statement of Methodology for Quantitative Analysis (Giannini Foundation Report No. 206, Univ. of Cal. 1958).

3. Aside from the difficulties inherent in a water production function, there is often no clear separation between water production and consumption in terms either of processes or decision agents.

The economic functions of water transfer now include more than merely allocating water; they include maintaining a given rate of investment by agencies within the marketing spectrum. Whereas the comparative static view of economic growth may lead one to consider water transfer as a means of allocating a given stock of water, a more dynamic interpretation requires water transfer to maintain and enhance the functioning of a large array of water organizations, each of which engages in its particular type of investment program and all of which affect the economy's output. The criteria which are relevant for evaluating various water transfer procedures in this broader sense cannot be defined on an a priori basis. Their specification requires understanding the functions of the entire set of activities and relationships discussed above.

II

IMPLICATIONS FOR ECONOMIC GROWTH

What functional relationship may be posited between water transfer and economic growth as defined? Insofar as water transfer facilitates water use, it enables a significant resource to enter the economy, the full consequence of which depends upon the eventual form of use. If used to initiate new production, the net value of the goods produced is added to the system's economic output. If used to alter or "displace" previous production as, for example, the introduction of irrigation in an existing dry-farm area, the excess net value of irrigated crops over the displaced dry-farmed output represents the increment to the economy's output. A third type of use might involve the provision of supplemental water to an area possessing local supplies of water which are declining in quantity or quality. The consequence of such a transfer might be the perpetuation of production which otherwise would have been impossible because of water deficiencies. Again, additional goods or services would be added to the region's economic output.

A. Water Mobility and Economic Growth

Perfecting systems of water transfer makes water a more mobile factor of production. The relationship between the degree of factor mobility and both the rate and composition of economic growth claims a substantial literature. For purposes of the present discussion, two arguments from this literature are relevant. The first argument claims that the greater the mobility of a given productive factor, the greater will be its eventual contribution to the economic product of the system at large.[4] This assumes that uses in which water has high productivity will "outbid" less efficient ones for the limited mobile factor. The second argument stands in opposition to this, arguing an inverse relationship between mobility and economic output.[5]

This apparent dichotomy stems from different spatial interpretations of an "economy" rather than a contradiction in logic. The first argument considers an entire, self-contained economic system; the second considers a regional component of such a system. Consideration of the former imposes fewer constraints on factor inputs which, in turn, affords greater flexibility and adaptability to production processes using mobile resources. Viewing growth from a sectional standpoint, imperfectly mobile, yet sufficiently scarce, resources constitute a stimulus for the regional importation of other factors. This may affect both the composition and magnitude of regional output. The attraction of the mobile "other factor"—or mobile water uses—will tend to increase regional product by the amount of rent or quasi rent imputed to the relatively immobile water factor.

It should be emphasized that transfer refers to the exchangeability of water, not merely its physical transplacement. Perfections in tenure arrangements or the fractioning of fee simple ownership may enhance exchangeability without affecting inherent difficulties in its physical transplacement. A resource's economic mobility may be enhanced by perfecting either institutional or physical aspects of transfer.

B. Some Quantitative Problems

Quantification of economic growth resulting from water transfer poses numerous difficulties. A particular problem is encountered in the transfer between public and private agencies,[6] namely, the problem of determining value for public goods.

4. This proposition is implicit in the classical notion of general equilibrium. It permits a resource to "migrate" to that use in which it has the highest marginal value product. If immobility thwarts this, the size of the system's economic product is reduced. See K. E. Boulding, Economic Analysis (Harper & Bros. 1941); A. W. Stonier & D. C. Hague, Textbook of Economic Theory 123-47 (Longmans, Green & Co. 1957).

5. J. H. Dales, *Comment* on T. W. Schultz, *Connections Between Natural Resources and Economic Growth,* in Natural Resources and Economic Growth 16 (Spengler ed., Resources for the Future, Inc. 1961).

6. Similar problems may exist even though the transfer initially is between public agencies, so long as subsequent transfer is made involving a private individual or organization.

According to the traditional concept of the circular flow of an economy, an identity exists between the wages paid factors of production and total economic product.[7] This identity is preserved in actuality only if all residual rents are calculated as factor costs.[8] Factor costs represent resource values in alternative uses, and, hence, residual rents above this cost cannot be independently estimated.[9] One needs to compute the excess of product value over factor costs, calling this a residual rent aggregate for purposes of the formulation suggested above.

If resources such as water, being transferred between public and private agencies, are introduced into the circular flow, how should their value be computed? If water is freely given to users, its cost being paid from general tax receipts,[10] the cost of "other factors" has increased due to their utilization in water development. But how has the value of the total product changed? To be sure, the free water which is made available will induce factor recombination and consequent changes in output, distribution, and thus the real value of the economy's output. But how is this to be computed?

The United States Department of Commerce has argued that public goods should be accounted for by including their factor cost values in the measurement of economic output. These are the cost of factors used to produce the public good or service. The Department considers public goods and services, which are priced in the market, as final consumer goods; for computational purposes, they are not distinguished from privately produced and marketed goods.

Two different phenomena are measured, depending on whether water is "priced" or freely distributed. In the first instance, the marginal value of the last unit of water to consumers is being measured if the pricing is competitive;[11] in the second, factor cost of water production measures the value of resources employed in

7. These "wages" include interest payments, profits, and offsets for depreciation of capital assets.

8. R. T. Bowman & R. A. Easterlin, *The Income Side: Some Theoretical Aspects*, in A Critique of the United States Income and Product Accounts 149 (National Bureau of Economic Research, Princeton Univ. Press 1958).

9. For a provocative discussion of this and related points, see Forte & Buchanan, *The Evaluation of Public Service*, 69 J. Pol. Econ. 107 (1961).

10. For our purposes, it may be assumed that the factor costs are paid from neutral income tax receipts, which have no effect on existing price relationships in the economy.

11. The term "pricing" is used here in the narrow sense, implying a bidding situation that reflects the intersection of supply and demand functions. It further implies a volume-based price that is directly incident on the water user.

water development in their highest alternative uses. The numerical results also will differ. Thus, according to present United States Department of Commerce practice, public goods not sold on a reasonably open market will tend to be undervalued in terms of the statistical computation of national output.

Going deeper into the problem, we may consider two situations—one in which a vertical transfer of water is made without charge to the transferee and one in which the same quantity of water is sold on a reasonably open market. The free-water situation will be characterized by a lower general price level because water is being priced at zero; this will result in prices for final goods that do not include a return to water. The second situation will result in a larger economic output because water's market price will be reflected in a higher price of final goods. However, the apparently smaller income generated in the first situation could buy all the goods in the second situation at its own price level.[12] The test of invariance holds in this instance, and both situations represent identical rates of real economic growth.

If we assume, as seems plausibile, that less water is used in the second situation than the first because of its price to users, fewer resources would be devoted to the production of water and more to the production of other items of output than would be the case in the first situation. The composition of output in the two communities differs. Judgments regarding appropriate weights have to be made for an index number comparison to be achieved, and the welfare consequence is statistically indeterminate.

C. Implications for Efficiency and Equity

A transfer process which allocates a limited resource to the highest competing use may be considered efficient[13] and will be reflected in a rapid rate of growth for a short period. The efficiency of economic growth, however, also is affected by the duration of the high rate. A very rapid rate of short-term growth may be less desirable than a somewhat lower rate of growth over a longer time interval. The problem of appropriate comparisons has remained a perpetual issue in social economics. Suffice it to say that a compari-

12. See Forte and Buchanan, *op. cit. supra* note 10.

13. Economic efficiency implies receiving the largest value of output from a given value of inputs within environmental conditions usually held stable through *ceteris paribus* assumptions.

son of present values of growth paths over time seems an analytically valid approach. The proper definition of an appropriate rate of discount in aggregating such growth paths over time remains an issue of debate.[14]

On more fundamental theoretical grounds, economic efficiency may be assessed in terms of the extent to which relevant costs and returns are brought into conjunction for purposes of decision making. The efficiency of atomistic competition implies that the decision maker, whether he be consumer or purchaser, shoulders all costs and receives all returns. Indeed, rational economic choice may be called efficient only if these conditions prevail. Inherent externalities in water use often result in violation of this principle. Frequently, costs associated with water transfer are paid by society in general or by the community in the vicinity of the place of transfer.

The other relatively familiar aspect of economic efficiency with which we shall deal relates to the tenure side of water transfer. Entitlement to use water, whether a water right or service contract, is a real asset, and the security of that entitlement may be assumed a basic determinant of time preference with which the use of water and related investment decisions are regarded. This becomes especially important for irrigated agriculture and other potential uses in which relatively heavy investment in associated inputs is required.[15] Economic growth characterizing a given system would tend to be less self-sustaining with high tenure uncertainty than with a low level of such uncertainties.

The implications of water transfer also pose problems in terms of equity. These include the effect of particular types of water transfer on income distribution either directly or indirectly through the composition of changes in real output. A change in equity position of an economy involves changes in real relative wealth or net asset value of sub-groups or individuals within the economy.[16] The philosophical difficulties of defining an optimal state of equity or

14. See O. Eckstein, *A Survey of the Theory of Public Expenditure Criteria*, in Public Finances: Needs, Sources, and Utilization 453 (National Bureau of Economic Research, Princeton Univ. Press 1961).

15. In general, the lower the tenure security in a particular water transfer process, the higher will be the time preference rate used in the decisions with respect to such associated investment.

16. A crucial, yet surprisingly unexplored, problem of definition is involved in distinguishing an economy from its subgroups. The relevant attribute seems to be the institutional cohesion of a system occupying both space and identifiable activities (lines of production). Frequently, economic analysis adopts political and jurisdictional systems —largely, I suspect, because data prospects favor such demarcations—without critical

inequity will not be detailed here. Rather, "equitable" economic growth will be considered as a positive rate of change of the real output of an economy with a smaller aggregate variation from the mean on a per capita basis.

A per capita definition of equitable growth, however, may not be sufficient. Regional income differences may be increased even though per capita equity criteria are not violated, with substantial implications for long-run growth. Regional economic domination may permit systematic introduction of market distortions which, while appearing to yield "efficient" results at the firm level, may in fact be singularly inefficient from an overall aggregate standpoint.[17] This is a form of organizational oligopoly which may exist in either the final product or factor markets.

A corollary to this point, and one which links the equity question with the statistical problems dealt with above, relates to the manner in which public water is valued. If it is valued at market prices (and this assumes the method of water transfer involves user prices determined on some sort of a market), we should strive for perfection on the product market. If, on the other hand, water is valued at factor cost (as the United States Department of Commerce would have us do), the interests of equity require perfection of the factor markets to prevent the accrual of substantial quasi rents on those markets.

III

AN ASSESSMENT OF TRANSFER FORMS

A. Tenure Forms

At least three types of ownership equities are pertinent to actual water transfer procedures: (1) outright ownership of a water right, (2) long-term water service delivery contracts, and (3) similar contracts of a short-term nature. The first and third represent extremes, with most vertical transfers of water taking the form of relatively long-run water service contracts. Long-run commit-

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attention to whether or not existing institutions logically warrant such definition. Interstate contracts and international treaties frequently have redefined previously logical concepts of a "relevant economy" and its subgroups.

17. Southern California may be considered an example of regional dominance. The regional pricing arrangements associated with California's water development program will tend to displace production that otherwise would occur in the northern parts of the state. This southern migration of production is of questionable efficiency from the standpoint of the economy of the state of California. See M. F. Brewer, Economics of Public Water Pricing 19-23 (Giannini Foundation Report No. 244, Univ. of Cal. 1961).

ments of water service—continual service at the extreme—as opposed to short-run or temporary water service will be considered.

It is difficult to generalize about the impact of contract life on the rapidity of economic growth. One point of leverage on the rate and duration of economic growth is the effect of contract length on time preference rates. For annual commitments of a given quantity of water, the value of a service contract will be directly related to its legal life. Long-term contracts may be expected to have individual time preference rates relatively lower than those associated with shorter contracts, permitting greater futurity in planning. As a consequence, investment programs or production plans with relatively long periods of amortization in associated lines of investment would be economically feasible. Although this does not assure a larger growth per se, any production alternative feasible for short-term leases is likewise possible under a long-term lease.

Viewed at a more aggregate level, however, long-term leases may tend to freeze production patterns. This facilitates economic growth only so long as the initial contracting use represents the economically "highest use," or if no market for subcontracting exists. The latter condition may stem from outright prohibition on subcontracting or from high fixed costs associated with water use such as those characteristic of irrigated agriculture. This becomes especially pertinent if payment forms other than unit user fees are employed, for they generally increase fixed production costs.

Granting that long-term leases often pose difficulties for subleasing or exchange, the economic advantage of relative security and associated lower time preference must be weighed against stickiness in reallocation as other alternative water uses develop over time or as the relative productivities of existing alternatives change. Some resolution between the conflicting economic properties of longer time horizons and allocation rigidity is needed.[18] Obviously, each particular case would have to be evaluated on its own merits, but one plausibly might advocate long-term contracts

18. This problem was considered recently by Gaffney with respect to California water rights. His primary emphasis is on allocative rigidity, but a sequel study is needed that analyzes the implications for economic growth of the relatively long planning and investment horizon these rights have occasioned. See M. Gaffney, *Diseconomies Inherent in Western Water Laws: A California Case Study*, in Water and Range Resources and Economic Development of the West: Economic Analysis of Multiple Use, the Arizona Watershed Program—A Case Study of Multiple Use 55 (Proceedings of the Committee on the Economics of Water Resources Development, Western Agricultural Economics Research Council 1961).

when the structure of the regional economy is relatively stable and high associated investments are required in connection with water use.

Within the general terms of existing contractual institutions, long-term security and flexibility—from the standpoint of water transferability—have been competitive, largely because of inherent physical problems of scheduling deliveries via distribution systems with limited capacity.[19] This competitiveness could be reduced by some device permitting a tenure security commensurate with the time preference associated with the type of use to which water is put—relatively low if it enables a regional conversion to an irrigated economy, somewhat higher if used in a production enterprise not requiring associated investment of long gestation, etc.

Basically, transfer indivisibilities in ownership of two sorts need to be overcome: indivisibilities in quantity and over time. Reduction of quantitative indivisibilities favors development of a competitive market environment wherein such transfer may occur. Reducing temporal indivisibilities increases the frequency of opportunities for water reallocation. Although in itself not sufficient, the ability to redefine proprietary interest is a necessary condition to such a reallocation.

A reduction of these two types of indivisibilities at the wholesale level may be considered as an increase in the negotiability of water delivery contracts and bears directly upon the problem of water transfer in connection with secular economic adjustments of agriculture.[20]

Increased negotiability would facilitate adjustment among water-using activities on the one hand and water supply organization on the other. Proprietary interest could be shifted as different forms of local distributive organizations appear more appropriate. Different forms of local distribution organizations may be desired as a result of such change, or they may be adopted specifically to induce

19. To some extent, this relationship may be mitigated by changing the design of the water delivery system. For example, the trend in California toward demand delivery by irrigation districts permits greater flexibility. Adoption of a continuous delivery method would achieve similar increases in flexibility, but generally this method is impracticable in semiarid areas because of limited water supplies.

20. Obviously, concurrence by both contracting entities would be required to permit the transition to be incorporated into the delivery schedule of the former and avoid overcapacity demands on the aqueduct system. Similarly, a legal transfer of liability for payments during the remaining life of the contract would require agreement of all parties. Under these provisions, however, negotiable contracts would contribute to the economic efficiency of the operation of a regional program of water development and distribution.

these changes that are deemed desirable. Reduction of these indivisibilities would correspondingly reduce lags in these shifts, permitting a more rapid realization of the implied increments in real income.

There would be no a priori tendency for the negotiable contract to induce equity problems. Indeed, linked with provisions for a centrally imposed assessment upon a new contract recipient, the cost to new recipients could be varied purposively to capture a portion of the consumers' surplus such transfer might entail.

B. Payment Forms

Water transfer usually entails a wide variety of payment forms. Entirely free service user fees and regionally imposed ad valorem assessments have been used. Here again, the analysis is simplified by focusing on extremes.

The two polar forms of payment in water transfer are user fees, based upon either average or marginal cost, and free water, in the sense that the economy as a whole repays the project from general tax revenues. Projects that are supported regionally by taxes and/or various other types of fees represent intermediate positions.

The price aspect of water transfer performs two economic functions: allocation and repayment. The extent to which it adequately allocates water can be assessed theoretically by traditional marginality tests. The repayment function is adequately performed if least-cost production is facilitated and a "correct" supply response elicited. Marginal cost pricing satisfies both criteria so long as no externalities exist in production or consumption. If there are externalities—manifest in consumers' surplus or quasi rents—marginal cost pricing will not suffice. It has been argued that under such circumstances marginal cost pricing, coupled with a tax-financed subsidy, is the most desirable way out on the assumption that higher cost firms will be eliminated through competition in the product market. However, the lack of traditional competition in the water market weakens this argument as a guide for price policy with respect to water transfer.

With respect to the rapidity of economic growth, "free water" will have many bidders and, hence, will speed up the physical processes of conversion from dry to irrigated farming. Expenditures on complementary inputs will proceed at a relatively rapid rate, stimulating regional economic growth. On the other hand, the provision of free water presumably will reduce the price level of irrigation products to the consumer and thus lower the general price level of the region. As developed above, if a different quantity were consumed under "free water" conditions than with a user price, the resulting impact on a regional output formally is indeterminate.

It may be noted that the tax-financing route commonly has been followed when water transfer has involved irrigating previously unirrigated agricultural land. A similar trend has been observed in initial water transfers to municipalities or urban agencies. In the latter case, this is reflected in general obligation bond financing. Subsequent tranfers, however, often have shifted the payment form toward user fees. Relatively larger water tolls were the vehicle of this shift within public irrigation districts and revenue bonds or similar financing arrangements for municipalities and urban groups. The efficiency of such a transition has been discussed in light of the accrual of secondary benefits during the initial periods of transfer and the relatively more important role of specific primary benefits during subsequent periods.[21]

IV

CHANGE OF WATER TRANSFER INSTITUTIONS: THE IMPLICATIONS FOR A POLITICAL ECONOMY

There are broader implications of water transfer processes than the technical aspects discussed above—implications of a less formal but hardly less significant nature. Water transfer institutions have changed as western irrigated agricultural economies have undergone different stages of development. These trends may be discerned in the historical performance of transfer agencies as well as through cross-sectional observation. In this final section, attention is focused on the transfer institutions used at several stages of development.

Five stages of regional water development are considered. In California these have followed in general chronological order, although the sequence may not have been precisely duplicated elsewhere.

1. Initial irrigation with local water supplies.
2. The development and use of more distant regional sources of water.

21. See M. F. Brewer, Water Pricing and Allocation with Particular Reference to California Irrigation Districts 126-32 (Giannini Foundation Report No. 235, Univ. of Cal. 1960).

3. The integrated management and use of ground and surface water.
4. Coordinating the jurisdiction of water supply agencies (both federal and state government agencies).
5. Providing for increasing water demand of urban water services.

Each of these five stages has placed emphasis on different problems with implications for water transfer. During the development of indigenous supplies, which occurred in California during the latter third of the last century, clarification of water tenure was stressed. This emphasis is reflected by the perfection of the appropriative right to surface water in California and by the fractioning of water ownership through joint stock water companies. A problem associated with this era of private water development was the physical necessity of coordinating local water distribution facilities. This need stimulated the institutionalization of a regulatory agency, usually in the form of a watermaster. Acknowledgment of the need for such regulatory powers was one of the rallying points of irrigation district enthusiasts during the 1880's.

During the second stage of development, problems of tenure perfection and physical coordination persisted, but the large investments needed to divert and transfer distant water emphasized the financial side of water transfer. Public districts were seen as the institutions which afforded appropriate financial flexibility. They could bond-finance these investments and had the power of ad valorem assessment. Assessment on unimproved property within the district not only provided a dependable source of revenue for bond servicing but also enabled the irrigator to retain a net farm return sufficiently large to undertake the relatively high investments in associated inputs required for irrigated cultivation. The transition from dry farming to irrigation occurred relatively rapidly within irrigation districts in California.

The stage of development that focused on ground surface water management again placed emphasis on the payment side of water transfer. Direct integrated management by the district was hampered by the appropriative and correlative water rights doctrines.[22]

22. The correlative doctrine establishes coequal rights to use groundwater for overlying landowners. A groundwater appropriative right is perfected by withdrawing and using groundwater on nonoverlying property. In neither of these instances could the district per se exercise its police power to control groundwater use.

Management plans were implemented by devising transfer payments so that economic incentive induced the combinations of use embodied by the management plan. Various types of water toll were developed, and the creation of internal improvement districts within parent irrigation districts enabled differential rates of assessment. In addition to these more flexible systems of transfer payment, intermember transfers of water were facilitated. Prorating procedures were developed for times of inadequate surface supply, and a general strengthening of the transfer authority's police power occurred. It is interesting to note that the concept of "efficient water use" was broadened during this stage of development to embrace the total water supply available to a district, including indigenous ground and surface water sources as well as imported supplies. To accomplish this, greater regulatory authority was required than when the concept of efficient resource use was limited to district imported surface water alone.

The fourth stage of development—and basically this is where California presently finds itself—faces squarely the problem of coordination among various water supply agencies. This includes coordination between federal, state, and local agencies and concerns all three aspects of water transfer (the physical, tenure, and financial aspects). Coordination is being achieved primarily through water transfer contract. This represents a somewhat unique approach to this problem, for, generally, problems of agency supply coordination have been sought through interagency treaties, compacts, and agreements. With the politically powerful and well-organized water user groups which exist in California, interagency coordination frequently is attempted through a bargaining process, in which the terms of contract are made as attractive as possible by each of the competing supply agencies. The actual form of coordination is determined by the water-consuming groups. Illustrating such coordination is the integration of United States Bureau of Reclamation water from the Central Valley Project and the supplies developed by public water districts. Each district has selected the combination of sources felt most appropriate to its particular needs.

California is now facing a similar issue as the state, the United States Bureau of Reclamation, and numerous local water supply organizations attempt coordination. Both the United States Bureau of Reclamation and the state are offering water supplies to irrigated agriculture in the San Joaquin Valley. This competition has been documented by continual changes in the forms of water transfer contract offered this area. Although negotiation of the water delivery contract between the state and the Metropolitan Water District has standardized the basic contract form, the payment formulations included appear to be at least partially a negotiable variable.

The fifth stage of development is not a necessary sequent to the four which have been discussed. It is, however, a typical problem recurring with increased frequency through the arid West and one that has stimulated development of new institutions which have provided the legal and administrative vehicles for water transfer. They are primarily organizational in nature and center on the concept of municipal area service which coordinates water supply with numerous other services such as waste disposal, fire protection, and health services.

The significance of this series of mutations in water transfer institutions is substantial. It has permitted more efficient resource allocation as new problems have become apparent and thus has had a salutary effect on the development potential of the regional economy. Although it does not assure a higher rate of economic growth from one point in time to the next, it admits the possibilities for such increases, and, more important still, it increases the probability that economic growth will be self-adjusting and thus self-sustaining over longer periods of time.

The empirical consequences of this tradition in the field of water resources development seem strongly to endorse a broad intellectual point of departure for economic research. The mechanistic concept of society, involving a fundamentally static conceptualization of an "objective function," may be questioned in light of this experience. Possibly more relevant criteria for evaluating water transfer devices would be facilitated if the broad disciplinary partnerships suggested by these problems occur in the research process.