California Law Review

VOL. 81 | MAY 1993 | No. 3

Institutional Perspectives on Water Policy and Markets

Barton H. Thompson, Jr.

TABLE OF CONTENTS

Institutional Perspectives on Water Policy and Markets

Barton H. Thompson, Jr.†

Water policy in the western states has historically evinced a number of problems. These include inadequate conservation incentives, lack of adequate environmental protection, inflexibility in meeting changing needs, and excessive mining of groundwater aquifers. The author argues that the traditional focus on common law and statutory remedies to these problems has failed to give adequate consideration to the important role of institutions in both shaping and impeding solutions. As an illustration, the Article closely examines the growing movement towards using markets to promote both efficiency and environmental goals in the distribution of water. Local institutions have often created internal markets that enable their members to transfer water among themselves more readily than traditional state transfer procedures would permit. Yet, institutions have also served as a significant barrier to external transfers of water. The author explores the underlying reasons institutions have served as a barrier to more active interregional water markets. Some of those reasons are found to be legitimate while others are not. The author concludes that legislatures should remove legal restrictions on external transfers by institutions and create financial incentives for such transfers by providing for a clear flow of the profits from such transfers to the membership. The author suggests that legislatures may also wish to strip local institutions of control over external transfers if institutions continue to block external transfers unjustifiably. Any such reform, however, must be carefully drafted to preserve the valuable role that institutions can play and have played in regulating water use.

INTRODUCTION

State and federal legislatures are spending ever greater time attempting to resolve the many flaws in traditional water policy. Historically, water law has provided consumers with little incentive to conserve water or to use water for its highest economic value. As a result, farmers use vast quantities of water to grow cotton and other water-intensive crops in the middle of water-scarce California, and agricultural, industrial, and residential water consumers all use more water than its real cost would

† Professor of Law, Stanford Law School. B.A. 1972, M.B.A. 1976, J.D. 1976, Stanford University. I am grateful to Hal Candee, Hap Dunning, Brian Gray, Hank Greely, Joe Grundfest, Mitch Polinsky, Joe Sax, and Robert Stavins for valuable advice and thoughts on earlier drafts. Jeff Rachlinski (J.D. 1993, Ph.D 1993, Stanford University) aided me immensely on the research.

justify. Lacking effective environmental protection, many waterways are drained or polluted. Often unrestrained by the government, groundwater users in many parts of the West "mine" groundwater aquifers—depleting an important resource and causing surface subsidence, groundwater contamination, and other significant problems. Frequently, inflexible water allocations frustrate attempts to redistribute water to meet drought conditions or changing long-term demand.

Solutions to such problems must involve local water institutions, which together control over half of all the water consumed in the western United States.[1] Yet in the search for solutions, most policy discussions have focused narrowly on potential changes to the common law and statutory rules defining and regulating water rights. Until recently, the discussions gave scant attention to the role of local water institutions in modifying and supplementing the law. Legal scholarship has also widely neglected the importance of local institutions to the formulation and reform of water policy.[2]

This legal centrism is both surprising and unfortunate. Other areas of legal scholarship and policymaking have long recognized the important role that institutions play in permitting parties to modify, supplement, or contract around judicial or legislative rules.[3] Institutions are no

1. In this article, I use the term "institution" narrowly to refer to those private and public organizations that water users form to help obtain, distribute, manage, and regulate water resources. Although there is no standard definition, the term is often used far more broadly in economic works to refer to any set of rules or standards, whether embodied in governmental laws, social conventions, organizational dictates, or contractual obligations, that coordinate or regulate human behavior. *See* DANIEL W. BROMLEY, ECONOMIC INTERESTS AND INSTITUTIONS 22-23, 27-28, 39 (1989); Andrew Schotter, *Comment, in* ECONOMIC INSTITUTIONS IN A DYNAMIC SOCIETY: SEARCH FOR A NEW FRONTIER 50, 50-51 (Takashi Shiraishi & Shigeto Tsuru eds., 1989). *But see* WENDELL GORDON, INSTITUTIONAL ECONOMICS: THE CHANGING SYSTEM 16 (1980) (defining an institution as "a grouping of people with some common behavior patterns, its members having an awareness of the grouping").

2. Economists have devoted more attention than legal scholars to institutional influences on water policy. *See, e.g.*, SCARCE WATER AND INSTITUTIONAL CHANGE (Kenneth D. Frederick ed., 1986); WATER RIGHTS: SCARCE RESOURCE ALLOCATION, BUREAUCRACY, AND THE ENVIRONMENT 119-220 (Terry L. Anderson ed., 1983) [hereinafter WATER RIGHTS] (providing examples of water institutions and possible institutional reform). Yet even economists have focused more than one would expect on potential improvements to common law and statutory rules rather than on reform of local water institutions. *See, e.g.*, Bonnie G. Colby, *Transactions Costs and Efficiency in Western Water Allocation*, 72 AM. J. AGRIC. ECON. 1184 (1990). The most comprehensive examinations of local water institutions are found in two symposia: SPECIAL WATER DISTRICTS: CHALLENGE FOR THE FUTURE (James N. Corbridge, Jr. ed., 1983) [hereinafter SPECIAL WATER DISTRICTS]; *Special Project: Irrigation Districts*, 1982 ARIZ. ST. L.J. 345. Tellingly, economists and political scientists contributed virtually all of the works in the two symposia.

The only major exception to the anti-institutional bias in the legal literature has been the considerable attention lavished on the federal Bureau of Reclamation. Even here, however, attention has centered on the pros and (mostly) cons of particular reclamation *policies* rather than on the role that institutions can and do play in setting and reforming water policy.

3. The anti-institutional bias in water scholarship may stem in part from the tremendous diversity of water institutions which, as Professor John Leshy once suggested, resembles that of snowflakes: no two are alike, making general analyses difficult. John D. Leshy, *Special Water*

less significant in shaping water policy. Local water institutions enable their members to overcome a variety of problems that state law does not or cannot adequately address and to reconfigure water rights and policies to meet their members' particular needs. At the same time, however, many water institutions parochially ignore outside interests and use their insulation and considerable political power to thwart broader community goals. Any realistic solution to current water problems must consider both the potential usefulness of institutions in overcoming these problems and the obstacles institutions can present to legislators or other governmental officials trying to cure the problems through purely legal reform.

This Article seeks to show that water institutions can have as great an impact on water policy as can the law of water rights. State and federal law, of course, can in turn influence water institutions by defining the organization, power structure, authority, and limitations of the institutions. But this "institutional" law is quite distinct from the law of water rights that has been the typical focus of legal scholarship and, until quite recently, of public policy debates. To maintain this distinction, references in this Article to "water law," "legal centrism," and "legal reform" all refer narrowly to state and federal law allocating and regulating water rights. References to "institutional reform," in turn, include reforms both to institutions' rules of operation and to state and federal laws governing water institutions.

The current debate over water markets highlights the traditional legal centrism on water issues, as well as the importance and potential value of water institutions. Water markets have been a major topic since at least 1973 when the National Water Commission recommended reducing then existing barriers to water transfers.[4] Most analyses since then have emphasized the role that markets can play in meeting the growing water demands of the West's urban and suburban areas. These analyses have viewed market trades as an alternative to the economically and ecologically costly political-engineering approach to water needs, which dominated western water policy through the 1960s. When a region needed additional water to satisfy population growth or, as in California's Central Valley, to realize entrepreneurial dreams of farming in pre-

Districts—The Historical Background, in SPECIAL WATER DISTRICTS, *supra* note 2, at 11, 23. As Part I illustrates, however, valuable generalizations are possible.

4. *See* NATIONAL WATER COMM'N, WATER POLICIES FOR THE FUTURE 260-70 (1973); *see also* CHARLES J. MEYERS & RICHARD A. POSNER, MARKET TRANSFERS OF WATER RIGHTS: TOWARD AN IMPROVED MARKET IN WATER RESOURCES (National Water Comm'n Legal Study No. 4, 1971) (suggesting legal and institutional reforms to remove barriers to efficient use of the free market as a tool of water allocation). Since 1973, various state studies have also recommended loosening constraints on water transfers in the West. *See, e.g.*, CALIFORNIA GOVERNOR'S COMM'N TO REVIEW CAL. WATER RIGHTS LAW, FINAL REPORT 62-72 (Dec. 1978) [hereinafter CALIFORNIA GOVERNOR'S COMM'N].

viously hostile areas, the typical solution was to have the government build a new water project. Under the federal reclamation program, taxpayers subsidized the construction of hundreds of projects in the West, many of which caused significant environmental damage.[5]

Beginning in the 1970s, however, a coalition of economists, environmentalists, and urban water agencies began to promote the use of markets to meet the still increasing water demands of the West. Under a market approach, growing urban areas could buy water from agricultural users rather than build new dams and reservoirs. To the economists, markets were the most efficient (and thus presumptively beneficial) means of coping with water scarcity. To environmentalists, markets offered a far more benign means of meeting the West's increasing urban water demands. Finally, as growing technological, environmental, and fiscal obstacles stifled new engineering projects, cities also recognized market purchases as an important substitute source of water.

In building a case for greater reliance on market-based water transfers, however, many scholars and policymakers have overstated the inflexibility of the current system of water allocations. Numerous articles and books have painted a picture of a legal structure in which water is rigidly dedicated to specific lands and uses and cannot easily be reallocated in response to changing supplies and demands. The principal villain in these portraits is state water law that supposedly makes formal transfers of water rights cumbersome, costly, time-consuming, and sometimes impossible. The favored solution, consequently, has generally been legal reform.

This portrait of western water rights is flawed in various respects.[6] Most importantly, it neglects informal transfers of water within institutions, which are more numerous than the formal transfers that have typically been the subject of study. Closer examination of institutional water transfers in states (like California) criticized for generating few water transfers[7] reveals active water markets.

Institutional transfers are an important example of the way in which water consumers have used institutions to get around problems posed by state water law. Legal restrictions on formal water transfers pose insurmountable transaction costs for many small water users who wish to buy

5. For an incredibly rich history of the West's hydrological remaking of its natural endowments, see DONALD WORSTER, RIVERS OF EMPIRE: WATER, ARIDITY, AND THE GROWTH OF THE AMERICAN WEST (1985). A more journalistic account is found in MARC REISNER, CADILLAC DESERT: THE AMERICAN WEST AND ITS DISAPPEARING WATER (1986).

6. A recent study of transfers in six different states, for example, found the burdens of most states' transfer processes to be far less significant than is commonly suspected. *See* 1 LAWRENCE J. MACDONNELL, THE WATER TRANSFER PROCESS AS A MANAGEMENT OPTION FOR MEETING CHANGING WATER DEMANDS 66 (1990) [hereinafter MACDONNELL STUDY SUMMARY] ("Law and policy in all six states now generally support water transfers, though in varying degrees.").

7. *See, e.g.*, Rodney T. Smith & Roger Vaughan, *Irrigation Districts: Obstacles to Water Marketing*, AM. WATER WORKS ASS'N J., Mar. 1988, at 10, 10.

or sell water through formal transfers. Many of these users, however, have employed local institutions to obtain or exchange water without legal reform or formal transfers. In some cases, this gain in flexibility has been an unintentional benefit of an institution formed for unrelated economic or policy reasons. But in other cases, water users have organized or designed institutions with transfer advantages very much in mind. Institutional transfer practices, moreover, have evolved to meet changing user needs far faster than state and federal law: when the need for market flexibility has increased in a region, institutions have typically adopted new and more responsive market practices.

Nonetheless, the principal need for increased flexibility in water allocation is now shifting from communities to states and even to interstate regions. Here, institutions are coming to be seen more as market barriers. Institutions often block or impede transfers of water from within their jurisdiction to users outside. Policymakers must understand why. Although legal restrictions on extrajurisdictional water transfers are partly to blame, many local water institutions balk at such transfers even when there are no legal obstacles. Water institutions have a legitimate interest in ensuring that transfers do not impose negative externalities on either them or their members, and perhaps also in protecting the local economy. But institutions may also hinder extrajurisdictional transfers because of structural impediments or because of more benighted reasons. These reasons may include managerial self-interest and the desire of members to keep the local price of water artificially low by restricting the transfer market in case they need additional water themselves.

Given the significance of institutional obstacles to major interbasin transfers, institutional rather than legal reform may have the greatest impact on the future growth of water markets.[8] Absent institutional reform, easing legal constraints on formal water transfers will often increase transfers only marginally in those western regions where institutions dominate water markets. Indeed, recent legal reforms have often disappointed their proponents. As a result, interest is finally beginning to emerge in institutional reform as a means of encouraging greater market activity. Recent federal legislation, for example, strips governmental water districts in California's Central Valley of their plenary power to block extrajurisdictional transfers of water supplied by the federal government. Under the federal 1992 Reclamation Act, farmers within these

8. *See* BUYING AND SELLING WATER IN CALIFORNIA: HOW DOES IT FIT INTO THE STATE'S WATER POLICY PORTFOLIO? 99, 130-31 (Proceedings & Summary of a Conference conducted by Public Policy Program, UCLA Extension, Feb. 27-28, 1986) [hereinafter UCLA CONFERENCE]; *cf.* BRUCE DRIVER, WATER EFFICIENCY TASK FORCE, WESTERN WATER: TUNING THE SYSTEM 38 (1986) (Report to the Western Governors' Association) (recognizing that local special water institutions are central to change in western water policy).

districts can decide individually whether to transfer any of their water entitlements, subject only to limited veto authority by the district and the federal government.[9] The California legislature has also considered, but not passed, legislation that would limit water districts' control over all extrajurisdictional transfers throughout California.[10]

Although institutional barriers to extrajurisdictional transfers should be eased, such legislation might go too far: institutional control serves a number of legitimate goals, and those goals should not be unnecessarily sacrificed in efforts to promote transfers. Unfortunately, no discussion of the nature of institutional barriers and the costs and benefits of alternative means of addressing them preceded legislative consideration of the 1992 Reclamation Act or the California bill.

A legislature can try to ease such barriers in a variety of ways. To begin with, states should remove current statutory restrictions on institutions' power to engage in such transfers either themselves or through their members. States should also give members of governmental water institutions a greater incentive to support extrajurisdictional transfers, by providing for a direct flow of the profits from such transfers to the membership. If states fear that institutions will unjustifiably block extrajurisdictional transfers even with such added incentives, then and only then should the legislature consider divesting institutions of control over such transfers by authorizing individual members to transfer shares of the institution's water supply. This policy option should be a last resort because institutions serve a valuable function in evaluating and protecting various legitimate local interests. Reducing institutional control threatens to encourage water transfers at the cost of these interests.

The errors of most recent market analyses do not stop with their underappreciation of the role of institutions in both promoting and blocking water transfers. By ignoring the fact that institutions are almost always the buyers in agriculture-to-urban ("ag-urban") water transfers, water scholars have also oversimplified the questions of whether and how such transfers should be regnlated. Most analyses of the efficacy of ag-urban transfers have assumed that buyers will make rational economic comparisons of their alternatives and purchase water only if the transfer is less costly than other means of satisfying demand. As a result, proposals for regnlation have focused only on the possibility that transfers will inadequately account for third-party impacts (e.g., pecuniary losses to businesses in the farming region). Yet urban water institutions do not behave as purely economic entities representing the summed interests of their constituents. As a result of both political and agency problems,

9. *See, e.g.,* Reclamation Projects Authorization & Adjustment Act of 1992, Pub. L. No. 102-575, § 3405(a), 106 Stat. 4600, 4709 [hereinafter 1992 Reclamation Act].

10. *See* Assembly Bill 2090, 1991-1992 Reg. Sess. § 2 (Cal.). For a discussion of both Bill 2090 and the 1992 Reclamation Act, see *infra* notes 308-14 and accompanying text.

urban institutions may pursue ag-urban trades even when there are less costly means of meeting increasing urban water demands. If so, unimpaired water markets will not necessarily lead to the most efficient water allocation.

Part I of this Article describes the importance of local water institutions in the western United States, suggests possible reasons for their prominence, and then discusses how these institutions enable their members to overcome many of the problems presented by common law and statutory rules of water rights. The remainder of the Article uses water markets as a means of illustrating the importance of local water institutions. Part II shows how local institutions have created internal water markets that give their members flexibility not provided by state law transfer procedures, but have also stood in the way of many valuable interregional transfers. Part II also suggests possible reasons why many institutions often discourage transfers of water outside their borders. Part III then discusses how legislatures might best try to break down this opposition. Finally, Part IV turns to urban water institutions and discusses the concern that they may use water transfers to avoid more cost-effective, but politically difficult urban conservation measures.

I
THE RELATIVE ROLES OF WATER LAW AND INSTITUTIONS IN SHAPING WATER POLICY

State and federal law set the general framework for water allocation and use, yet institutional rules and customs play important roles. Purely legal analyses thus give an inaccurate picture of current water policies and problems. Prescriptions for future improvements in water policy, moreover, require an appreciation of the advantages and disadvantages that institutions pose as mechanisms for change.

It is useful to examine water institutions from both economic and legal regulatory perspectives. Economists have long recognized the importance of institutions in overcoming market imperfections.[11] Institutions can often resolve externality or public good problems, for example, by binding interested parties together.[12] Working through institutions can help lower transaction costs by avoiding some of the uncertainty and enforcement problems of market contracts.[13] Yet insti-

11. For an excellent overview and topography of the literature, see OLIVER E. WILLIAMSON, THE ECONOMIC INSTITUTIONS OF CAPITALISM: FIRMS, MARKETS, RELATIONAL CONTRACTING 23-29 (1985).

12. *See* James S. Coleman, *Constructed Organization: First Principles,* 7 J.L. ECON. & ORG. 7, 9 (1991).

13. *See, e.g.,* BROMLEY, *supra* note 1, at 52; THRÁINN EGGERTSSON, ECONOMIC BEHAVIOR AND INSTITUTIONS 221 (1990); GEOFFREY M. HODGSON, ECONOMICS AND INSTITUTIONS: A MANIFESTO FOR A MODERN INSTITUTIONAL ECONOMICS 199-200 (1988); ANDREW SCHOTTER, THE ECONOMIC THEORY OF SOCIAL INSTITUTIONS 151 (1981).

tutions can have pernicious sides as well: for example, individuals can sometimes use them to organize and protect market power.[14] As discussed below, water institutions illustrate these various economic functions.

From a legal regulatory perspective, water institutions help overcome limitations in state and federal lawmaking. At the same time, however, they can impede state and federal goals by reconfiguring state or federally created property rights and incentives.[15]

Institutions enable water regimes to be sensitive to local and rapidly changing needs. Due to a variety of handicaps and restrictions, the legal rules and entitlements that are set at a state or federal level can be effective only at certain times, in certain places, and in certain segments of the economy. Delineation of entitlements will always be incomplete due to the sheer number of potential issues and the inherent uncertainty about possible conditions.[16] Given limited legislative time, constrained judicial discretion, and an inherent bias toward the status quo, however, entitlements will seldom be revisited. Uniform rules and entitlements, moreover, will inevitably overlook peculiar local situations where they will prove less workable or effective. Although states and the federal government can try to contour entitlements and rules to local settings, efforts at greater localization will prove both costly and inexact. Attempts to localize through administrative discretion, moreover, are generally doomed by a natural bureaucratic resistance to decentralization.[17] As described in Section A, water rights and regulations in the western United States often prove less than efficient for these and other reasons.

Groups of water users interested in overcoming the problems inherent in state and federal water rights and regulations can often do so through local institutions. As explained in Section B, institutions can reconfigure water rights to achieve a variety of member goals, including greater user flexibility, a more efficient or equitable allocation of rights, and the elimination of entitlement-based externalities. Institutions can also adopt new regulatory mechanisms designed to promote conservation

14. *See* WILLIAMSON, *supra* note 11, at 23-26, 125, 128, 365-84.

15. By emphasizing a "legal regulatory" perspective on institutions, I do not intend to draw a sharp dichotomy between this perspective and economic perspectives on institutions. Indeed, the property rights school of what is often referred to as "new institutional" economics has long emphasized the value of institutions in reconfiguring property rights to eliminate externalities and better align incentives. *See* Louis De Alessi, *Property Rights, Transaction Costs, and X-Efficiency: An Essay in Economic Theory*, 73 AM. ECON. REV. 64, 66-67 (1983). The emphasis here differs only in placing greater stress on the inherent failings of state and federal legal regimes and on the legal role that institutions play in correcting for those failings as well as impeding various public goals.

16. *See* EGGERTSSON, *supra* note 13, at 39 (stating that reasons for incomplete delineation of property rights "include a weak state, high measurement costs relative to the value of an asset, rapid economic change, and struggle over the distribution of wealth").

17. *See, e.g., id.* at 61 (noting a bureaucratic fear that decentralization "will lead to rising agency costs and loss of control").

or other local aims. Local institutions offer special policymaking advantages. They provide a forum within which water users with similar conditions or goals can evaluate, formulate, and enforce water policies.[18] In some cases, they can physically transform the resource into a form that is more readily assigned, transferred, and regulated. Depending on their structure, institutions also permit flexibility in adapting local water policy to changes in the economy, the environment, and the needs of members.

Nonetheless, there is a benighted side to local water institutions. To the extent that local institutions can reconfigure property rights or alter regulatory mechanisms, moreover, individuals can also attempt to use institutions in ways that thwart broader societal goals. By the very act of organizing into larger groups, individuals can often gain considerable political power over state and federal water policy.

A. The Role of State Law

To understand the important role water institutions play in reconfiguring water rights and regulations, it is valuable first to review briefly the basic contours and limitations of state water law.

1. Surface Water Allocation

The seventeen coterminous western states (along with Alaska) allocate surface water primarily under a prior appropriation system, in which one who diverts previously unclaimed water from a surface stream for a "reasonable and beneficial" use becomes entitled to that flow of water for as long as she needs and uses it.[19] No one who comes along later may deprive the prior appropriator of her water, leaving the appropriator exposed only to the whims of nature and the state. In times of drought, the most junior appropriator loses her water first, while the most senior appropriator is protected against all but the severest shortage.[20] No two parties can have equal seniority: appropriators on

18. *See* ELINOR OSTROM, GOVERNING THE COMMONS: THE EVOLUTION OF INSTITUTIONS FOR COLLECTIVE ACTION 136-42 (1990) (discussing the ways in which local institutions address groundwater issues).

19. This paragraph necessarily provides only the briefest summary of the prior appropriation system. For more extensive descriptions, see JOSEPH L. SAX, ROBERT H. ABRAMS, & BARTON H. THOMPSON, JR., LEGAL CONTROL OF WATER RESOURCES 137-48 (2d ed. 1991); A. DAN TARLOCK, LAW OF WATER RIGHTS AND RESOURCES ch. 5 (1992).

20. This is actually neither a hard and fast nor a universal result. Largely because of inadequate records, New Mexico, for example, has never strictly enforced priorities. *See* Willis H. Ellis & Charles T. DuMars, *The Two-Tiered Market in Western Water*, 57 NEB. L. REV. 333, 366 (1978). In other states, administrative discretion and various statutory preferences sometimes defeat a senior's claim during periods of drought. *See* TARLOCK, *supra* note 19, § 5.08(2), at 5-39 to 5-41.

The geographic positioning of appropriators can also give juniors more water than the law might suggest. Water that returns to a river after one appropriator's use of the water (the "return flow") is available for appropriation by other downstream users. If the most senior appropriator ("S") lies toward the very bottom of a river, and the most junior appropriator ("J") appropriates S'

any given stream form a ladder from the most senior to the most junior. For historic reasons, a few states clutter this comparatively simple system with separate riparian rights (awarded exclusively to owners of land bordering streams) that fit only uncomfortably with appropriative rights.[21] Most western states, however, employ pure appropriation systems.

The prior appropriation system has come under criticism primarily for two faults. First, assuming that the marginal value of water declines for most users over the normal range of use, and that water transfers are difficult or impossible, apportioning water by seniority in times of drought or other shortage is inefficient.[22] Rather than forcing everyone to cut back a small amount at minimal loss in value, the system causes a few users to lose all water at significant cost.[23] The seniority rule also impedes the development of competitive water markets by making each water right uniquely dependent on its place on the seniority ladder.[24]

But the most logical alternative, a pro rata sharing rule, would transform the security that the more senior water users enjoy into an unconstrained commons with serious externality and administrative problems. A potential water user would not consider the consequent reduction in the level of drought security enjoyed by all the appropriators on her river when deciding whether to locate on the river. Assuming sufficient water demand in a river's environs, new immigrants would con-

---

return flow, J might well be able to piggyback on S' senior rights. *See* SAX, ABRAMS, & THOMPSON, *supra* note 19, at 140.

Despite these exceptions, however, the priority rule still plays a significant role in reallocation during shortages.

21. The principal hybrid states today are California, Nebraska, and Oklahoma. *See* SAX, ABRAMS, & THOMPSON, *supra* note 19, at 333-60.

22. *See* H. Stuart Burness & James P. Quirk, *Water Law, Water Transfers, and Economic Efficiency: The Colorado River*, 23 J.L. & ECON. 111, 120-21 (1980); Charles W. Howe et al., *Innovations in Water Management: Lessons from the Colorado-Big Thompson Project and Northern Colorado Water Conservancy District*, *in* SCARCE WATER AND INSTITUTIONAL CHANGE, *supra* note 2, at 171, 183-84.

23. Alternative scenarios can be imagined in which a seniority rule would be the most efficient means of dealing with droughts. For example, if senior water users enjoyed the greatest benefit from the water (which might be the case in a static world where first users had their choice of land and occupation), pure efficiency would call for giving them the greatest protection. There is no reason, however, to believe that senior appropriators currently enjoy the greatest benefit from water. Early settlers often did not claim the most productive lands. *See, e.g.*, JOE S. BAIN ET AL., NORTHERN CALIFORNIA'S WATER INDUSTRY 615 (1966) (referring to settlement along river basins of the Central Valley). Even if they had, changes in both the western economy and demographics would long ago have erased any special efficiency claim that seniors could make during times of shortage.

If a region were dedicated to farms where even a small drop in water availability would cause serious injury (which might be the case in areas with permanent crops and barely sufficient water supplies), a seniority rule might again be comparatively more efficient than, say, pro rata sharing. But most farms can suffer minor water loss for short periods with little appreciable economic impact. Only in cases of severe drought, where pro rata sharing might cut water use on all farms to below the point at which marginal water benefits begin declining, would a seniority system potentially be more efficient than a pro rata rule.

24. *See infra* note 141 and accompanying text.

tinue to make new diversions until, at some point, all the water available during normal periods would be fully appropriated. No one would have any security against even minimal droughts.[25]

A pro rata rule would also be more difficult to administer than a seniority rule. Administrators would continually need to determine how much water each user could divert in light of variations in water flow; they could not simply cut off the flow to those juniors for whom insufficient water remains. Moreover, it is easier to determine whether the most junior appropriators are still diverting than to determine whether each user has reduced his appropriation by the required amount.[26]

The second common criticism of the prior appropriation system is that it provides little incentive for conservation.[27] Appropriative rights are given away essentially for free, and the law only loosely regulates the amount of water that a user can withdraw and consume. Theoretically, courts or agencies can prohibit a water user from diverting an "unreasonable" or "wasteful" amount of water. Because of the expense typically involved in improving water efficiency, however, courts and agencies have been loathe to cut back on the water a particular user diverts or to require new water-saving improvements (such as lined ditches or microsprinklers), except where a user's practices are totally outside the community norm.[28] Although a few states try to limit agricultural water use

25. A strong "Coasean" might object that senior appropriators could pay new users to turn to a different water source. *See generally* R.H. Coase, *The Problem of Social Cost,* 3 J.L. & ECON. 1 (1960) (seminal article on the rearrangement of legal rights through the market to account for externalities). Because an individual can acquire an appropriation right in most states only for a beneficial consumptive use, however, seniors could not permanently remove the remaining water in a river from the market. Senior appropriators would thus face the daunting prospect of having to pay off *all* new users for years to come. Indeed, a pro rata sharing rule could become a moneymaking opportunity for enterprising potential appropriators. Assuming that someone could credibly threaten to divert water for even a minimally beneficial use, she could demand money from current appropriators not to make the diversion.

A state could mitigate the problem by limiting the amount of water that can be taken from any given waterway. Indeed New Mexico, which, as earlier noted, does not strictly follow an appropriation rule, has taken exactly this tack. *See* Ellis & DuMars, *supra* note 20, at 366. The state, however, may well misjudge a river's optimum security.

Compounding the problems of a pro rata system, appropriators might try to claim more than they actually need in order to provide themselves with a security cushion in times of drought. *But cf.* SAX, ABRAMS, & THOMPSON, *supra* note 19, at 213 (noting that the opportunity to sell water rights itself encouraged overappropriation by early appropriators).

26. Today a pro rata rule might not be that much more difficult to administer given the existence of computers and relatively accurate flow indicators. But the seniority system would have been far easier to administer than a pro rata rule in the nineteenth century when the prior appropriation system arose.

27. *See, e.g.,* George W. Pring & Karen A. Tomb, *License to Waste: Legal Barriers to Conservation and Efficient Use of Water in the West,* 25 ROCKY MTN. MIN. L. INST. 25-1, 25-8 to 25-32 (1979); Steven J. Shupe, *Waste in Western Water Law: A Blueprint for Change,* 61 OR. L. REV. 483, 485-91 (1982).

28. *See* Pring & Tomb, *supra* note 27, at 25-14, -17 to -20; Shupe, *supra* note 27, at 491. There is some movement toward stricter conservation requirements, although with only minor impact to date. *See, e.g.,* CAL. WATER CODE § 100.5 (West Supp. 1992) (providing that local custom shall not

through water "duties" (which limit the water amount that can be applied per acre of crop),[29] the duties are generally quite lax as a result of political compromise and regulatory lag.[30] Considerable room therefore still exists for water conservation in the western United States.[31]

2. *Groundwater Allocation*

Western states employ far more diverse systems in allocating groundwater, although most use a prior appropriation system in which seniority typically entitles a groundwater user merely to maintenance of a reasonable pumping level.[32] Few western states have adopted comprehensive protections against inefficient mining of aquifers.[33] Most of the judicial groundwater regimes employed in the West do not directly limit groundwater mining.[34] Even where the common law theoretically proscribes mining, as in California, few groundwater users ever file suit because of the risk and tremendous cost involved.[35] Groundwater users have typically opposed direct state regulation of groundwater extractions out of fear that they would lose control over their groundwater prac-

---

be the sole factor in determining the reasonableness of water use, thereby allowing for consideration of conservation goals).

29. *See, e.g.*, NEB. REV. STAT. § 46-231 (1988); S.D. CODIFIED LAWS ANN. § 46-5-6 (1987).

30. *See* Pring & Tomb, *supra* note 27, at 25-16 to -17 (discussing reasons why the "duty of water" does not encourage conservation, among which is the failure by those actors who set and enforce the duty to look to modern irrigation techniques).

31. *See id.* at 25-3 to -8. Some progress, however, has been made. From 1980 to 1985, irrigation water use declined six percent nationwide—primarily due to a significant drop in the amount of water used to irrigate the average acre of land. *See* WAYNE B. SOLLEY ET AL., U.S. DEP'T OF THE INTERIOR, ESTIMATED USE OF WATER IN THE UNITED STATES IN 1985, at 22 (U.S. Geological Survey Circular 1004, 1988) [hereinafter 1985 ESTIMATED USE].

32. For detailed descriptions of western groundwater law, see SAX, ABRAMS, & THOMPSON, *supra* note 19, at 385-92; TARLOCK, *supra* note 19, §§ 4.04-.06, -.09, 6.03-.05.

33. An aquifer is "mined" when withdrawals exceed the amount of water that can be withdrawn on a renewable basis. Mining can result in a variety of problems, including permanent depletion of the aquifer, dropping water tables, subsidence of overlying land, and intrusion by seawater or other contaminants. Despite these problems, some mining can be efficient—particularly where an aquifer has negligible inflow, and the alternative to mining is not using the water at all. As elsewhere, the costs must be balanced against the current use value of the water. *See* Edgar S. Bagley, *Water Rights Law and Public Policies Relating to Ground Water "Mining" in the Southwestern States*, 4 J.L. & ECON. 144, 148-51 (1961). Only a handful of western states, however, have attempted to make even rough determinations of the amount of water that should be extracted from an aquifer for social benefits to be maximized, or have attempted to limit users to that amount.

34. The prior appropriation doctrine provides a degree of indirect protection by ensuring groundwater users a reasonable pumping level, but courts have been relatively lax in enforcing this guarantee. Some western states, moreover, follow far less efficacious rules. Except in subsidence cases, for example, Texas courts employ a rule of capture that places no limitations on pumping—other than for negligence, willful waste, or malice—and permits the total depletion of an aquifer. *See* Friendswood Dev. Co. v. Smith-Southwest Indus., 576 S.W.2d 21, 26, 30 (Tex. 1978).

35. *See, e.g.*, Sandra O. Archibald et al., An Economic Analysis of Water Availability in California Central Valley Agriculture: Phase II Draft Report 5-46 (Feb. 14, 1992) (unpublished manuscript, available from the Center for Economic Policy Research, Stanford, CA) [hereinafter Archibald Study].

tices.[36] As a consequence, state legislation has typically addressed only aquifers in a critically stressed condition and has often promised far more than it has actually delivered.[37] The consequence in most states is a predictable overuse of the commons. Arizona, California, Colorado, Kansas, Nebraska, Nevada, New Mexico, Oklahoma, and Texas all suffer sizable regional overdrafts; only two or three western states are free of any significant local overdrafts.[38]

The widespread separation of legal regimes for groundwater and surface water is largely historical and today makes little policy sense, given that the two sources of water are often hydrologically linked.[39] Although some states have recently taken strides toward integrating the regimes, most still fail to coordinate fully groundwater and surface water use.[40] Efficiencies that could be achieved by the substitutability of groundwater and surface water[41] are lost. Most states similarly have not yet worked out legal regimes to protect and encourage conjunctive

36. Local groundwater use depends heavily on local needs and uses and can vary tremendously over time. In periods of drought, for example, farmers often mine groundwater heavily to compensate for reduced surface water. *See, e.g.,* Archibald Study, *supra* note 35, at 5-37 to 5-47. To local users, proposals for state regulation of groundwater mining threaten the valuable flexibility that groundwater aquifers currently offer. *E.g.,* Deborah A. de Lambert, *District Management for California's Groundwater,* 11 ECOLOGY L.Q. 373, 398-99 (1984) (stating that farmers fear state groundwater management would be used as a land use planning tool favoring urban interests).

37. Arizona, for example, is often touted as having taken forceful steps in its Groundwater Management Act of 1980 toward eliminating its most serious overdrafts. *See, e.g.,* Philip R. Higdon & Terence W. Thompson, *The 1980 Arizona Groundwater Management Code,* 1980 ARIZ. ST. L.J. 621, 621, 666 (touting the Act as a "remarkable achievement and a commendable foundation"); Jon L. Kyl, *The 1980 Arizona Groundwater Management Act: From Inception to Current Constitutional Challenge,* 53 U. COLO. L. REV. 471, 471, 503 (1982) (praising the Act as "a thorough blueprint for state management and regulation of groundwater"). Even read in the most favorable light, however, the Act will not eliminate the overdraft of major Arizona basins until 2025 (45 years after passage of the Act). *See* ARIZ. REV. STAT. ANN. § 45-562(A) (1987) (setting January 1, 2025 as the management goal date). The Act, moreover, does not provide an effective set of tools to meet this goal. *See* Robert J. Glennon, *"Because That's Where the Water Is": Retiring Current Water Uses to Achieve the Safe-Yield Objective of the Arizona Groundwater Management Act,* 33 ARIZ. L. REV. 89, 93-101 (1991). Furthermore, it places considerable reliance on the political will of Arizona's Department of Water Resources that, to date, has had difficulty imposing unwanted rules on groundwater users. *See* SAX, ABRAMS, & THOMPSON, *supra* note 19, at 505-06.

38. *See* WILLIAM ASHWORTH, NOR ANY DROP TO DRINK 108 (1982).

39. *See* Peter N. Davis, *Wells and Streams: Relationship at Law,* 37 MO. L. REV. 189, 198-204 (1972) (basic common law concepts based on the assumption that the two types of water were independent). Courts in western states seemed to recognize early in the century that there was a hydrologic connection between groundwater and surface water. *Id.* at 213-16, 222-27. Eastern courts took longer to do so. *See id.* at 216-22. Academic criticism has recognized the value of integrating the legal regimes at least since the early part of this century. *See* Samuel C. Wiel, *Need of Unified Law for Surface and Underground Water,* 2 S. CAL. L. REV. 358 (1928-1929).

40. For a general discussion of states' efforts to coordinate use of groundwater and surface water, see TARLOCK, *supra* note 19, § 6.06; Douglas L. Grant, *The Complexities of Managing Hydrologically Connected Surface Water and Groundwater Under the Appropriation Doctrine,* 22 LAND & WATER L. REV. 63 (1987); Frank J. Trelease, *Conjunctive Use of Groundwater and Surface Water,* 27 ROCKY MTN. MIN. L. INST. 1853 (1982).

41. *See* Trelease, *supra* note 40, at 1863-74.

groundwater storage projects. One of the least expensive and environmentally safest means of stretching available water supplies is to store surplus surface water during wet periods in groundwater aquifers for use in later dry spans.[42] Various legal uncertainties, however, have deterred greater use of groundwater storage. To date, only California has made extensive use of groundwater aquifers as storage for surface water, although Colorado is considering such storage projects in the wake of the defeat of a major surface water project.[43]

B. The Role of Water Institutions

Institutions play a central role in the allocation and use of water in the West. As shown in Table 1, on the average institutions supply the water for between thirty-five and fifty percent of the irrigated acreage in the seventeen westernmost coterminous states, with the exact percentage depending on the irrigation data used.[44] Approximately ninety percent of the domestic users in these states, including virtually all urban and suburban residents, obtain their water from institutional suppliers.[45] As Table 1 illustrates, the degree of institutional prominence varies from state to state, with agricultural institutions assuming an especially promi-

42. *See* DRIVER, *supra* note 8, at 12; Ronald B. Robie & Patricia R. Donovan, *Water Management of the Future: A Ground Water Storage Program for the California State Water Project,* 11 PAC. L.J. 41, 44-48 (1979).

43. *See After Losing Fight for Two Forks Dam, Denver to Try Going Underground,* U.S. WATER NEWS, June 1992, at 19. For discussions of the legal issues that arose in two groundwater storage cases, see James W. Anderson, *Some Thoughts on Conjunctive Use of Ground Water in California,* 16 W. ST. U. L. REV. 559, 573-76 (1989) (discussing groundwater storage in California's Chino Ground Water Basin); Robie & Donovan, *supra* note 42, at 51-56 (discussing groundwater storage in California's Alameda County Water District); *see also* DRIVER, *supra* note 8, at 30 (criticizing conjunctive use laws for their vagueness).

44. Two sources of information are available. The Census of Agricultural Institutions, last conducted in 1978, collects estimates from all local institutions providing water to farmers. 4 BUREAU OF THE CENSUS, U.S. DEP'T OF COMMERCE, 1978 CENSUS OF AGRICULTURE: IRRIGATION 154-63 tbl. 4 (1980) [hereinafter 1978 CENSUS]. The Farm & Ranch Survey, conducted in both 1978 and 1988, surveys a random sample of farms and ranches. *See* 5 BUREAU OF THE CENSUS, U.S. DEP'T OF COMMERCE, 1978 CENSUS OF AGRICULTURE: FARM AND RANCH IRRIGATION SURVEY (1979) [hereinafter 1978 FARM AND RANCH SURVEY; 3 BUREAU OF THE CENSUS, U.S. DEP'T OF COMMERCE, 1987 CENSUS OF AGRICULTURE: FARM AND RANCH IRRIGATION SURVEY (1988) [hereinafter 1987 FARM AND RANCH SURVEY]. As Table 1 indicates, the 1978 Census reported greater institutional importance than the 1978 Survey. Most articles and books have used the Census figures. *See, e.g.,* John D. Leshy, *Irrigation Districts in a Changing West—An Overview,* 1982 ARIZ. ST. L.J. 345, 348. Nevertheless, the Survey data is probably more accurate. Irrigation institutions, for example, report serving an acre even if they furnish only part of the water needed to irrigate that acre. To obtain more water from an institution, moreover, farmers sometimes overstate the acreage that they irrigate with the water. As a result, the Census data at times shows institutions supplying over 100% of acreage in a state, as for example in the 1978 Utah figure.

45. The U.S. Geological Survey estimates that about 63.6 million of the 71.4 million residents of these states (or 89.1%) received their water from public suppliers in 1985. *See* 1985 ESTIMATED USE, *supra* note 31, at 17, 59.

nent role in a number of key states including California, Colorado, and Utah.

TABLE 1
PERCENTAGE OF IRRIGATED ACREAGE SUPPLIED WITH WATER BY INSTITUTIONS IN 17 WESTERN STATES[46]

State	'78 Farm & Ranch Survey	'88 Farm & Ranch Survey	'78 Census of Irrigation Organizations
Arizona	53.5%	56.2%	50.5%
California	55.7%	51.3%	68.0%
Colorado	45.3%	54.9%	78.2%
Idaho	60.4%	53.4%	75.3%
Kansas & Oklahoma	2.7%	4.8%	3.7%
Montana	63.2%	64.6%	80.1%
Nebraska	8.9%	11.4%	14.1%
Nevada	48.5%	36.5%	87.6%
New Mexico	29.2%	30.8%	54.5%
North Dakota	37.1%	26.5%	24.8%
Oregon	49.3%	44.1%	55.7%
South Dakota	21.8%	31.5%	28.4%
Texas	17.7%	17.2%	15.2%
Utah	79.8%	67.5%	116.8%
Washington	64.3%	59.2%	80.1%
Wyoming	64.9%	56.2%	80.0%
TOTAL	39.1%	38.5%	48.9%

1. A Brief Overview of Institutions

Water institutions form a complex, multilayered industry. Consumers receive water from various "retailing" institutions, which in turn often obtain their supplies from various "wholesaling" institutions. Some institutions serve both roles, supplying water simultaneously to ultimate consumers and to other institutions. The institutional layers are also often nested; retailing institutions are commonly members of wholesaling institutions. As Table 2 shows, the principal agricultural retailers are mutual water companies ("mutuals") and irrigation and other governmental water districts ("water districts"). Of these two, the older are the mutuals—private nonprofit associations (typically corporations) whose customers are also their shareholders. Slightly eclipsing mutuals in importance today, however, are the water districts, which are gov-

46. *See* 1978 CENSUS, *supra* note 44; 1978 FARM AND RANCH SURVEY, *supra* note 44, at 2 tbl. 2, 63 tbl. 14; 1987 FARM AND RANCH SURVEY, *supra* note 44, at 2 tbl. 2, 14 tbl. 6.

erned by elected boards much like other local governments. Both types of institutions engage in a broad set of activities, including obtaining and storing necessary water supplies, transporting the water to their service areas, and distributing it to their members.

TABLE 2
1978 SOURCE OF IRRIGATION WATER BY PERCENT OF IRRIGATED ACREAGE IN 17 WESTERN STATES[47]

State	Self-Supplied	Mutuals	Commercial	Public Water District	Other
Arizona	49.5%	7.4%	0.2%	33.4%	9.5%
California	32.0%	9.0%	0.8%	56.8%	2.1%
Colorado	21.8%	69.9%	1.6%	7.1%	0.6%
Idaho	24.7%	46.7%	n/a	22.2%	1.9%
Kansas & Oklahoma	96.3%	0.9%	0.0%	2.8%	0.0%
Montana	19.9%	48.9%	n/a	20.0%	10.7%
Nebraska	85.9%	1.1%	n/a	12.8%	0.0%
Nevada	12.4%	44.1%	n/a	36.8%	n/a
New Mexico	45.6%	21.7%	n/a	17.7%	14.7%
North Dakota	75.2%	n/a	0.0%	22.7%	n/a
Oregon	44.3%	20.0%	0.8%	33.8%	1.2%
South Dakota	71.6%	4.7%	0.0%	23.8%	0.0%
Texas	84.8%	0.2%	1.3%	10.9%	2.8%
Utah	n/a	99.7%	0.2%	7.1%	5.5%
Washington	30.0%	7.4%	0.0%	54.3%	8.4%
Wyoming	19.9%	30.7%	n/a	24.7%	2.0%
TOTAL	51.1%	20.6%	0.5%	24.7%	3.1%

Governmental institutions are even more prominent suppliers of domestic water, furnishing about eighty-five percent of the water that domestic users receive from institutions.[48] In some cases, cities and counties themselves furnish water to their residents; in other cases, municipal or other water districts supply the water.[49] Privately-owned

47. *See* 1978 CENSUS, *supra* note 44, at 154-63 tbl. 4.

48. SAX, ABRAMS, & THOMPSON, *supra* note 19, at 617.

49. Some states have established special municipal utility districts to supply domestic residents. *See, e.g.*, CAL. WATER CODE §§ 71000-73001 (West 1966 & Supp. 1993) (authorizing formation of municipal water districts). As urban areas have begun to encroach on formerly agricultural regions, however, public agricultural districts have also on occasion taken over the provision of domestic water. This has frequently led to heated controversies between domestic and agricultural residents. *See, e.g.*, Ball v. James, 451 U.S. 355 (1981) (upholding Arizona system that weights votes by acreage owned; this apportions greater voting power on issues of water operations to agricultural than to urban landowners).

utilities furnish most of the remaining fifteen percent, although mutuals also serve some domestic consumers.

Although many retailing institutions hold their own appropriative water rights, many obtain at least some of their supply from a diverse assortment of "wholesaling" institutions, including local umbrella agencies, state agencies, and the federal Bureau of Reclamation. The Bureau, the most important wholesaler, supplies water to over twenty percent of all irrigated acreage in the West, as well as to twenty million domestic users—almost entirely through water districts and other retailing governmental agencies.[50]

2. *Explanations for the Prominence and Unique Characteristics of Water Institutions*

It is not surprising that institutions play a major role in bringing water into a region and distributing it to users. Considerable economies of scale in water collection, diversion, transportation, and delivery make it far less expensive for an institution to build a single reservoir and aqueduct and to transport water to a number of consumers in the same region than for each consumer to collect and bring in her own water.[51] Also, state and federal governments have encouraged the formation of public institutions, as well as some mutuals, by endowing them with numerous governmental powers and privileges, including eminent domain, the power to tax property and issue tax-exempt bonds, and various tax exemptions.[52] Technological economies of scale and governmental benefits, however, do not explain two prominent characteristics of the vast majority of state and local water institutions: control of the institutions by the water users themselves, and institutional ownership of the water rights in addition to the water works.

a. Vertical Integration

A unique characteristic of most modern state and local water institutions is vertical integration of water supplier and water user. Although many private businesses supplied water to users up through the 1920s, commercial companies have long since been eclipsed by mutuals and

50. SAX, ABRAMS, & THOMPSON, *supra* note 19, at 621.

51. *See* Robert A. Young, *Why Are There So Few Transactions Among Water Users?*, 68 AM. J. AGRIC. ECON. 1143, 1144 (1986). For data on the sizable economies of scale involved in storing, transporting, and distributing water, see BAIN ET AL., *supra* note 23, at 209-26; John M. McDowell & Keith R. Ugone, *The Effect of Institutional Setting on Behavior in Public Enterprises: Irrigation Districts in the Western States*, 1982 ARIZ. ST. L.J. 453, 480-82.

52. *See* WELLS A. HUTCHINS ET AL., IRRIGATION-ENTERPRISE ORGANIZATIONS 59-61, 79-80, 83-85 (U.S. Dep't of Agric. Circular No. 934, 1953); ARTHUR MAASS & RAYMOND L. ANDERSON, . . . AND THE DESERT SHALL REJOICE: CONFLICT, GROWTH, AND JUSTICE IN ARID ENVIRONMENTS 173-74, 218 (1978); Lenni B. Benson, *Desert Survival: The Evolving Western Irrigation District*, 1982 ARIZ. ST. L.J. 377, 380, 384-89; *see also* Leshy, *supra* note 44, at 353-58 (suggesting reasons for the governmental status of these institutions).

governmental institutions, both of which are controlled by their customers. Customer control takes the form of either stock rights (in the case of mutuals) or voting rights (in the case of virtually all districts). As shown in Table 3, commercial companies supplied water to approximately ten percent of irrigated acreage in 1920 (and, although complete statistics are not available, probably a much higher percentage in the late-nineteenth and early-twentieth centuries[53]), but they serviced only 0.5% of the acreage in 1978. Governmental institutions also dominate the market for domestic water[54]—even though privately-owned companies predominate in the supply of other utilities such as electricity.[55]

TABLE 3
HISTORICAL SOURCE OF IRRIGATION WATER BY IRRIGATED ACREAGE IN 17 WESTERN STATES[56]

Year	Self-Supplied	Mutuals	Commercial	Public Water District	Other
1910	79.3%		10.6%	3.8%	6.3%
1920	80.0%		9.5%	9.5%	n/a
1930	8.4%	44.5%	7.1%	24.5%	15.5%
1940	21.8%	38.4%	4.9%	20.7%	14.2%
1950	39.4%	38.4%	2.9%	20.4%	5.3%
1959	43.0%	28.6%	1.3%	22.5%	4.6%
1969	41.6%	26.5%	1.2%	27.9%	2.8%
1978	51.1%	20.6%	0.5%	24.7%	3.1%

Today's high degree of vertical integration is attributable in part to the bilateral monopoly problems that would otherwise threaten agricul-

53. Commercial companies were the dominant form of water supplier in many regions of the early West. *See* A.E. CHANDLER, ELEMENTS OF WESTERN WATER LAW 109-12 (2d ed. 1918) (discussing the early development of commercial water companies).

Table 3 reveals a variety of interesting trends. The jump in the percentage of land irrigated with self-supplied water, which begins in 1940, is probably the result of increased use of groundwater. Mutuals are continuing to lose ground as a percentage of total irrigated acreage, but only because irrigated acreage has grown. In 1920, mutuals furnished water for about 6.6 million acres out of about 12.3 million acres irrigated. 3 BUREAU OF THE CENSUS, U.S. DEP'T OF COMMERCE, U.S. CENSUS OF AGRICULTURE: 1959, at 30 summary tbl. 7 (1962) [hereinafter 1959 CENSUS]. In 1978, mutuals irrigated over 40% more acres (about 9.0 million), but this was a much smaller percentage of the total acres irrigated (43.6 million). 1978 CENSUS, *supra* note 44, at 155 tbl. 4. Commercial companies have declined in importance both as a percentage of total irrigated acres and in acres served. In 1909, commercial companies furnished water for about 1.5 million acres (almost three times as many acres as water districts). 5 BUREAU OF CENSUS, U.S. DEP'T OF COMMERCE, THIRTEENTH CENSUS OF THE UNITED STATES TAKEN IN THE YEAR 1910: AGRICULTURE 846 tbl. 15 (1913) [hereinafter 1910 CENSUS]. In 1978, they served only 220,000 acres. 1978 CENSUS, *supra* note 44, at 155 tbl. 4.

54. *See supra* note 45 and accompanying text.

55. SAX, ABRAMS, & THOMPSON, *supra* note 19, at 675.

56. *See* 1910 CENSUS, *supra* note 53, at 846; 1959 CENSUS, *supra* note 53, at 30-33 summary tbl. 7; 1978 CENSUS, *supra* note 44, at 154-63 tbl. 4.

tural regions.[57] An institution that brings water into an arid region will typically enjoy considerable monopoly power. Because an alternative aqueduct would be costly, the threat of competition is remote and unlikely to drive water prices down to long-run marginal cost.[58] Because the aqueduct is geographically fixed, however, the institution may often face a limited customer pool; customers may enjoy considerable monopsonistic power, and be able to demand a low price that just covers the supplier's short-run operating costs of capturing and delivering the water.[59] Separation of water delivery and water use will thus often present both seller and buyer with considerable economic risk as well as constant and expensive conflict.[60]

Vertical integration is the most effective means of avoiding this bilateral monopoly problem in most settings. Water providers and users in the late-nineteenth century sometimes entered into long-term contracts setting fixed prices for water delivery to curb the temptation of supplier and users to assert their power to renegotiate advantageous rates.[61] Because long-term contracts are unable to account for all future variables, however, the contracts replaced the risk of opportunistic behavior with the risk of dynamic miscalculation;[62] many commercial suppliers went bankrupt or reorganized themselves because the contracts did not provide effectively for long-term cost rises and exceptional expenses.[63]

57. Water users are not unique in resorting to vertical integration to overcome monopoly problems. Farmers and ranchers have often formed buyer cooperatives (or mutuals) in order to overcome monopoly threats in the provision of services and supplies. *See generally* RICHARD B. HEFLEBOWER, COOPERATIVES AND MUTUALS IN THE MARKET SYSTEM 74-99 (1980) (enumerating conditions affecting the entry and growth of farm supply cooperatives in livestock feeds, fertilizer, durable goods, and petroleum).

58. *But see* TERRY L. ANDERSON, WATER CRISIS: ENDING THE POLICY DROUGHT 38-39 (1983) (arguing that early water users could fairly easily move to other lands irrigated by cheaper water if a private company demanded too high a rate for water).

59. For evidence of the customers' monopsonistic power, see CHANDLER, *supra* note 53, at 110.

60. *See* MAASS & ANDERSON, *supra* note 52, at 175 (noting that reduction in conflict was a principal cause of the conversion of many commercial carriers into water districts).

61. *See* FRANK J. TRELEASE & GEORGE A. GOULD, CASES AND MATERIALS ON WATER LAW 504 (4th ed. 1986); *see also* MAASS & ANDERSON, *supra* note 52, at 163-64, 171-72 (illustrating the contractual concerns of Fresno, California farmers). Confusion over land title in the late-nineteenth century limited the practicality of long-term contracts for water suppliers. Long-term contracts can work only if both sides secure their promises. Many early water users, however, were "sooners" who did not technically own their land and thus had no collateral to secure their obligations. CHANDLER, *supra* note 53, at 110.

62. For a discussion of the problems involved in drafting long-term contracts, see Paul L. Joskow, *Vertical Integration and Long-term Contracts: The Case of Coal-burning Electric Generating Plants*, 1 J.L. ECON. & ORG. 33, 60-64 (1985).

63. One example was the California Development Corporation ("CDC") which profitably supplied water from the Colorado River to California's Imperial Valley until the river broke through CDC's diversion works and flooded the valley—creating in the process both the Salton Sea and a swarm of debts and lawsuits. Facing imminent bankruptcy in 1911, CDC was converted into the Imperial Irrigation District. *See* OTIS B. TOUT, THE FIRST THIRTY YEARS 1901-1931: BEING AN ACCOUNT OF THE PRINCIPAL EVENTS IN THE HISTORY OF IMPERIAL VALLEY, SOUTHERN

Moreover, unless contracts are perpetual (which would simply intensify the problem of dynamic miscalculation), renewal negotiations will still raise difficult bilateral monopoly problems. Not surprisingly, at the time of contract renewals, many commercial companies converted into mutuals or water districts through purchase or condemnation.[64]

State regulation is another means of addressing the problems of bilateral monopoly. Indeed, it is the nation's traditional response to natural monopolies such as electricity and telephones. Regulation, however, is costly to administer and reduces operational flexibility. Moreover, due to both political and administrative imperfections, regulation is at best an imperfect means of controlling opportunistic economic behavior.[65] Vertical integration will typically be a more effective response than regulation to bilateral monopoly where customers constitute a small enough class to be able to govern and oversee operations. As Tables 4 and 5 show, most agricultural water retailers, particularly mutuals, meet this criterion.

CALIFORNIA, U.S.A. 98-114 (1931); *cf.* HAROLD B. WRIGHT, THE WINNING OF BARBARA WORTH (1911) (literary account of the Imperial Valley's history). Sometimes, however, state utility commissions allowed rate increases in order to compensate for rising expenses. *See* CHANDLER, *supra* note 53, at 120.

64. *See, e.g.*, MAASS & ANDERSON, *supra* note 52, at 172-73, 175; Kathleen A. Miller, The Right to Use vs. the Right to Sell: Water Rights in the Western United States 67-68 (1985) (unpublished Ph.D. dissertation, University of Washington, on file with author).

65. For indications that overly stringent regulation of commercial water suppliers led in part to their demise, see BAIN ET AL., *supra* note 23, at 310 ("[T]he State Railroad Commission, the predecessor of the Public Utilities Commission, was often hostile to the earning of significant profits by rural water companies."); MAASS & ANDERSON, *supra* note 52, at 172-73 (suggesting that regulatory restrictions on rate increases led private water companies to sell assets to public districts); Richard M. Alston, Commercial Irrigation Enterprise: The Fear of Water Monopoly and the Genesis of Market Distortion (1970) (unpublished Ph.D. dissertation, Cornell University, on file with author).

TABLE 4
MEAN ACRES IRRIGATED IN 1978
BY INSTITUTIONS IN 17 WESTERN STATES[66]
1000s of Acres (# of Institutions)

State	Unincorp. Mutuals	Incorp. Mutuals	Public Water Districts
Arizona	.42 (27)	2.26 (35)	15.58 (26)
California	.69 (113)	3.85 (181)	21.25 (230)
Colorado	.48 (848)	3.76 (533)	13.00 (19)
Idaho	.67 (313)	4.60 (310)	8.67 (90)
Kansas & Oklahoma	n/a (1)	n/a (5)	18.64 (5)
Montana	.75 (489)	3.43 (191)	9.92 (42)
Nebraska	n/a (11)	6.00 (10)	18.27 (40)
Nevada	1.18 (55)	2.25 (30)	22.08 (5)
New Mexico	.28 (421)	.96 (84)	5.70 (28)
North Dakota	.00 (0)	n/a (0)	4.60 (7)
Oregon	.57 (347)	1.62 (115)	8.21 (79)
South Dakota	.44 (19)	1.26 (6)	13.58 (6)
Texas	1.22 (8)	.85 (7)	17.33 (44)
Utah	.42 (315)	1.71 (612)	3.34 (25)
Washington	.49 (70)	1.27 (71)	11.54 (70)
Wyoming	n/a (451)	3.67 (141)	11.91 (35)
TOTAL	.58 (3488)	2.98 (2333)	14.17 (760)

66. *See* 1978 CENSUS, *supra* note 44, at 154-63 tbl. 4.

TABLE 5
MEAN NUMBER OF FARMS/RANCHES SERVED IN 1978
BY INSTITUTIONS IN 17 WESTERN STATES[67]
# of Farms/Ranches (# of Institutions)

State	Uninc. Mutuals	Inc. Mutuals	Public Water Districts
Arizona	11.5 (27)	65.0 (35)	200.0 (26)
California	6.4 (113)	52.5 (181)	400.2 (230)
Colorado	5.7 (848)	45.8 (533)	147.8 (19)
Idaho	8.2 (313)	67.8 (310)	241.2 (90)
Kansas & Oklahoma	n/a (1)	n/a (5)	215.0 (5)
Montana	4.9 (489)	29.7 (191)	108.3 (42)
Nebraska	n/a (11)	55.7 (10)	217.2 (40)
Nevada	n/a (55)	38.6 (30)	230.0 (5)
New Mexico	24.4 (421)	49.0 (84)	473.5 (28)
North Dakota	0.0 (0)	n/a (2)	34.0 (7)
Oregon	5.8 (347)	30.8 (115)	193.7 (79)
South Dakota	7.6 (19)	13.2 (6)	103.0 (6)
Texas	8.4 (8)	22.1 (7)	537.2 (44)
Utah	7.7 (315)	65.7 (612)	286.0 (25)
Washington	5.4 (70)	56.8 (71)	289.5 (70)
Wyoming	n/a (451)	26.7 (141)	96.7 (35)
TOTAL	8.4 (3488)	51.7 (2333)	294.3 (760)

There are other reasons for choosing vertical integration over regulation.[68] Importantly, most water users believe that water is of sufficient importance and complexity that its delivery cannot be trusted to commercial institutions even when they are regulated. Most Westerners historically have viewed water as a crucial necessity, central to life, livelihood, and community. As a result, they long for some personal control over distribution of the resource—no matter how attenuated—and often fear turning decisions concerning water over to the marketplace.[69]

67. *Id.*

68. For a list, see SAX, ABRAMS, & THOMPSON, *supra* note 19, at 676-77.

Bilateral monopoly concerns cannot by themselves explain the prevalence of vertical integration in water delivery. Governmental institutions also dominate the supply of domestic water. Such institutions are often extremely large (and thus unlikely to be susceptible to effective user control even through the ballot box), and the market looks much like that for electricity and telephone service, where regulation predominates over vertical integration.

69. The desire of water users to control water delivery continues today in local proposals to acquire and run facilities currently operated by the federal Bureau of Reclamation. *See, e.g.*, Elliot Diringer, *Wilson Backs Takeover of U.S. Water*, S.F. CHRON., Feb. 28, 1992, at A1 (describing Governor Pete Wilson's interest in transferring control of the Central Valley Project from the federal government to the California state government).

b. *Institutional Water Ownership*

Institutional ownership of water rights requires further explanation. Institutions could obtain all the benefits of technological economies of scale simply by owning the diversion, transportation, and distribution facilities. By also placing water ownership in the institution, individual water users actually lose some control over the resource and may well feel less secure than if they owned the water as individuals. Indeed, shareholders of some mutuals and water districts personally own their water rights; these institutions provide solely a diversion and carriage service.[70] The majority of institutions, however, legally own water rights on behalf of their users.[71]

There are two probable explanations. First, institutional water ownership creates administrative economies of scale: water users can save considerable time and expense by having their institution apply for and, if necessary, defend a single water right on behalf of all users. Second, by placing ownership of all water rights in the institution, water users maximize their ability to reshape water policy within the institution's service area. Institutions, of course, could engage in some regulation of water usage even if their members held legal title to the water. Institutional ownership, however, permits institutions to reconfigure the water right directly. The institution's appropriation permit, for example, usually allows the institution to use its water for a generally beneficial purpose (e.g., irrigation) anywhere within its service area. This relatively broad latitude allows institutions to create entitlement rights that users can transfer far more easily than appropriative rights.[72]

3. *Institutional Reconfiguration of Water Rights and Regulation*

The problems of western water law outlined earlier help illustrate how institutions can reconfigure and manage state water rights efficiently and equitably, often in ways the state cannot.[73] Consider, for example,

---

70. *See* WELLS A. HUTCHINS, MUTUAL IRRIGATION COMPANIES 5 (U.S. Dep't of Agric. Tech. Bull. No. 82, 1929); Benson, *supra* note 52, at 409-10; *see also* MAASS & ANDERSON, *supra* note 52, at 346 (discussing the Strawberry project in Utah); NATIONAL RESEARCH COUNCIL, WATER TRANSFERS IN THE WEST: EFFICIENCY, EQUITY, AND THE ENVIRONMENT 122 (1992) (discussing the Truckee-Carson project in Nevada).

71. Although the institution holds formal legal title to the water, its members are often considered the equitable owners. *See* CHANDLER, *supra* note 53, at 117-19; SAX, ABRAMS, & THOMPSON, *supra* note 19, at 624.

72. *See infra* notes 152-55 and accompanying text.

73. California invented the modern irrigation district in part to enable local agricultural regions to override state recognition of riparian rights. As noted earlier, California has long recognized both appropriative and riparian rights, even though the systems do not comfortably mesh and even though riparian rights undermine security provided by the appropriation system. *See* CALIFORNIA GOVERNOR'S COMM'N, *supra* note 4, at 18-21; SAX, ABRAMS, & THOMPSON, *supra* note 19, at 341-42. In 1887, California authorized irrigation districts partly so that local water users could condemn riparian rights and reallocate the water more equitably and efficiently among the districts' members. *See* WORSTER, *supra* note 5, at 108-09; Thomas E. Malone, The California

the advantages of a pro rata sharing rule during droughts. As explained, pro rata sharing would be far more efficient than the current seniority rule, but if enacted as state policy, would permit new water users to slowly eat away at the drought security enjoyed by existing appropriators and be more difficult to administer.[74] Water institutions provide a solution. Because institutions have some control over the size of their service areas, institutions can help prevent a pro rata rule from turning security into an unconstrained commons within the institution itself. Indeed, local water institutions can balance their service areas, water supplies, and storage capabilities to try to optimize the level of security that their membership will enjoy.[75] Local institutions, which are already responsible for distributing water, can also more readily calculate and enforce pro rata allocations. As a result, the vast majority of institutions provide for pro rata sharing during times of drought or other shortages.[76] Some institutions go further and employ drought allocation rules that are even more responsive to the equity and efficiency demands of their membership.[77] By encouraging and facilitating water transfers among its members, many institutions further reduce the economic dislocation that water shortages cause.[78]

This ability to avoid the destructive consequences of a pro rata sharing rule is a specific instance of institutions' value in preventing overuse of local commons.[79] Another example is their effective reconfiguration of

---

Irrigation Crisis of 1886: Origins of the Wright Act (1966) (unpublished Ph.D. dissertation, Stanford University, on file with author). *But see* BAIN ET AL., *supra* note 23, at 297 (suggesting alternative motivations behind California's creation of irrigation districts).

74. *See supra* notes 22-26 and accompanying text.

75. States could also moderate the commons problem by limiting the water that can be taken from each waterway. As noted, New Mexico has done exactly that. *See supra* note 25. But local institutions enable their water users to contour security levels far more to local needs and conditions than a statewide rule would permit. And local users are likely to trust local institutions far more than a state agency.

76. State statutes give institutions considerable discretion in choosing how to allocate water during droughts. *See* Benson, *supra* note 52, at 414-15. For empirical analyses of the use of pro rata rules by various California water districts, see MAASS & ANDERSON, *supra* note 52, at 178 (Fresno Irrigation District); Archibald Study, *supra* note 35, at 4-55 to 4-59 (Central Valley districts); *see also* BONNIE C. SALIBA & DAVID B. BUSH, WATER MARKETS IN THEORY AND PRACTICE: MARKET TRANSFERS, WATER VALUES, AND PUBLIC POLICY 59-60 (1987) (discussing mutuals' use of pro rata sharing).

77. Some institutions, for example, follow local use preferences during water shortages. *See, e.g.*, L.M. HARTMAN & DON SEASTONE, WATER TRANSFERS: ECONOMIC EFFICIENCY AND ALTERNATIVE INSTITUTIONS 64-65 (1970) (noting that the Southeastern Colorado Water Conservancy District gives domestic use priority over all other uses). In rationing water, other institutions consider each user's water needs and options. *See, e.g.*, H.J. Vaux, Jr., *Water Scarcity and Gains from Trade in Kern County, California, in* SCARCE WATER AND INSTITUTIONAL CHANGE, *supra* note 2, at 67, 88 (indicating that groundwater availability is a factor in allocating surface water).

78. *See infra* Section II.C.

79. For an extensive consideration of local institutional solutions to the tragedy of the commons, see OSTROM, *supra* note 18.

groundwater rights. In states like California that do not effectively constrain groundwater mining, local groundwater users have formed or used local water districts to limit groundwater pumping and allocate withdrawal rights among users.[80] Institutions, in effect, provide the users of an aquifer a useful structure within which to negotiate and manage the unitization of the aquifer, thereby eliminating the strategic disincentives of a commons.[81]

Local institutions, moreover, permit users to customize groundwater rights and regulation to local needs. Where well interference has been a significant problem, for example, local institutions have adopted well spacing rules.[82] Where groundwater mining has threatened salt water intrusion, local institutions have often supplemented pumping restraints with hydrologic barriers.[83] Where surface water has been available, institutions frequently have used a variety of pump taxes, import projects, and/or conjunctive use schemes to optimize the relative use of groundwater and surface water.[84] No two institutions have

80. *See* ANDERSON, *supra* note 58, at 105-10 (discussing California's Tehachapi-Cumming County Water District); 6 WILLIAM BLOMQUIST, THE PERFORMANCE OF INSTITUTIONS FOR GROUNDWATER MANAGEMENT (1988) (case study of San Fernando Valley water district); 7 *id.* (1990) (case study of Chino Basin water district); 8 *id.* (1989) (case study of Mojave River Basin); ALBERT J. LIPSON, EFFICIENT WATER USE IN CALIFORNIA: THE EVOLUTION OF GROUNDWATER MANAGEMENT IN SOUTHERN CALIFORNIA (Rand Corp. Doc. No. 2387, 1978) (examining evolution of local programs); OSTROM, *supra* note 18, at 110, 129-33 (utilizing California examples to provide a conceptual framework for how local institutions can resolve groundwater commons); Bagley, *supra* note 33, at 162-65 (discussing California and Texas statutes authorizing local water districts with power over groundwater); John C. Peck, *Kansas Groundwater Management Districts,* 29 KAN. L. REV. 51 (1980) (discussing efforts to provide local control over groundwater depletion problems); Trelease, *supra* note 40, at 1886-94 (comparing California's Orange County Water District to other districts).

81. *Cf.* Timothy D. Tregarthen, *Water in Colorado: Fear and Loathing of the Marketplace, in* WATER RIGHTS, *supra* note 2, at 119, 135 (discussing the benefits of unitization). States, of course, could also resolve the commons problem by capping or taxing groundwater extractions. But state solutions threaten local autonomy and cause agency problems, and are thus typieally opposed by groundwater users. *See supra* note 36 and accompanying text. State controls, moreover, will often be less fine tuned to the particular needs and conditions of local users than rules worked out through consensus in local institutions.

82. *See, e.g.,* Bagley, *supra* note 33, at 163-64 (districts in Texas' High Plains); Peck, *supra* note 80, at 75-77 (districts in western Kansas).

83. *See, e.g.,* LIPSON, *supra* note 80, at 37-38, 72 (freshwater barrier in Los Angeles' West Coast Basin); Bagley, *supra* note 33, at 164-65 (freshwater injection barriers in Los Angeles County); Susan M. Trager, *Emerging Forums for Groundwater Dispute Resolution in California: A Glimpse at the Second Generation of Groundwater Issues and How Agencies Work Towards Problem Resolution,* 20 PAC. L.J. 31, 40 (1988) (barriers against seawater intrusion in Orange County's coastal areas).

84. *See, e.g.,* ANDERSON, *supra* note 58, at 105-10 (surface water importation); LIPSON, *supra* note 80, at 3-9, 11-13 (pump tax and importation); Terry L. Anderson et al., *Privatizing Groundwater Basins: A Model and Its Application, in* WATER RIGHTS, *supra* note 2, at 223, 242-45 (surface water importation); Paula K. Smith, *Coercion and Groundwater Management: Three Case Studies and a "Market" Approach,* 16 ENVTL. L. 797, 832-38 (1986) (importation and conjunctive use scheme); Trager, *supra* note 83, at 61-63 (pump tax); Trelease, *supra* note 40, at 1886-89 (pump tax).

Many water institutions that are criticized for failing to regulate groundwater mining within their borders may actually have adopted the least-cost approach for their particular situations.

adopted the same groundwater policy; policies instead are uniquely local.

Where water users have found themselves threatened by either short- or long-term reductions in water availability, they have also used local institutions to supplement the weak conservation measures of state law. In response to California's recent drought and threats of longer-term water reductions, for example, a number of water districts in the state's Central Valley have adopted new, and sometimes significant, conservation programs.[85] Many districts now provide subsidized loan programs, conservation rebates, professional irrigation advice, and information clearinghouses.[86] In a few cases, districts have even adopted tiered pricing structures.[87] Local water users have been far more receptive to local conservation programs than to proposed state controls both because the local programs respond to their particular needs and because local users can maintain close control over the programs (eliminating fears of outsiders deciding to curtail water deliveries unreasonably). Although most of the conservation programs are too new to evaluate empirically, the oldest of the programs[88] has already increased local irrigation efficiency by twenty percent.[89]

4. *Varying Responsiveness of Institutions to Outside Interests*

Institutional conservation efforts illustrate the evolutionary response of water institutions to changing *local* needs and conditions—as well as water institutions' frequent unwillingness to respond to *external* eco-

---

Central Valley districts, for example, have historically addressed groundwater mining by importing subsidized water. *See* BAIN ET AL., *supra* note 23, at 299; Anderson et al., *supra,* at 242-45; Vaux, *supra* note 77, at 70-71, 80. The optimal means of controlling mining is not necessarily an absolute cap on withdrawals. Direct regulation of withdrawals is an expensive process, requiring the regulator to determine the total amount that ean be withdrawn in each year, allocate the total, and then monitor individual pumping (which in turn requires the licensing of wells and the installation of meters). Taxing groundwater use also requires monitoring and assessing expense. A final way for institutions to reduce groundwater mining is to subsidize surface water. *See* BAIN ET AL., *supra* note 23, at 345-46. Although subsidies raise other efficiency problems, they can effectively moderate excess groundwater pumping.

85. A number of federal and state actions threaten to reduce the amount of water that would otherwise go to Central Valley farmers in an effort to increase instream flows, improve water quality, and protect fish species. *See, e.g.*, 1992 Reclamation Act, *supra* note 9, § 3406(b); Ronald B. Roble, *The Delta Decisions: The Quiet Revolution in California's Water Rights*, 19 PAC. L.J. 1111 (1988).

86. Recent studies have found that most Central Valley water districts have adopted significant conservation programs, typically in the last five years. *See* GREGORY A. THOMAS & MICHELLE LEIGHTON-SCHWARTZ, NATURAL HERITAGE INSTITUTE, LEGAL AND INSTITUTIONAL STRUCTURES FOR MANAGING AGRICULTURAL DRAINAGE IN THE SAN JOAQUIN VALLEY: DESIGNING A FUTURE VII-6 to VII-10, VII-50 to VII-71 (1990); Archibald Study, *supra* note 35, at 4-72 to 4-76.

87. THOMAS & LEIGHTON-SCHWARTZ, *supra* note 86, at VII-6 to VII-8; Archibald Study, *supra* note 35, at 4-65 to 4-67.

88. Central Valley's El Dorado Irrigation District began its program in 1976. Archibald Study, *supra* note 35, at 4-73.

89. *See* THOMAS & LEIGHTON-SCHWARTZ, *supra* note 86, at VII-50; Archibald Study, *supra* note 35, at 4-73.

nomic and societal needs. Although federal and state legislatures have occasionally tried to enlist local water districts in conservation programs,[90] local institutions have been largely unresponsive to statewide needs for conservation except when imminent local shortages have threatened users within the institution. Institutions, in fact, have often undermined conservation incentives over the past century by subsidizing water rates through property tax receipts,[91] hydropower sales,[92] and various federal programs.[93] When water shortfalls have jeopardized the economic health of a community, however, local institutions have typically responded with quite innovative and effective conservation programs.[94]

An institution's responsiveness to external policy interests depends on a number of factors, including the institution's structure, its culture, and any legal constraints on the institution's activities. Mutuals, for example, are small business corporations, frequently enlivened with a dollop of community spirit. Because most have a small number of local shareholders, their managers generally pursue the goals of their shareholders closely; consensus decisionmaking is often the norm, and the noneconomic interests of shareholders can sometimes play a role in policy formation.[95] Typically, however, shareholders view their mutuals as business entities and support rules and activities that can maximize their economic gain. Many mutuals permit free trading in their shares, enabling outside water users to purchase shares and transfer the accompanying water to new uses.[96] Indeed, in theory outside interests can gain

90. *See, e.g.*, 43 U.S.C. § 390jj(b) (1988) (requiring water districts receiving federally subsidized water to develop conservation plans); CAL. WATER CODE §§ 10610-10656 (West 1992 & Supp. 1993) (requiring adoption of urban water management plans); *id.* §§ 10800-10855 (West 1992) (requiring agricultural water districts to submit water management plans).

91. *See, e.g.*, Henry J. Vaux, Jr., *Growth and Water in the South Coast Basin of California, in* WATER AND ARID LANDS OF THE WESTERN UNITED STATES 233, 263 (Mohamed T. El-Ashry & Diana C. Gibbons eds., 1988).

92. *See, e.g.*, McDowell & Ugone, *supra* note 51, at 492.

93. Federal taxpayers have subsidized institutional rates through the federal reclamation program. *See, e.g.*, RICHARD W. WAHL, MARKETS FOR FEDERAL WATER: SUBSIDIES, PROPERTY RIGHTS, AND THE BUREAU OF RECLAMATION 27-124 (1989); *cf.* 1 E. PHILLIP LEVEEN & LAURA B. KING, NATURAL RESOURCES DEFENSE COUNCIL, TURNING OFF THE TAP ON FEDERAL WATER SUBSIDIES (1985) (criticizing federal subsidies of Central Valley growers). They have also subsidized rates through the tax-exempt municipal bonds issued by many water districts. *See* SAX, ABRAMS, & THOMPSON, *supra* note 19, at 630.

94. Central Valley districts have adopted virtually all of their significaut conservatiou programs in response to either water scarcity or drainage problems. *See* THOMAS & LEIGHTON-SCHWARTZ, *supra* note 86, at VII-50, VII-52, VII-56. The Central California Irrigation District ("CCID") provides a good example of institutional responsiveness to local conditious. Prior to 1989, CCID had an abundant water supply and no conservation program. *See id.* at VII-65. In response to the recent California drought and longer term needs for an increased water supply, however, CCID has instituted both a tiered pricing system and a conservation loan program. *See* Archibald Study, *supra* note 35, at 4-65 to 4-67, 4-72 to 4-73.

95. *See* Kevin B. Pratt, *Mitigating Third-Party Effects*, AM. WATER WORKS ASS'N J., Mar. 1988, at 51, 56.

96. *See infra* notes 215-21 and accompanying text.

control over a mutual by purchasing a sufficient quantity of the mutual's stock.[97]

Most water districts are relatively unresponsive to outside interests. Direct control is typically limited by statute to specified local voters, requiring any outsiders who might wish to change district policies to lobby voters on purchase controlling land interests within the district.[98] As nonprofit governmental agencies, moreover, districts frequently do not have any formal method of allowing their members to profit from satisfying the needs of outside interests;[99] societal images of the proper role of specialized local governments also sometimes deter water districts from pursuing outside profit opportunities.[100] External interests can often influence water districts, therefore, only by exercising legislative power at the state or federal level. By the very step of organizing into water districts, however, local users often gain considerable political power within state legislatures with which they can stave off any outside attacks on district discretion that they believe threaten their interests.[101]

Water districts are often extremely selective even in the local interests they reflect. Voting systems vary from district to district.[102] Some districts elect their board members by a popular vote of all local residents. Others, however, permit only landowners to vote, and often weight votes by acreage owned or by the assessed value of that acreage. Some are governed by directors appointed by local judges or other offi-

97. Any outside interest that gained control over a mutual, however, would still have fiduciary obligations to the remaining local shareholders. *See* SAX, ABRAMS, & THOMPSON, *supra* note 19, at 624.

98. *See* Tim De Young, *Governing Special Districts: The Conflict Between Voting Rights and Property Privileges,* 1982 ARIZ. ST. L.J. 419, 423, 424 tbl. 1. The boards of a few districts are appointed, precluding even this costly approach to control. *Id.* at 423.

99. *See infra* notes 252-57 and accompanying text.

100. *See infra* note 273 and accompanying text. Districts do occasionally take advantage of profit-making opportunities. *See, e.g., City of Roma Buys 1,000 af Rio Grande Surface Water,* WATER INTELLIGENCE MONTHLY, Nov. 1991, at 5, 5-6 [hereinafter *City of Roma*] (describing the efforts of a Texas district to conserve and sell water); *infra* notes 241-42, 250 and accompanying text. But districts appear to have pursued such opportunities less frequently than mutuals. *See infra* text accompanying notes 215-22, 240-49.

101. Organized associations of discrete and cohesive interests should theoretically enjoy a high level of political clout. *See* DANIEL A. FARBER & PHILIP P. FRICKEY, LAW AND PUBLIC CHOICE: A CRITICAL INTRODUCTION 19, 23-24 (1991). This is not to say that water districts are immune from state and federal pressures. The 1992 Reclamation Act, *supra* note 9, shows that reformers can overcome district opposition. State and federal threats to impose relatively radical conservation measures on California water districts may also have partially encouraged some of the districts' recent, more modest conservation efforts. *See supra* notes 85-89 and accompanying text. But on the whole, water districts enjoy high resistance to state and federal pressures, as most attempts to reform the federal reclamation program have shown. *See* SAX, ABRAMS, & THOMPSON, *supra* note 19, at 664-68.

102. The variations in voting systems, and some of their consequences, are discussed in MERRILL R. GOODALL ET AL., CALIFORNIA WATER: A NEW POLITICAL ECONOMY (1978); De Young, *supra* note 98; Merrill R. Goodall & John D. Sullivan, *Water District Organization: Political Decision Systems, in* CALIFORNIA WATER PLANNING AND POLICY: SELECTED ISSUES 207 (Ernest A. Engelbert ed., 1979).

cials. The exact voting system used can influence the district's policies and create conflicts with broader community interests.[103]

II
THE ROLE OF INSTITUTIONS IN WATER MARKETS

Water markets provide an instructive setting in which to examine in more depth the complex role that institutions play in reconfiguring water rights. As discussed below, local water institutions often promote water markets within their borders but impede water transfers from within the institution to distant cities or regions. The goal for policymakers interested in promoting water markets should be to eliminate the obstacles that institutions pose to long-distance transfers while encouraging institutions to continue to play a role in the promotion and facilitation of water markets.

A. The Importance of Water Markets

Water markets can play a valuable economic role in reallocating water to meet changing demands both among geographical regions and among water users within the same region. Most of the current discussions of water markets focus on the potential value of long-distance transfers of water from agricultural regions to the West's many growing urban and suburban areas. Dozens of major western cities, including Dallas, Las Vegas, Los Angeles, Phoenix, Reno, Sacramento, San Diego, and Tucson, grew over twenty-five percent between 1980 and 1990.[104] And this high rate of growth will almost certainly continue. Because both household units and businesses are expected to increase faster than the population, urban water demand will rise even faster.[105]

Metropolitan areas, like the rest of the West, traditionally satisfied growing water needs by constructing new water projects. Metropolitan areas generally disguised the high cost of these new projects by subsidizing them through property tax revenues and by averaging the cost of new supplies in with the lower cost of existing water supplies.[106] Today, however, a broad coalition of interests is encouraging cities to obtain at

103. For a discussion of the impact of voting policies on rules regarding extrajurisdictional transfers, see *infra* notes 266-67 and accompanying text.

104. BUREAU OF THE CENSUS, U.S. DEP'T OF COMMERCE, STATE AND METROPOLITAN AREA DATA BOOK 1991, at 20-23 tbl. 2 (4th ed.).

105. For example, although the Southern California coastal population is expected to increase about 25% by 2010, the total number of occupied units is expected to increase by over one third and total employment by almost that fraction. *See* METROPOLITAN WATER DIST. OF S. CAL., THE REGIONAL URBAN WATER MANAGEMENT PLAN FOR THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA 19 tbl. II-3 (1990) [hereinafter MWD WATER MANAGEMENT PLAN]. The Metropolitan Water District of Southern California therefore predicts that, with current conservation practices, total yearly water demand in its service area will increase by 32%—or by over one million acre feet. *Id.* at 37 tbl. II-10.

106. *See infra* notes 354-55 and accompanying text.

least part of the water their growing populations demand by purchasing it from existing users elsewhere.[107] Because agriculture currently accounts for over ninety percent of water consumption in the western seventeen states,[108] it will likely supply most urban purchases.

Much of the current support for such "ag-urban" water trades is political.[109] Ag-urban trades, however, will also frequently be the most efficient means of meeting the water demands of growing urban and suburban areas. Trades will permit water to flow to more economically valuable uses and to satisfy the growing urban and suburban demand at the lowest cost. The potential for trade will also encourage greater and more efficient agricultural conservation.

Despite the current focus on long-distance ag-urban transfers, water markets can play an equally if not more valuable role in enabling water users within the same general geographic region to trade water among themselves. The needs of farmers, industrial consumers, and domestic users change over time and demand flexibility in water allocation. Farmers choose to fallow fields temporarily or to switch crops; industries develop new processes or expand their operations; domestic users change landscaping. If water rights were effectively tied to particular uses and land, waste and inefficiency would inevitably result.

Droughts and other shifts in water availability increase the need for local flexibility. Administrative rules for allocating water during shortages—whether the seniority rule of the prior appropriation system, the pro rata rule used by virtually all water institutions, or some more exacting rule—are at best starting points for efficient allocations. Some users facing cuts under an administrative rule will always value water more than other users facing similar or lower cuts. By permitting these

107. Cities have long purchased water from other regions. Los Angeles' acquisition of water from the Owens Valley is an infamous (but thankfully unrepresentative) example of an early interregional trade. *See* WILLIAM L. KAHRL, WATER AND POWER: THE CONFLICT OVER LOS ANGELES' WATER SUPPLY IN THE OWENS VALLEY (1982). Until the late 1960s, however, few interregional trades occurred; instead, cities either built water projects to bring in new supplies or, where possible, condemned the necessary water. *See* sources cited *supra* note 5.

108. As of 1985, total freshwater consumption in the 17 westernmost coterminous states was approximately 71.8 billion gallons per day (bgd). *See* 1985 ESTIMATED USE, *supra* note 31, at 59 tbl. 24. Of this amount, 90.5% (or 65.0 bgd) was consumed in irrigation, *id.* at 25 tbl. 8, and another 1.3% (or 0.9 bgd) was consumed by livestock operations, *id.* at 29 tbl. 10. In total, therefore, farming and ranching operations consumed 91.8% of the water.

109. Environmentalists have long opposed the orthodox engineering solution to western water demands and have urged the use of water trades as an effective, environmentally safer alternative. *See* MARC REISNER & SARAH BATES, OVERTAPPED OASIS: REFORM OR REVOLUTION FOR WESTERN WATER 123-24, 130-33 (1990); ROBERT STAVINS, ENVTL. DEFENSE FUND, TRADING CONSERVATION INVESTMENTS FOR WATER 21, 25-26 (1983). As environmental opposition, tight budgets, and a reduced number of remaining sites have reduced the opportunity for engineering solutions, a growing number of cities have also recognized that water trades may be one of the few realistic means available to meet their increasing demands.

users to buy or lease more water, markets can decrease the economic loss from water shortfalls.

Water institutions play quite different roles regarding local water markets and more distant ag-urban transfers. Institutions promote local flexibility. All states provide statutory mechanisms by which appropriators can transfer their water rights to others ("statutory transfers"). Unfortunately, as detailed in the next Section, statutory transfer requirements impose high and often prohibitive costs on most small and short-term transfers. As a result, although statutory transfers are common in many states, they generally provide only limited flexibility to local water users. Many local water institutions have remedied this problem by providing less costly, internal mechanisms ("institutional markets") by which their members can reallocate water among themselves as member needs and water conditions change. Where available, institutional markets are generally far more active and robust than statutory transfer markets. Institutions have also responded well to the evolving interests of their members, changing and shaping their market policies as appropriate.

The roles of statutory transfers and institutions are largely reversed at the interregional level. The costs of statutory transfers generally do not obstruct large ag-urban trades whose costs can be spread over hundreds or thousands of acre feet. Yet agricultural institutions, which control much of the water that urban areas covet, have often opposed and successfully blocked such trades. The future of interregional trades, therefore, may well require significant institutional reform or regulation.

B. Statutory Transfers

Although a majority of western states once prohibited appropriators from transferring their water separate from their land, all western states now permit such trades.[110] Even in states whose laws are most receptive to statutory transfers, however, selling or leasing water is typically far more complex than trading other propertied resources such as land or petroleum. Appropriators generally have no right to their return flow; water that returns to a stream is available for appropriation by downstream users exactly as if it had never been diverted. To protect those downstream users, all western states have "no injury" rules. These "no injury" rules prohibit changes in water use that would harm downstream users by altering the amount, timing, or quality of the return flow.[111]

110. *See* SAX, ABRAMS, & THOMPSON, *supra* note 19, at 213-14. Statutes banning transfers still remain as historic vestiges on the books of some western states, but are either riddled with exceptions or overridden by later statutes. *See, e.g.*, WYO. STAT. § 41-3-101 (Supp. 1992); *see also* Mark Squillace, *Water Marketing in Wyoming*, 31 ARIZ. L. REV. 865, 884 & n.163 (1989) (discussing Wyoming law).

111. *See* SAX, ABRAMS, & THOMPSON, *supra* note 19, at 222-30; *see, e.g.*, Farmers Highline Canal & Reservoir Co. v. City of Golden, 272 P.2d 629, 632 (Colo. 1954) (en banc) (" 'The well-

The principal exception is where an appropriator imports water into a new watershed. In that case, the importer has a legal right to both the initial use and all reuse of the "developed" water.[112]

Appropriators who wish to modify their water use (as part of a sale or otherwise) must generally apply to the governing state agency for a permit change.[113] Notice is provided to other water users in the area and, if the proposed change is protested, the current owner must prove—sometimes in an adjudicatory or quasi-adjudicatory hearing—that the change will not injure any other user.[114] Unfortunately, noninjury is not always easy to prove. Appropriative rights are measured by the amount of water that an appropriator can divert from a waterway, and the quantity and timing of any return flow is often unknown and quite difficult and expensive to assess.

The statutory transfer requirements do not appear *directly* to prevent a high percentage of transfers. In a recent study of six western states, fewer than half of all transfer applications filed between 1975 and 1984 drew protests.[115] Where protests are filed, applicants are generally able to prove that their transfer will not injure other appropriators (although the proof can be expensive). Even when they cannot, they can often modify transfer terms to avoid injuring another appropriator. In the six-state study, fewer than ten percent of all transfer applications filed ultimately were denied by the relevant state agency or court.[116]

The high cost of statutory transfer proceedings, however, almost certainly deters many transfers, particularly small or short-term trades. Small purchasers and sellers may often be able to escape high transfer costs if no one protests the transfer.[117] But transfer proceedings can be quite expensive if anyone challenges the transfer and in states with more burdensome transfer procedures. Recent surveys of Colorado and New Mexico proceedings involving various-sized transfers, for example, revealed costs that ranged from a few hundred dollars to almost

recognized right to change either the point of diversion of the water right or its place of use is always subject to the limitation that such change shall not injure the rights of subsequent appropriators.' ").

112. *See, e.g.*, Brighton Ditch Co. v. City of Englewood, 237 P.2d 116, 122 (Colo. 1951) (en banc) ("[A]ppropriators on a stream have no vested right to a continuance of importation of foreign water which another has brought to the watershed.").

113. *See* SAX, ABRAMS, & THOMPSON, *supra* note 19, at 223 & n.6.

114. *See id.* at 223-24.

115. *See* MACDONNELL STUDY SUMMARY, *supra* note 6, at 47-48, 62 n.86 (all data but for California from years 1975 to 1984; California data from years 1982 to 1989). In New Mexico and Utah, fewer than 10% of transfer applications were protested. *Id.* at 47, 47a fig. 3.2.1.

116. *Id.* at 47-48.

117. *See, e.g.*, Chris C. Hogge et al., *Review of the Water Rights Transfer Process and Activity in Utah, in* 2 THE WATER TRANSFER PROCESS AS A MANAGEMENT OPTION FOR MEETING CHANGING WATER DEMANDS ch. 5, 61 (Lawrence J. MacDonnell principal investigator, 1990) [hereinafter MACDONNELL STUDY CASES] (noting that 70% of transfer applicants in Utah were able to handle their applications personally).

$50,000.[118] Although large transfers can spread these costs over hundreds or even thousands of acre feet, smaller transfers cannot.[119] The Colorado and New Mexico surveys suggest that, on average, statutory transfer procedures impose costs of at least $300 per acre foot on transfers of twenty acre feet or less.[120] Conservatively assuming water prices of $1500 or less per acre foot, therefore, the statutory transfer process can in a typical case add twenty percent or more onto the cost of small purchases.

The length of the process can be equally problematic for local flexibility. Many transfer applications take only a month or two to resolve, but the average processing time appears to range from six months to one and one-half years (with controversial transfers occasionally taking up to several years).[121] Such time delays are unlikely to deter many long-term transfers, which often go through considerable advance planning and negotiating. Multimonth proceedings, however, can easily deter short-term transfers, robbing local regions of the ability to respond to droughts and transient changes in water needs.

A few states have tried, with some success, to reduce the costs and

118. *See* F. Lee Brown et al., *Transfers of Water Use in New Mexico, in* MACDONNELL STUDY CASES, *supra* note 117, ch. 4, at 16-19; Lawrence J. MacDonnell et al., *Transfer of Water Use in Colorado, in* MACDONNELL STUDY CASES, *supra* note 117, ch. 3, at 16. The data available from these studies, unfortunately, are not particularly good. Both studies involved only a few data points (9 for Colorado, 87 for New Mexico). Transaction costs were also poorly defined for purposes of policy analysis: the Colorado study did not separate the costs of obtaining state permission from brokering and other transaction costs, while the New Mexico study did not clearly define the costs. The data, however, is the best currently available and, after adjusting for price increases, is in line with numbers from most earlier studies. *See, e.g.*, MEYERS & POSNER, *supra* note 4, at A2-2, A2-8. *But see* Micha Gisser & Ronald N. Johnson, *Institutional Restrictions on the Transfer of Water Rights and the Survival of an Agency, in* WATER RIGHTS, *supra* note 2, at 137, 148-49 (reporting exceptionally low transaction costs in New Mexico).

119. *See, e.g.*, MACDONNELL STUDY SUMMARY, *supra* note 6, at 56 ("There clearly exist economies of scale in applicants' costs in New Mexico . . . ."); MEYERS & POSNER, *supra* note 4, at A2-2 (reporting the view of the then General Counsel of the Denver Water Board that "[t]ransfers of small amounts of water are frustrated by costs of transfer"). *But see* BONNIE G. COLBY ET AL., DEPARTMENT OF AGRIC. ECON., UNIVERSITY OF ARIZ., WATER TRANSFERS AND TRANSACTION COSTS: CASE STUDIES IN COLORADO, NEW MEXICO, UTAH, AND NEVADA 54 (1989) [hereinafter TRANSACTION COSTS STUDY] (concluding that transfer costs are small compared to the cost of the water rights and do not affect most transfers' attractiveness); R. Keith Higginson & Jack A. Barnett, Water Rights and Their Transfer in the Western United States 15-16 (May 1984) (unpublished report to the Conservation Foundation, on file with author) (arguing on the basis of personal experience that statutory transfer procedures do not pose a barrier to noneontroversial transfers).

120. *See* Brown, *supra* note 118, at 16-19 (New Mexico); MacDonnell et al., *supra* note 118, at 16 (Colorado).

121. *See* MACDONNELL STUDY SUMMARY, *supra* note 6, at 47 (in the six states studied, average proceeding times ranged from 5.8 months in New Mexico to 19.5 months in Colorado); *see also* MEYERS & POSNER, *supra* note 4, at A2-8 to A2-9 (reporting Colorado data suggesting slightly longer times than those reported in the *MacDonnell Study*). One earlier study suggested that the average time period ranged from only a couple of months in most states to half a year in Texas, Washington, and Wyoming, but the study relied purely on surveys of agency officials who could be expected to underreport delays. *See* Higginson & Barnett, *supra* note 119, at 7, 9-10 tbl. 3.

delays involved in statutory transfers. In 1980, for example, California adopted both a streamlined process for approving "temporary" transfers[122] and a procedure for "trial transfers" in which transfers would be allowed for a short period of time in order to assess their efficacy and impact.[123] Measured purely by the resulting percentage increase in statutory transfers, the California legislation was successful. Although no one had applied for a statutory transfer from 1975 to 1981 (except for several exceptional transfers stemming from the State's 1976-1977 drought), water users sought approval of seventeen transfers from 1982 to 1989 (again excluding drought-related transfers).[124] As further evidence of the value of the new procedures, water users filed only one of the 1982-1989 transfer applications under the traditional approval process.[125]

The California experience, however, also suggests the limited relief that legislative tinkering with the statutory transfer process can provide—particularly in increasing local flexibility among small users. A survey of approximately 500 California water users in the early 1980s revealed that over a quarter were potentially interested in selling some or all of their water.[126] Yet the 1982 legislation yielded only about two transfer applications per year, virtually all of which involved large transfers by institutions or sizable commercial interests; only one application entailed a small transfer between individual water users.[127]

The degree to which the statutory review process can be eased or streamlined is limited. The principal impediment to statutory transfers in most states lies not in overly restrictive laws or poorly designed procedures but in the rational legal decision to protect other appropriators. Both to ensure that transfers are efficient and to provide junior appropriators with a modicum of security, the law must protect juniors from inju-

122. *See* Act of Sept. 19, 1980, 1980 Cal. Stat. 933, § 12 (codified at CAL. WATER CODE §§ 1725-1730 (West 1992)). Under the 1980 provision, temporary changes automatically took effect 30 days after the state agency was notified of the change unless the agency objected. *Id.*

123. *Id.* For a detailed description of California's efforts to improve its statutory transfer process, see Brian E. Gray, *A Primer on California Water Transfer Law,* 31 ARIZ. L. REV. 745, 768-79 (1989).

124. Brian E. Gray, *Water Transfers in California: 1981-1989, in* MACDONNELL STUDY CASES, *supra* note 117, ch. 2, at 12-22 (24 transfers from 1982 to 1989, of which seven appear to have been drought-related).

125. *Id.* Of the other 16, three were filed as "trial transfers" and the remainder as "temporary transfers." *Id.*

126. *See* CALIFORNIA ASSEMBLY OFFICE OF RESEARCH, A MARKETING APPROACH TO WATER ALLOCATION 41-42 (1982). Two thousand seven hundred and ten surveys were sent out. Of the approximately 500 respondents, 19% reported they were willing to sell their water, 8.5% reported they might be, and 13% reported they would be willing if the legislature modified the transfer process. Twenty-five percent were small domestic users and thus not potential sellers. Only about a third of the respondents expressed no interest in water markets. Those users stating how much they would be willing to sell reported almost 175,000 acre feet available. *Id.* at 42; *see also* NATIONAL RESEARCH COUNCIL, *supra* note 70, at 222 (noting that there were significant opportunities for profitable transfers in California).

127. *See* Gray, *supra* note 124, at 13-22.

rious transfers.[128] Yet so long as the law does, the sheer hydrologic uncertainty involved in determining whether a transfer will affect downstream appropriators will inevitably produce sizable administrative costs.

Efforts to promote statutory transfers by reducing or shortening substantive reviews will at some point inevitably draw opposition from appropriators who are concerned that future water transfers will undermine their current rights.[129] Eight years after its 1980 reforms, in fact, the California legislature decided that it had gone too far; in new reforms, the legislature increased administrative oversight of temporary changes and abolished trial transfers.[130]

The only reasonably effective cure for the problems presented by the no-injury rule is to requantify appropriative rights according to the amount of water that each appropriator can *consume* rather than the amount each can *divert,* thereby eliminating the need to determine return flow each time a right is transferred.[131] But this would merely change the point at which states must determine return flows. Although transfers would be unburdened, states would need to calculate the return flows of *all* water rights *immediately* in order to quantify the consumptive rights—a tremendous administrative chore that no state would want to undertake without a compelling reason. Any redefinition, moreover, is almost certain to draw factual objections and constitutional challenges from water users who believe that the redefinition has reduced their water rights. Attempts to overcome the administrative difficulties by using approximations will simply attract more and stronger challenges. States would also have more difficulties policing consumption-based rights to ensure that appropriators are not using more water than the amount to which they are entitled.[132]

None of this undermines the importance of trying to reform the statutory transfer process. A few western states still retain unnecessary stat-

128. *See* MEYERS & POSNER, *supra* note 4, at 27-28; SAX, ABRAMS, & THOMPSON, *supra* note 19, at 227-28.

129. Responses to a 1963 survey of 950 Colorado water users showed the depth of opposition; many viewed the current statutory procedures as crucial to the protection of their rights and priorities. *See* MEYERS & POSNER, *supra* note 4, at A2-10 to A2-13.

130. Act of Sept. 22, 1988, 1988 Cal. Stat. 1145 (codified at CAL. WATER CODE §§ 1547.1, 1725-1732, 1735-1737, 1740, 11712, 11752 (West 1992)).

131. *See* ANDERSON, *supra* note 58, at 66-67; Gisser & Johnson, *supra* note 118, at 139-46, 161-62. Even defining water rights in consumption terms, moreover, would not resolve all third-party effects, such as the potential impact from changes in the timing of return flow. *See* George A. Gould, *Water Rights Transfers and Third-Party Effects,* 23 LAND & WATER L. REV. 1, 27-28 (1988). For a discussion of consumptive rights and other prominently suggested means of reducing the costs and delay of statutory transfer processes, see SAX, ABRAMS, & THOMPSON, *supra* note 19, at 229-30 (discussing consumptive rights as well as the possibility of relegating junior appropriators to damages and/or delaying approval rulings until after a trial period); Gould, *supra,* at 25-41 (dealing specifically with consumptive rights).

132. *See* Gould, *supra* note 131, at 26.

utory barriers to transfers.[133] Legal ambiguities similarly impede some transfers; many states' laws, for example, do not clearly address whether conserved water can be transferred.[134] Efforts to streamline the review process, despite the limitations just discussed, can also increase the number of transfers at least marginally. Finally, streamlining can reduce the dead weight expense that the process imposes on those transfers that would proceed even under the current transfer system. Absent radical revision of the prior appropriation system, however, the statutory transfer process by itself is unlikely to provide a high degree of *local* flexibility.

The current legislative trend, moreover, appears to be toward increasing, rather than decreasing, restrictions on statutory transfers. A growing number of states are requiring administrative agencies to evaluate the impact of a transfer not only on other water users, but also on the environment, the local community, and the general "public interest."[135] Although traditionally neglected externalities might justify at least some of these added standards,[136] the standards will also increase the administrative complexity and costs of many statutory transfer reviews.

C. *Institutional Creation of Local Markets*

Thankfully, institutions have often provided the local flexibility that statutory transfers are ill designed to provide. Researchers have only recently begun collecting detailed empirical information on water markets in the western United States.[137] Unfortunately, most of these studies have focused primarily on statutory transfers.[138] Although the problems

133. *See* DRIVER, *supra* note 8, at 26 (discussing how riparian rights, burdensome procedures, and unclear requirements serve as barriers); SAX, ABRAMS, & THOMPSON, *supra* note 19, at 231-32 (discussing special transfer restrictions in some states and noting the lingering uncertainties in states that once flatly banned transfers); David H. Getches, *Water Use Efficiency: The Value of Water in the West,* 8 PUB. LAND L. REV. 1, 20-21 (1987) (describing various legal and administrative barriers to water transfers).

134. *See* DRIVER, *supra* note 8, at 27-29; SAX, ABRAMS, & THOMPSON, *supra* note 19, at 184-94, 231-32 (survey of cases limiting rights to conserved water); *SWRCB to Hold Hearing on El Dorado Conservation Project,* WATER INTELLIGENCE MONTHLY, Mar. 1992, at 8, 8-9 (discussing the propriety of a water board's restriction of transfers of conserved water).

135. *See* SAX, ABRAMS, & THOMPSON, *supra* note 19, at 235.

136. *See infra* notes 262-63 and accompanying text.

137. The most extensive study of water markets to date, funded by the U.S. Geological Survey, examined water markets in six states: Arizona, California, Colorado, New Mexico, Utah, and Wyoming. *See* MACDONNELL STUDY SUMMARY, *supra* note 6. Professor Bonnie Colby, who served as an investigator in the *MacDonnell Study, see id.* at viii, has also conducted a number of separate studies of western water markets. *See* COLBY ET AL., *supra* note 119; SALIBA & BUSH, *supra* note 76; Bonnie Colby et al., Transferring Water Rights in the Western States—A Comparison of Policies and Procedures (Feb. 1989) (unpublished manuscript, on file with author).

138. Only the portiou of the *MacDonnell Study* looking at California, for example, devoted any significant attention to institutional transfers. *See* Gray, *supra* note 124, at 11-40.

Again, this is not to say that studies of water markets have totally ignored the relevance of institutions. For example, the study of water markets recently completed by a committee of the National Research Council, chaired by Professor Dan Tarlock, recognizes the considerable

of obtaining comprehensive information on institutional markets partially explains this bias,[139] the studies have given the inaccurate impression that statutory transfers are both more common and more important than institutional markets in providing needed flexibility to western water users. What information exists on institutional markets (and a few studies have now been completed) suggests just the opposite at the local level.[140]

Absent institutions and institutional markets, local water users who were interested in selling or temporarily leasing small quantities of water would face a variety of potential obstacles. Perhaps the most serious obstacles, just discussed, would be the cost and delay involved in statutory transfers. Because appropriative water rights are each unique, many potential buyers would also find it difficult to locate and evaluate appropriate rights to buy. Selling price determinations would also often be complex and require costly negotiations.[141] At least some water markets, moreover, would be relatively thin with no established brokering system, further complicating the search and negotiation process.[142] Except where both purchaser and seller were near a common waterway, water purchasers would also confront the expensive task of transporting the water to where it will be used.[143]

---

importance of institutions. *See* NATIONAL RESEARCH COUNCIL, *supra* note 70, at 96-97. But the bulk of focus there and elsewhere has been on statutory transfers and legal constraints.

139. Most of the studies have noted the existence of institutional markets and, at times, even provided limited examples. *See, e.g.*, SALIBA & BUSH, *supra* note 76, at 58-60, 125-33, 165-66 (discussing the market role of water districts in Arizona, California, Colorado, and Utah).

140. *But see* ALLEN V. KNEESE & F. LEE BROWN, THE SOUTHWEST UNDER STRESS: NATIONAL RESOURCE DEVELOPMENT ISSUES IN A REGIONAL SETTING 95-96 (1981) (suggesting that most institutions centrally allocate water and make little use of market mechanisms).

Most of the information that we have regarding institutional transfers, unfortunately, is relatively dated. *See, e.g.*, HARTMAN & SEASTONE, *supra* note 77, at 34-44 (analyzing the North Poudre Irrigation Company's transfer activities during the 1960s); MAASS & ANDERSON, *supra* note 52, at 197-208 (discussing water use and transfer patterns in and around Hanford, California during the late 1960s). Several recent studies, however, have examined the Northern Colorado Water Conservancy District's internal transfer market. *See* NATIONAL RESEARCH COUNCIL, *supra* note 70, at 147-50; SALIBA & BUSH, *supra* note 76, at 128-33; WAHL, *supra* note 93, at 135-36. And two recent studies have looked in some depth at institutional transfers in California's Central Valley. *See* Gray, *supra* note 124, at 22-33; Archibald Study, *supra* note 35.

141. Under current appropriation law, the value of a water right to a potential purchaser depends on numerous individual factors, including the waterway involved, the right's flow amount, its priority date, the seasons and times during which it can be used, the current return flow, and the current diversion point. *See* Jan P. Crouter, *Hedonic Estimation Applied to a Water Rights Market*, 63 LAND ECON. 259, 262-63 (1987); Howe et al., *supra* note 22, at 183-84.

142. For a discussion of current problems in matching buyers and sellers, see Victor Brajer et al., *The Strengths and Weaknesses of Water Markets as They Affect Water Scarcity and Sovereignty Interests in the West*, 29 NAT. RESOURCES J. 489, 502-03 (1989).

143. Although frequently ignored in water market discussions, transportation problems are not a trivial hurdle. A purchaser who cannot draw her water from the same waterway as the seller must worry about both constructing a transportation canal (or finding an existing canal with available capacity, *see infra* note 323) and, if her land is uphill, paying the energy costs of pumping water uphill. *See, e.g.*, UCLA CONFERENCE, *supra* note 8, at 100-05 (explaining the difficulty of

Water institutions typically provide help on all these fronts. As described below, most institutions provide a system for reallocating water without requiring users to apply for statutory transfers. Of equal importance, institutions provide their users with largely interchangeable water entitlements; although users differ in the quantity of rights they hold or purchase, the quality of each right does not generally depend on priority, point of diversion, current return flow, or other unique factors. Standardized markets can thus develop, easing both search and pricing costs. Additionally, because water institutions are in relatively constant contact with their members and are familiar with their needs, institutions can easily (and often do) serve as transfer clearinghouses.[144] Finally, because most institutions were formed to distribute water among their members, institutions have typically constructed extensive canal works that often can be readily used to redirect water from one user to another.[145]

1. Alternative Means of Providing Allocative Flexibility

As in other areas of water policy, institutions are able to customize market mechanisms to the particular needs and conditions of their water users. Institutions can provide local market flexibility through at least two quite different mechanisms: a "transfer" system under which the institution awards water entitlements to its members and then permits the members to trade their entitlements among themselves, and a "pricing" system in which each user in the institution is permitted to buy as much water as she demands at a preannounced price. Perhaps because water scholars tend to think of water as a system of rights rather than as a retail commodity, discussions of water markets almost invariably focus myopically on transfer systems. In some settings, however, pricing systems can be a superior method of achieving local flexibility and are frequently used to reallocate water within water institutions.

---

transporting water through California facilities); Young, *supra* note 51, at 1145 ("Transport for any distance, particularly if energy for lifting is required, may rapidly outweigh the user's willingness to pay at the margin."). To give some feeling for the magnitude of construction costs, Phoenix estimates that it will need to pay about $50 million to move water 80 to 90 miles to the Central Arizona Projeet. *See* GARY C. WOODARD ET AL., DIVISION OF ECON. & BUS. RESEARCH, UNIVERSITY OF ARIZ., THE WATER TRANSFER PROCESS IN ARIZONA: ANALYSIS OF IMPACTS AND LEGISLATIVE OPTIONS 44 (1988).

144. *See* Archibald Study, *supra* note 35, at 4-71, 5-53.

145. *See, e.g.*, MAASS & ANDERSON, *supra* note 52, at 304 (discussing how water transfers are put into effect by rerouting water through canals to renters' or purchasers' receptacle ditches); Mark Squillace, *Water Rights Transfers in Wyoming, in* MACDONNELL STUDY CASES, *supra* note 117, ch. 6, at 7 (discussing this informal process monitored by "ditch riders").

a. Pricing Systems

Most domestic water users, and even some agricultural users,[146] are personally familiar with the flexibility provided by pricing systems. Institutional pricing systems constantly and, from the users' viewpoint, relatively effortlessly reallocate water among institutional members as demands change. Users can generally increase or decrease their use at will. They need take no administrative steps, except in some settings to advise the institution of how much water they want in advance. Under most pricing systems, users merely consume the amount of water they want and are billed later.

Prices also encourage a degree of conservation. Where institutions charge the marginal or opportunity cost of the water supplied,[147] pricing systems encourage an efficient level of conservation.[148] In practice, few institutions use marginal cost pricing, and even those which do use it only in limited settings.[149] Indeed, many institutions actually subsidize an inefficiently high level of water use through property taxes, declining price structures, or other means.[150] Institutional pricing systems still

146. Most states permit agricultural institutions to allocate water either through entitlements or through pricing systems. *See, e.g.*, CAL. WATER CODE §§ 22250, 22252, 35421 (West 1984). As explained below, however, most agricultural institutions use entitlements. *See infra* notes 169-77 and accompanying text. Yet a few normally supply water on demand to any of their farmers willing to pay the current district rates. *See, e.g.*, Michael D. Rosen, *Conflict Within Irrigation Districts May Limit Water Transfer Gains*, CAL. AGRIC., Nov.-Dec. 1992, at 4, 5 (California's Imperial Irrigation and Metropolitan Water Districts); Archibald Study, *supra* note 35, at 4-56 to 4-57 (California's El Dorado and Glenn-Colusa Irrigation Districts).

Even agricultural institutions that allocate their principal supply through entitlements sometimes use a pricing system to allocate any extra water acquired in a given year. *See, e.g.*, MAASS & ANDERSON, *supra* note 52, at 198 (sale of surplus water by the Lemore Canal and Irrigation Company); SAX, ABRAMS, & THOMPSON, *supra* note 19, at 622-23 (mutuals sell surplus water at rates set by a board of directors); Archibald Study, *supra* note 35, at 4-56 (some districts sell water "on demand" as long as there is enough water to go around).

147. I separate out marginal and social opportunity costs here because of the likelihood that, in practice, the marginal cost facing a typical agricultural water district might diverge from the societal opportunity cost, and because of the confusion that water lawyers often have with these terms. Assume that the price to a water district of obtaining its last unit of water is $50 per acre foot (and somewhat uurealistically that there is no subsidy). Although this is the marginal cost facing the water district, an urban region might be willing to pay $200 per acre foot for the water if transfers were permitted. For economic efficiency purposes, the district should charge its users the social opportunity cost of $200 rather than the private marginal cost of $50. To the economist, marginal cost is defined in societal terms and would be equal to the social opportunity cost; in the rest of this Article, I use the economist's definition of marginal cost.

148. For a discussion of marginal cost pricing and its benefits, see DRIVER, *supra* note 8, at 84-85; CHARLES E. PHELPS ET AL., EFFICIENT WATER USE IN CALIFORNIA: WATER RIGHTS, WATER DISTRICTS, AND WATER TRANSFERS 17-25 (Rand Corp. Doc. No. 2386, 1978); Vaux, *supra* note 91, at 263-69.

149. *See* BAIN ET AL., *supra* note 23, at 325-28 (enumerating the equitable and political considerations that drive the pricing decisions of various Northern California water agencies); SAX, ABRAMS, & THOMPSON, *supra* note 19, at 689 (suggesting that political difficulties with raising prices and legal prohibitions against government profit-making explain why districts use average cost pricing).

150. *See* PHELPS ET AL., *supra* note 148, at 13, 23; SAX, ABRAMS, & THOMPSON, *supra* note 19,

encourage some conservation, but often less than is optimal.

b. *Transfer Systems*

An institution can provide each of its members with similar flexibility and conservation incentives by allocating water entitlements to each member and then permitting members to trade the entitlements.[151] Institutional transfer systems typically involve far lower transaction costs than the statutory transfer systems discussed earlier. Given that institutions in most states generally hold appropriation permits that allow water use anywhere within the institution's service area, most institutional transfers do not constitute formal changes in state appropriative rights and thus do not require state approval.[152] Institutional transfers may also escape special state restrictions on statutory transfers.[153] Although most institutions retain the authority to prohibit transfers on a blanket or case-by-case basis,[154] they typically have little incentive to exercise this authority. Because unconsumed water commonly flows

at 689-90; Vaux, *supra* note 91, at 263-64. There have been some limited and scattered efforts at reform in recent years. *See, e.g.*, 1992 Reclamation Act, *supra* note 9, § 3405(d) (requiring retailing districts in the Central Valley Project to use inverted block rate structures); Act of July 3, 1984, 1984 Cal. Stat. 271, § 1 (codified at CAL. REV. & TAX. CODE § 97.6 (West 1987)) (requiring districts to adopt programs to reduce reliance on property taxes).

151. *See infra* note 170 (discussing the legality of internal transfers).

152. *See, e.g.*, NEV. REV. STAT. ANN. § 539.230(3) (Michie Supp. 1991); *see also* SAX, ABRAMS, & THOMPSON, *supra* note 19, at 623. In Oregon, a water district must notify the Water Resources Commission of the proposed transfer. The Commission has the authority to deny the transfer "if such use would interfere with existing water rights or result in enlargement of the water right"; inaction is deemed approval. OR. REV. STAT. § 540.570(3) (1991).

Where institutions have imported water into a watershed, even formal changes in state appropriative rights do not run up against return flow protections. *See supra* note 112 and accompanying text.

In an attempt to remove institutional obstacles to transfers of water out of water districts, the drafters of the 1992 Reclamation Act may have unthinkingly imposed additional burdens on internal transfers within California's Central Valley. Under the 1992 Act, the Secretary of the Interior must review and approve all transfers of reclamation water by members of Central Valley water districts. *See* 1992 Reclamation Act, *supra* note 9, § 3405(a)(1).

153. Although there is no relevant case law, the special barriers that some states impose to transfers, *see supra* note 133 and accompanying text, appear from their language or placement in state water codes to apply only to formal statutory transfers of water. *See, e.g.*, NEV. REV. STAT. ANN § 533.040 (Michie 1986); OKLA. STAT. ANN. tit. 82, § 105.22 (West 1990); S.D. CODIFIED LAWS ANN. § 46-5-34 (1987).

154. *See, e.g.*, CAL. CIV. CODE § 330.24 (West 1982) (mutuals can restrict transfers); *In re* Water Rights of Fort Lyon Canal Co., 762 P.2d 1375, 1379 (Colo. 1988) (en banc) (mutuals can condition transfers); Comstock v. Olney Springs Drainage Dist., 50 P.2d 531, 532 (Colo. 1935) (mutuals can prohibit certain transfers). The rules of each institution are typically spelled out in the institution's articles or bylaws. Occasionally, state law mandates board review and approval. *See, e.g.*, ARIZ. REV. STAT. ANN. § 45-172(4) (1987) (requires "written consent and approval" of any institution); IDAHO CODE § 42-108 (1990) (consent of mutual corporations or irrigation districts); *id.* § 42-2503 (written consent of Carey Act corporations); N.M. STAT. ANN. § 73-13-4 (Michie 1992) (boards of irrigation districts must publish notice and hear protests; appeals also permitted to state district court); UTAH CODE ANN. § 73-7-11 (1953 & Supp. 1992) (boards of irrigation districts must consent to transfers).

either into institution-owned ditches or a common underlying aquifer, institutional transfers generally do not raise serious return flow problems or significantly threaten other water users within the institution.[155] Indeed, institutions often encourage transfers by matching buyers and sellers and providing free use of available aqueduct capacity.[156]

Transfer systems provide a high degree of flexibility. Water users can reallocate water among themselves as their demands change. Like pricing systems, transfers also encourage conservation by providing users with a monetary incentive to save water. If the market for water entitlements were competitive, relatively costless, and open to all water users, a transfer system would achieve an economically optimal degree of conservation.

Like most existing pricing systems, however, transfer systems in practice do not generate optimal conservation. The members of an institution often cannot transfer their entitlements outside the institution.[157] As a result, their decision about conservation will consider the value of the saved water to others in the district but not to outsiders (which, in most agricultural districts, will be the higher value).

The reduced transaction costs of institutional transfers encourage active internal markets.[158] Small-scale studies suggest that institutional transfers far outnumber the few statutory transfers that occur each year in the average state.[159] Only three states currently average more than 100 statutory transfers per year; Utah enjoys the most with almost

155. Where return flow problems or other interdependencies do arise, institutions often regulate internal transfers more closely. *See, e.g.*, HUTCHINS, *supra* note 70, at 20 (some institutions place temporal limits on transfers between users, or connect water stocks directly to appurtenant land to protect flow levels and prevent inefficiencies caused by unlimited transfers). Colorado prohibits internal transfers that would injure the water rights of other members of the institution. *See* Great Western Sugar Co. v. Jackson Lake Reservoir & Irrigation Co., 681 P.2d 484, 490-92 (Colo. 1984) (en banc).

156. *See* Squillace, *supra* note 145, at 7 (institutions arrange buyer-seller matches and allocate from common reservoir); Archibald Study, *supra* note 35, at 4-71, 5-53 (use of "clearinghouses" to match buyers and sellers).

157. *See infra* Section II.D.

158. *See* MACDONNELL STUDY SUMMARY, *supra* note 6, at 53-57.

159. The relative number and volume of statutory and institutional transfers in any particular state will depend to a large degree on the number and size of water institutions. California, for example, in 1978 had 230 public water districts, each of which on average irrigated over 21,000 acres of land. *See* GOODALL, ET AL., *supra* note 102, at 34-35; Brian E. Gray, *Water Agencies and Water Transfers in California: A Case Study of the Kern County Water Agency, in* MOVING THE WEST'S WATER TO NEW USES: WINNERS AND LOSERS 4 (Natural Resources Law Ctr., University of Colo. ed., 1990) [hereinafter MOVING THE WEST'S WATER]; *supra* Table 4. As a result, California sees few statutory transfers but thousands of institutional transfers. *See* Gray, *supra* note 124, at 11-41; Archibald Study, *supra* note 35, at 4-42 to 4-47, 4-70 to 4-71, 5-48 to 5-53. Utah, by contrast, has a large number of institutions, *see supra* Tables 4, 5, but for topographical and historical reasons most are quite small and therefore can provide only limited geographical flexibility, *see* MAASS & ANDERSON, *supra* note 52, at 332-34. Utah thus has large numbers of both statutory and institutional transfers. *See* Hogge et al., *supra* note 117, at 12-13, 20-43.

400.[160] Some major states such as California and Arizona see only a few statutory transfers each year.[161] By comparison, a study of water rentals in Colorado during 1959 found 645 institutional transfers within just five mutuals in the South Platte Basin and another 376 institutional transfers within the Northern Colorado Water Conservancy District.[162] A similar study of institutional transfers among four large Utah mutuals between 1951 and 1964 revealed between 290 to 629 transfers per irrigation season.[163] More recently, members of California's Westlands Water District negotiated roughly 4500 institutional transfers during the 1990-1991 water year alone.[164] The limited data available on transfer volumes as a percent of total water supply also indicate that institutional transfers are far more significant than statutory transfers.[165]

2. *Choices Between Systems*

Both pricing and transfer systems, in summary, provide similar benefits. Which market system an institution chooses depends on the compatibility of the system with the institution's other goals, the administrative costs of the systems, and equitable considerations. The ideal system for an institution, moreover, can change as water conditions and goals change.

---

160. *See* MACDONNELL STUDY SUMMARY, *supra* note 6, at 49a fig. 3.3.1; SAX, ABRAMS, & THOMPSON, *supra* note 19, at 217-18.

161. *See* MACDONNELL STUDY SUMMARY, *supra* note 6, at 49b fig 3.3.2.

162. *See* MAASS & ANDERSON, *supra* note 52, at 304; *see also* HARTMAN & SEASTONE, *supra* note 77, at 41-43. The mutual transfers frequently involved only small quantities, with almost three quarters of the transfers involving less than 30 acre feet; overall, however, the transfers totalled slightly over 16,000 acre feet. *See* MAASS & ANDERSON, *supra* note 52, at 304.

For additional discussion of institutional transfers within the Northern Colorado Water Conservancy District, see *infra* notes 186-88 and accompanying text.

163. *See* Richard W. Wahl & Frank H. Osterhoudt, *Voluntary Transfers of Water in the West, in* U.S. GEOLOGICAL SURVEY, NATIONAL WATER SUMMARY 1985—HYDROLOGIC EVENTS AND SURFACE-WATER RESOURCES 113, 120 (1986).

164. *See* Archibald Study, *supra* note 35, at 4-71. Intradistrict transfers are apparently also more frequent than statutory transfers in Wyoming. *See* Squillace, *supra* note 145, at 6-7.

165. Most studies of statutory transfers report the number of transfers each year, but not the amount of water transferred. However, according to the recent U.S. Geological Survey-sponsored studies of New Mexico and Utah (the states currently with the most statutory transfers), recent transfers have averaged a total of about 9100 acre feet per year in New Mexico (measured by consumptive use) and roughly 37,600 acre feet per year in Utah. *See* Brown et al., *supra* note 118, at 10 tbl. NM-5 (average in New Mexico from 1975 to 1987); Hogge et al., *supra* note 117, at 30 tbl. 12 (average in Utah from 1975 to 1987). These quantities represent less than 1% of the water rights in New Mexico and about 1.5% of the rights in Utah. *See* 1985 ESTIMATED USE, *supra* note 31, at 59 tbl. 24.

By contrast, institutional transfers involved about 5.6% of the water supply of the Colorado mutuals. *See* MAASS & ANDERSON, *supra* note 52, at 298 tbl. 7.6 (25,860 out of 455,439 acre feet). They involved up to 29% of the Utah mutuals' supplies. *See* Wahl & Osterhoudt, *supra* note 163, at 120. Institutional transfers in the California Arvin-Edison Water Storage District have involved as much as 7.6% of the district's water supply. *Id.* at 118.

a. State Allocation Systems

Consideration of why western states have predominantly chosen to allocate water by a prior appropriation entitlement structure, rather than by a pricing system, helps illustrate both the prerequisites for a successful pricing system and the value of institutions. States could theoretically auction temporal rights to waters on a regular (probably yearly) basis. Auctions would enable periodic reallocations of water rights and encourage long-term conservation. Yet, although three states now authorize state sales of unappropriated water (primarily so that they can regulate and profit from interstate diversions), no state has allocated any water by auction or sale.[166]

The explanation for states' use of the prior appropriation system is primarily historical: when western states first developed their water systems in the nineteenth century, their goal was to encourage development by providing free water. Once established, property systems tend to remain. Refined pricing systems, however, would also be complex and costly at a statewide level. As already noted, most water rights are not fungible; for anything more than a rudimentary pricing system, states would need to segregate water rights by river system, time of use, and other factors, and conduct separate auctions for each type of right.

Water institutions enable pricing systems to work by organizing water users into discrete geographical units with common water supplies that can be broken down into standardized and thus easily priced and marketed units. If local water institutions did not already exist, a state that wished to adopt a pricing system would need to invent them.

b. Domestic Supply Systems

Except during droughts or other water shortages, domestic suppliers almost universally prefer pricing systems to transfer systems. Because domestic residents frequently change their water use (albeit by relatively small amounts), administrative costs are an especially important consideration in choosing a market system. And pricing systems pose far fewer

166. In Montana, anyone wishing to transport water out of five specified basins or appropriate large flows of water must lease the water from the state at a negotiated price; leases cannot exceed 50 years (although they are subject to a 50-year renewal). *See* John E. Thorson, *Water Marketing in Big Sky Country: An Interim Assessment*, 29 NAT. RESOURCES J. 479, 483-84 (1989). Texas also authorizes its Department of Water Resources to sell water. *See* TEX. WATER CODE ANN. § 15.323(a) (West 1988).

Alaska has gone furthest, recently adopting legislation imposing a graduated fee on interbasin diversions that is purportedly designed to encourage water conservation; the legislation also authorizes the state to appropriate water and sell it for its fair market value. *See* H. Bill 596, 17th Leg., 1st Spec. Sess., §§ 46.15.035, .036, .133 (Alaska 1992) (enacted).

New Mexico has also considered the idea of appropriating and leasing groundwater, but only to other states. *See* CHARLES T. DUMARS ET AL., NEW MEXICO WATER RESOURCES RESEARCH INST. & UNIV. OF N.M. LAW SCH., STATE APPROPRIATION OF UNAPPROPRIATED GROUNDWATER: A STRATEGY FOR INSURING NEW MEXICO A WATER FUTURE 13-14, 20 (1986).

administrative headaches for water users.[167]

Equitable concerns and political opposition, however, generally prevent domestic supply institutions from using prices to adjust to temporary water shortages.[168] During droughts, therefore, domestic supply institutions typically allocate a fixed ration to each user through a formula deemed more income-neutral and equitable. Unfortunately, because transfer systems are not already in place and would be costly to establish, drought rations are generally not transferable. This decreases economic efficiency.

c. *Agricultural Supply Systems*

Whereas most domestic institutions use prices to allocate water among users, most agricultural institutions provide fixed allocations to each user, typically set by acreage, assessed land value, or ownership share.[169] Where permitted by law,[170] agricultural institutions then typi-

167. *See supra* note 146 and accompanying text. Providing flexibility to domestic users through a transfer system is not impossible, just costly. *Cf.* Brown et al., *supra* note 118, at 10 (homeowners in New Mexico's Gila/San Francisco basin must purchase water for domestic use outside their homes, so there is a high level of transfer activity). Despite the administrative cost, some believe that transfer systems would be a more effective means of allocating domestic water in certain settings. *See, e.g.*, Robert A. Collinge, *Revenue Neutral Water Conservation: Marginal Cost Pricing with Discount Coupons*, 28 WATER RESOURCES RES. 617, 617 (1992) (advocating use of a " 'discount coupon system' . . . which is a technique to price water efficiently at the margin for each consumer while at the same time meet independently set revenue goals"); Norman J. Dudley, *Urban Capacity Sharing—An Innovative Property Right for Maturing Water Economies*, 30 NAT. RESOURCES J. 381, 384 (1990) (suggesting use of "saleable coupons to ration water in storage during droughts").

168. *See* SAX, ABRAMS, & THOMPSON, *supra* note 19, at 691. Most individuals deem it unfair to allocate goods during emergencies on the basis of price, whether the good be water during a drought or shovels during a snow storm. *See* HODGSON, *supra* note 13, at 186; Daniel Kahneman et al., *Fairness as a Constraint on Profit Seeking: Entitlements in the Market*, 76 AM. ECON. REV. 728, 734-36 (1986). Individuals also develop expectations of "normal" prices that they believe should prevail absent changes in cost functions. *See* HODGSON, *supra* note 13, at 186-87.

169. Mutual water companies have traditionally allocated water by the number of mutual shares that each user owns. *See* HARTMAN & SEASTONE, *supra* note 77, at 36-37; MAASS & ANDERSON, *supra* note 52, at 188, 287. Water districts have generally allocated water by either acreage or assessed property value (although a wide variety of formulas are used). *See* SAX, ABRAMS, & THOMPSON, *supra* note 19, at 628; Benson, *supra* note 52, at 410-11.

170. A few legal treatises have suggested that the law of some states might prohibit transfers of water rights within institutions. *See, e.g.*, 3 WATERS AND WATER RIGHTS, 485-92, 537 (Robert E. Beck ed., 1991). Yet an examination of the law fails to reveal any state banning all such transfers. South Dakota, which is often cited as an example, prohibits transfers of irrigation water unless the current user finds it "impracticable to use all or any part of the water beneficially or economically for irrigation." S.D. CODIFIED LAWS ANN. § 46-5-34 (1987). This section, however, does not seem applicable to internal institutional transfers. Indeed, irrigation district boards are explicitly authorized to provide a system "for the interchange of water from one tract of land to another at the option of the owners or lessees of any lands within [the] district at any time." *Id.* § 46A-5-24(3).

Confusion sometimes arises from the multiple meanings of the term "appurtenant." Although some opinions hold that water rights in mutual water companies are "appurtenant" to the land of the individual shareholders, courts typically mean only that transfers of the land carry with them the water rights *unless* otherwise conveyed. *See, e.g.*, Yellowstone Valley Co. v. Associated Mortgage

cally use transfer systems to provide flexibility.[171] In some institutions, users directly trade their entitlements among themselves;[172] in others, the institution serves as an agent by purchasing entitlements and then selling them to other users.[173]

Agricultural institutions have favored allocation and transfer systems over pricing systems for several reasons. First, agricultural institutions are frequently unwilling to charge a market-clearing rate. Agricultural institutions often supply water at or below cost, even when that rate produces demand in excess of supply.[174] Some institutions charge subsidized rates for political reasons or in an attempt to decrease groundwater usage.[175] Where the desired rate leads to demand in excess of supply, agricultural institutions must allocate their water supplies administratively.

Some agricultural institutions also use allocation and transfer systems because of the risk of miscalculating market-clearing prices. Unlike domestic suppliers, agricultural institutions often lack redundant capacity and large storage facilities.[176] If water is not used when available, the

---

Investors, 290 P. 255, 258 (Mont. 1930) (water right is an appurtenance to the land and passes with the land's conveyance unless expressly excluded from the conveyance).

Mutuals, in fact, are free in virtually every state to permit water transfers among their members. A number of states also expressly permit district boards to authorize intradistrict transfers. *See, e.g.*, NEB. REV. STAT. § 46-158 (1988) (irrigation districts); NEV. REV. STAT. ANN. § 541.290 (Michie 1986) (water conservancy districts); S.D. CODIFIED LAWS ANN. § 46A-5-24 (1987) (irrigation districts); UTAH CODE ANN. § 17A-2-711 (Supp. 1991) (irrigation districts) (limited to one-year assignments); *id.* § 17A-2-1435(5) (Supp. 1992) (conservancy districts); WYO. STAT. § 41-3-749(a)(v) (1977) (conservancy districts). A few states impose special requirements or limitations on internal transfers, but otherwise permit them. New Mexico, for example, directly authorizes one-year water transfers within irrigation districts. N.M. STAT. ANN. § 73-9-14 (Michie 1992). It permits permanent transfers only if the seller's land is "not suitable for irrigation or capable of being properly irrigated." *Id.* § 73-13-4. *See also* KAN. STATE ANN. § 42-121 (1986) (members of irrigation companies can transfer their water rights, but only by deeds executed and recorded as conveyances of real estate).

In many states, the statutes authorizing water districts leave the legality of intradistrict transfers unaddressed.

171. For descriptions of various institutional trading systems, see HARTMAN & SEASTONE, *supra* note 77, at 35-37, 41-44; MAASS & ANDERSON, *supra* note 52, at 179-82, 191-96, 197-206, 284, 303-07, 343; Hogge et al., *supra* note 117, at 12-13; Squillace, *supra* note 145, at 6-7; Wahl & Osterhoudt, *supra* note 163, at 118-22; Archibald Study, *supra* note 35, at 4-70 to 4-71.

Although most agricultural institutions have historically permitted transfers, neither mutuals nor water districts have been of one mind. In earlier periods, a number of institutions prohibited formal transfers (although informal gray market transfers may have occurred often). *See, e.g.*, CHANDLER, *supra* note 53, at 113-14 (discussing mutuals); HARTMAN & SEASTONE, *supra* note 77, at 68-69 (districts); HUTCHINS, *supra* note 70, at 19 (mutuals).

172. In mutuals, transfers are typically accomplished through the sale or rental of the mutual's stock. In districts, users generally trade the water entitlements themselves.

173. *See, e.g.*, Wahl & Osterhoudt, *supra* note 163, at 118; Archibald Study, *supra* note 35, at 5-48.

174. *See* BAIN ET AL., *supra* note 23, at 339, 343-47.

175. *See id.* at 325-26 (political considerations); Vaux, *supra* note 77, at 87-88 (groundwater usage considerations).

176. *See* Miller, *supra* note 64, at 82-86. Many agricultural institutions, of course, offer their

water is lost; if extra water is needed, the water is often difficult to obtain. Under a pricing system, therefore, accurate pricing would be imperative: too low a price would require rationing the institution's limited water supply, and too high a price would result in waste. A transfer system, in which the water supply is allocated by fixed entitlement, avoids the risk of setting inaccurate prices.[177]

Transfer systems have also proved more politically workable than pricing systems in responding to droughts and other water shortages. Pricing systems, as noted, raise potential conflicts between efficiency (which calls for higher prices as water supplies shrink) and equity. Transfer systems, by contrast, permit institutions to separate efficiency and equity goals. Institutions can set drought entitlements based on equitable views (they can, for example, ration pro rata), but then achieve efficiency by permitting water users to trade their entitlements.

The best system of market flexibility for any set of users, in short, depends on factors that differ from region to region and across time. State law is inherently at a disadvantage in responding to such differences. Unlike state legislatures and courts, local institutions can customize their market systems to the needs of their users and their supply systems' characteristics.

3. *Transfers Within Umbrella Institutions*

Although many local institutions have large service areas,[178] there is a geographical limit to the size of retailing institutions and thus to the flexibility that any single retailing institution can provide. In particular, as institutions grow, agency problems become more severe, until control costs exceed the benefits of greater geographical jurisdiction. Larger institutions also have to deal with more heterogeneous conditions and interests. Just as many individual water users can escape the transaction costs of statutory transfers through institutional markets, however, local institutions can sometimes transfer water among themselves through geographically larger water institutions to which they belong.[179]

As noted in Part I, many local institutions receive water from the federal reclamation program, state water projects, or regional umbrella districts. When water rights are legally held by such wholesaling institutions, the local institutions can often transfer their contractual entitlements within the wholesaling institution without seeking a statutory

members storage capability. *See, e.g.*, SALIBA & BUSH, *supra* note 76, at 126. These institutions do not need to be as concerned with accurate pricing.

177. Although an auction system theoretically could avoid the problem of inaccurate pricing, auctions would impose considerable administrative expense on both an institution and its members.

178. *See supra* Table 4.

179. It is usually more effective to use a system of nested institutions than for one institution to increase its size. The smaller constituent institutions manage most local matters, while the larger institution deals with issues of broader coordination. *See* OSTROM, *supra* note 18, at 101-02.

transfer.[180] Like local institutions, moreover, umbrella institutions typically aid transfers by creating standardized (and thus easily marketed) rights and by providing necessary transportation facilities.[181]

Many federal reclamation projects, for example, distribute water to a number of separate water districts. Typically, the Bureau of Reclamation holds an appropriative right to the water distributed, and the right provides for use anywhere within the project. Districts receiving water from a project have frequently transferred water back and forth among themselves,[182] even though the Bureau of Reclamation has long maintained an uneven policy regarding water transfers, and even though there are often various contractual and statutory obstacles to interdistrict transfers.[183] Districts within the California Central Valley Project engaged in 1200 short-term transfers among themselves between 1981 and 1988[184] and additional transfers during the recent drought.[185]

Many regional umbrella institutions also actively promote transfers among their member districts. The Northern Colorado Water Conservancy District ("NCWCD"), which allocates water from the federal government's Colorado-Big Thompson reclamation project to numerous cities, districts, and individual farmers, is perhaps the best known.[186] The NCWCD was designed to facilitate easy transfers among local water users and institutions[187] and thus closely resembles a mutual in structure. The district has 310,000 shares, each of which entitles the holder to a percentage of the NCWCD's water. Institutions and water users transfer water among each other through an extremely active market in the sale and rental of the NCWCD shares.[188]

---

180. *See* UCLA CONFERENCE, *supra* note 8, at 121 (statement of James Markle, Attorney for California State Water Resources Control Board).

181. Because of the larger areas and multiple institutions involved, however, return flow problems can be more frequent, requiring a greater degree of oversight by the local or umbrella institutions. *Cf.* Howe et al., *supra* note 22, at 196-97 (discussing the need to address return flow externalities).

182. *See* WAHL, *supra* note 93, at 133-38; Richard Roos-Collins, *Voluntary Conveyance of the Right to Receive a Water Supply from the United States Bureau of Reclamation,* 13 ECOLOGY L.Q. 773, 859-67 (1987).

183. *See infra* notes 232-37 and accompanying text.

184. Gray, *supra* note 124, at 22. The transfers ranged from a few to over 100,000 acre feet. Because the appropriation permit for the Central Valley Project identifies most of the valley as the place of use, the transfers did not need state approval, and the Bureau of Reclamation routinely approved the transfers. *See id.* at 22-23.

185. *See* Archibald Study, *supra* note 35, at 4-19 to 4-21, 4-45 to 4-47.

186. For another prominent example, see *infra* text accompanying notes 199-201 (discussing the fostering of water transfers by California's Kern County Water Agency).

187. The NCWCD is described in some detail in HARTMAN & SEASTONE, *supra* note 77, at 45-60; Howe et al., *supra* note 22, at 171-72, 185-97. An active market in NCWCD water is aided by the district's geography, which minimizes return flow problems. *See* Howe, *supra* note 22, at 196-97.

188. Although fewer than one percent of the shares were permanently transferred in each of the NCWCD's early years, *see* HARTMAN & SEASTONE, *supra* note 77, at 54, cities later purchased large quantities of shares to protect against future increases in urban water demands, *see* WAHL, *supra*

4. *Evolution of Institutional Policies Regarding Local Markets*

Institutional market policies evolve over time in response to changing supply conditions and user needs. Consider, for example, the internal transfer policies of agricultural institutions. Internal transfers are not costless and, in some contexts, raise equitable concerns. Agricultural institutions that enjoy relatively plentiful supplies and stable user needs thus usually have no formal transfer program; some even limit or bar institutional transfers. As supplies drop or the perceived need for user flexibility otherwise increases, however, institutions usually ease internal transfer constraints and often develop new and sophisticated transfer programs.

Many agricultural institutions have quite rudimentary systems for tracking users' entitlements. While some meter their water deliveries, in others watermasters monitor deliveries by counting runs or even by simply eyeballing flows.[189] In this setting, formal institutional transfers raise administrative difficulties that agricultural institutions are often unwilling to address unless there is considerable need.[190] Because delivery canals are often designed in light of particular expectations about demand, internal transfers can also lead to delivery inefficiencies and the overloading of some canals.[191]

Transfers for profit also sometimes contravene institutional norms. Water districts, for example, were often formed with the ethic that water should be supplied at cost and equitably shared among local users. If a user does not need her entire allotment, the prevailing view is that the water should be made available to others at the institutional price.[192] Transfers also raise the issue whether water users should be able to capitalize on the subsidized water rates.[193] To many members of water dis-

note 93, at 136. About 30% of the NCWCD's total available water moves through the rental market each year. *Id.* at 135-36; *see also* HARTMAN & SEASTONE, *supra* note 77, at 57 (discussing the period of 1958 to 1963); Charles W. Howe et al., *Innovative Approaches to Water Allocation: The Potential for Water Markets*, 22 WATER RESOURCES RES. 439, 443 (1986) ("About 30% of [Colorado-Big Thompson Project] water is involved in rental transactions each year, with towns being big renters of water to agriculture."). Curiously, given this quite active market, Professor Jan Crouter's econometric examination of the 1970 market for water in the NCWCD area indicated that the market "was not efficient in the sense of being separate from the land market and competitive." Crouter, *supra* note 141, at 267.

189. Sometimes the water users themselves monitor each other's withdrawals. *See* MAASS & ANDERSON, *supra* note 52, at 345-46.

190. *Cf. id.* at 195 (describing the operational problems presented by unconstrained transfers).

191. *See* 3 WATERS AND WATER RIGHTS, *supra* note 170, at 491.

192. *See, e.g.*, HARTMAN & SEASTONE, *supra* note 77, at 69 (discussing the view that farmers should not enjoy "windfall gains" from surplus water); Harrison C. Dunning, *Reflections on the Transfer of Water Rights*, 4 J. CONTEMP. L. 109, 111 (1977) (noting that "sellers generally have not demanded whatever price the market would bear" because that "would amount to an undesirable form of profiteering").

193. For discussions of the issue in the context of federal reclamation subsidies, see Raymond L. Anderson, *Windfall Gains from Transfer of Water Allotments Within the Colorado-Big Thompson*

tricts, subsidies designed to promote farming should not enrich users who do not need their full entitlement.

Such community norms and equitable concerns lead some institutions to ban transfers. More frequently, institutions permit transfers but ban or limit profit-making.[194] Even where banned, transfers still often take place, but they are quite informal and parties use "social balance accounts" rather than money as the medium of exchange. For example, if a farmer has excess water in a given year, she provides it to another farmer at cost in the expectation of reciprocal treatment in a future year.[195]

When reductions in water supplies or other events increase the social value of transfers, however, institutions typically ease or eliminate their formal restrictions.[196] The response of institutions to the California drought that began in 1986 is a good example. Although virtually all water districts in California's Central Valley permitted transfers prior to the drought, many prohibited profit-making. In response to the drought (as well as in recognition that water supplies may shrink even in the long run), most of the districts that previously limited transfers have now eased their restrictions.[197] Many actively promote trades, acting either as brokers or as water banks.[198]

The Kern County Water Agency, which wholesales water to districts in the southern Central Valley, has also responded to the drought by fostering more transfers among its member districts.[199] The districts have long engaged in water *swaps* designed to increase the efficiency of water deliveries, but prior to the current drought had never reallocated

---

Project, 43 LAND ECON. 265 (1967); Joseph L. Sax, *Selling Reclamation Water Rights: A Case Study in Federal Subsidy Policy,* 64 MICH. L. REV. 13 (1965).

194. *See, e.g.,* Archibald Study, *supra* note 35, at 5-49 (noting that the transfer rules of the Central California Irrigation District prohibit producers from selling their water at rates higher than originally paid). In some cases, institutions ban transfers but achieve the same result by permitting anyone who does not need his entire entitlement to sell unneeded water back to the institution at cost. The institution then resells that water at cost to others who need it. *See, e.g.,* WAHL, *supra* note 93, at 138-40 (discussing California's Arvin-Edison Water Storage District "water-exchange pool"); Wahl & Osterhoudt, *supra* note 163, at 118 (same).

195. *See* MAASS & ANDERSON, *supra* note 52, at 343-44 (noting that transfers are often informal and at modest below-value prices). For another example of the use of social balance accounts in rural communities, see Robert C. Ellickson, *Of Coase and Cattle: Dispute Resolution Among Neighbors in Shasta County,* 38 STAN. L. REV. 623, 675-76 (1986).

196. As a general proposition, institutions adopt more sophisticated and market-like allocation systems as a resource becomes scarcer. *See* Vernon W. Ruttan, *Induced Institutional Change, in* INDUCED INNOVATION: TECHNOLOGY, INSTITUTIONS, AND DEVELOPMENT 327, 332-37 (Hans P. Binswanger & Vernon W. Ruttan eds., 1978); Young, *supra* note 51, at 1145.

197. The evolution has not been universal. Institutions that have been less affected by the drought, and thus have had less incentive to change, have not adopted more flexible transfer policies. *See, e.g.,* Archibald Study, *supra* note 35, at 5-49.

198. *Id.* at 4-70 to 4-71, 5-48, 5-53 (discussing exchange pools, water banks, and clearing houses, respectively).

199. For useful background on the agency, see generally Gray, *supra* note 159.

water entitlements through an outright transfer.[200] During the drought, however, the agency has actively promoted transfers of water from member districts with a surplus to those with severe shortages.[201]

The increased need for transfers in California's Central Valley has not eliminated the concerns of the past; it has merely outweighed them. In deference to these concerns, some institutions have carefully drafted their transfer policies to address equity concerns and institutionally set the price at which trades can occur. Rather than permit totally unfettered transfers, for example, one district in 1991 encouraged "contributions" of excess water to the district for $100 per acre foot and then resold the water for the same price.[202] Although $100 was more than the district's normal rate of $29, comparable water in the region sold for even more during the same period.[203]

Faced by significant short-term drops or longer-term limits in water supplies, many Central Valley districts have gone beyond simply encouraging transfers of district entitlements and have adopted more innovative policies designed to integrate and stretch available water sources. Where groundwater is available, districts have used transfer policies to encourage greater groundwater use and mitigate the temporary drop in surface supplies. Several districts, for example, have made their canals available for wheeling private groundwater sales at little or no charge.[204] Other districts have encouraged farmers with groundwater wells to substitute groundwater for their district entitlements and then sell the entitlements to other district users.[205] The Kern County Water Agency has also encouraged member districts with large groundwater supplies to pump more during the drought and sell part or all of their surface entitlements to member districts with water shortfalls.[206]

---

200. *See* Vaux, *supra* note 77, at 80-85. Transfers did not occur despite the potential for considerable gains from trade. *See, e.g., id.* at 93-95 (speculating that California's Kern County could benefit from an internal water market).

201. *See* Archibald Study, *supra* note 35, at 4-42, 4-44 to 4-45.

Not all wholesaling institutions have matched the record of the Kern County Water Agency during the drought. In 1991, for example, the Bureau of Reclamation forbade its contracting districts from participating in California's emergency water bank. In response to wide criticism, however, the Bureau lifted the prohibition in 1992 as part of a general liberalization of its transfer policies. *See 1992 CVP Transfer Guidelines Permit Water Sales Outside of Project Area,* WATER INTELLIGENCE MONTHLY, June 1992, at 9; Bureau of Reclamation, U.S. Dep't of Interior, 1992 Central Valley Project Water Transfer Guidelines (Mar. 3, 1992) (on file with author) [hereinafter *1992 CVP Transfer Guidelines*].

202. *See* Letter & Memorandum from Howard R. Frick, President, Arvin-Edison Water Storage Dist., to Water Users 1 (Feb. 22, 1991) (on file with author).

203. *See* Archibald Study, *supra* note 35, at 5-48 to 5-51. Arvin-Edison previously operated a similar exchange pool, but users with surplus water were required to contribute the surplus at cost. *See* Wahl & Osterhoudt, *supra* note 163, at 118. In response to the drought, the district thus retained the same equitable facade but permitted a controlled profit.

204. *See, e.g.,* Archibald Study, *supra* note 35, at 4-38 to 4-39.

205. *See, e.g., id.* at 4-39.

206. *See id.* at 4-44.

When growing water scarcity has increased the value of water transfers, some institutions have also formed new organizations to help promote water transfers among themselves. During California's 1976-1977 drought, for example, the Bureau of Reclamation formed a temporary water bank for its Central Valley Project.[207] In response to increasing restrictions on water use, water districts in Washington's East Columbia basin and in California's Sacramento River Valley have also formed water banks to ease the process of transferring water rights among themselves.[208]

Institutional policy reflects a constantly shifting balance of the economic and equitable costs of transfers against the value of transfers to their users. Although the evolution is sometimes sticky, institutions meet the particular needs of their users for flexibility and often surpass state law in both responsiveness and innovation. As the next Section suggests, however, problems can arise when the parochial interests of an institution's members and management collide with a societal desire for transfers of water away from the institution.

D. Institutional Barriers to Interregional Trades

As suggested in Section B, the costs of statutory transfer proceedings are unlikely to deter many interregional ag-urban trades because of the large quantities of water and lengthy planning times typically involved. When spread over thousands of acre feet, transaction costs will often be minimal.[209] And given the lengthy advance planning often involved in obtaining new urban water supplies, transfer proceedings of even several years should not block many long-term trades. Major ag-urban transactions encounter varied state and federal legal obstacles,[210] but cities and other municipal water purchasers have generally been able to overcome those legal obstacles, except in interstate transactions.[211]

---

207. The bank traded over 40,000 acre feet of water during the 1976-1977 drought. *See* WAHL, *supra* note 93, at 136-38; *cf.* Roos-Collins, *supra* note 182, at 860-67 (confirming the statistical data regarding the bank but suggesting that the demand may have been "surprisingly low" for a variety of reasons). The Central Valley Project bank has been replaced in the most recent California drought by a state-run emergency water bank. *See* Archibald Study, *supra* note 35, at 4-42.

208. *See, e.g., East Columbia Basin Water Bank Leases 2,000 af During 1991,* WATER INTELLIGENCE MONTHLY, Apr. 1992, at 6 [hereinafter *East Columbia Basin*]; Gray, *supra* note 159, at 24-28 (Sacramento River Valley); Archibald Study, *supra* note 35, at 4-42, 4-46 (same). The East Columbia irrigators formed their bank expressly to encourage water conservation by purchasing saved water. *See East Columbia Basin, supra* at 6.

209. *See* COLBY ET AL., *supra* note 119, at 54; *see also* MACDONNELL STUDY SUMMARY, *supra* note 6, at 55-56 (noting significant economies of scale in statutory transfers in Colorado and Mexico).

210. For a discussion of the water agreement between the Imperial Irrigation District and Metropolitan Water District and the legal obstacles it confronted, see NATIONAL RESEARCH COUNCIL, *supra* note 70, at 242-44; SAX, ABRAMS, & THOMPSON, *supra* note 19, at 190-94; Gray, *supra* note 124, at 34-39.

211. For recent discussions of the particular legal problems facing interstate market transfers,

In this setting, however, local agricultural water institutions often become obstacles to trade. Much of the agricultural water in which urban and suburban areas are interested is held by institutions.[212] By reducing transaction costs, agricultural institutions theoretically could encourage valuable ag-urban trades, much as they do internal trades.[213] The process of finding buyers or sellers, negotiating terms, pursuing state approval, and transferring water lends itself to economies of scale. When a large number of farmers in one area are interested in buying or selling water, agricultural institutions can reduce the transaction costs by acting on behalf of all the farmers. For exactly this reason, agricultural institutions frequently purchase water for their members.[214]

Some local institutions have similarly helped their members transfer water to outside users. Many, however, have actively opposed such trades. Water districts, in particular, have frequently blocked efforts to transfer water out of their service areas.

1. Institutional Policies Regarding External Transfers

a. Mutuals

Although comprehensive empirical information is unavailable, mutuals in a number of states, including Colorado and Utah, have facilitated the movement of large quantities of water from agriculture to both urban areas and major industrial users.[215] Mutuals' articles of incorporation and bylaws often permit stock sales to anyone, including water users outside the mutuals' service areas. Although a shareholder must generally obtain the approval of a mutual's board of directors before changing the location of her water use, many boards judiciously use this power to block external transfers only where the transfer would injure other shareholders.[216]

This is not to say that mutuals never pose obstacles. Indeed, a few

---

see Barton H. Thompson, Jr., *Interstate Transfers:* Sporhase, *Compacts, and Free Markets, in* WESTERN WATER LAW IN THE AGE OF REALLOCATION 81 (ALI-ABA Study Materials No. C616, 1991).

212. *See supra* Table 1.

213. Agricultural institutions could also promote valuable transfers between agricultural regions. Such transfers can sometimes promise considerable gains from trade. The potential gains are likely to increase as water in some agricultural areas grows scarcer. *See, e.g.*, Vaux, *supra* note 77, at 90-93.

214. *See, e.g.*, Archibald Study, *supra* note 35, at 4-19, 4-21, 5-49.

215. For specific examples, see NATIONAL RESEARCH COUNCIL, *supra* note 70, at 150-51 (Southeastern Colorado); SALIBA & BUSH, *supra* note 76, at 128-39, 162-71 (Southeastern and Northeastern Colorado, Utah, respectively); Hogge et al., *supra* note 117, at 12-13 (Utah); MacDonnell et al., *supra* note 118, at 20-25, 28-30 (Colorado); Wahl & Osterhoudt, *supra* note 163, at 114-15, 120 (Utah, Idaho, respectively). According to two of the most knowledgeable students of transfers, mutuals "provide a well-tried mechanism" for water transfers. Smith & Vaughan, *supra* note 7, at 10.

216. Mutual bylaws also occasionally impose transfer restrictions designed to protect other shareholders and the economic health of the mutual; however, there is no evidence that such

observers have suggested—again without empirical evidence—that a majority of mutuals discourage or forbid external transfers.[217] In some cases, boards have exercised their veto power to block transfers that did not appear to threaten the water entitlements of other shareholders.[218] And although most states permit judicial challenges to board vetoes, courts have been exceptionally deferential to board decisions blocking proposed transfers.[219] In other cases, directors or shareholders who have feared contemplated transfers have modified their mutual's bylaws or regulations to prohibit or hinder proposed transfers.[220] Regardless of whether the majority of mutuals have promoted or opposed external transfers, however, a sizable number have enabled important ag-urban transfers.[221]

b. Water Districts

The same cannot be said of water districts. District water could theoretically be transferred to outsiders through two different mechanisms. The district, which typically holds the legal title to the water,[222] could itself sell or lease a portion of the water to external users (an "external *district* transfer"). Alternatively, the district could permit its members to sell or lease all or a portion of their individual entitlements to outsiders (an "external *entitlement* transfer"). Similarly, umbrella districts could either transfer water on behalf of their member districts or permit the districts to transfer water themselves. In practice, external district transfers do occur, but on a far less frequent and more limited basis than the potential gains from trade would suggest. External entitlement transfers are virtually nonexistent in most western states.

---

restrictions significantly limit the opportunity for external transfers. *See* Gisser & Johnson, *supra* note 118, at 154-55.

217. *See, e.g.*, Wahl & Osterhoudt, *supra* note 163, at 120.

218. Colorado, for example, found it impossible to obtain board approval to transfer about 10% of the water of the Catlin Canal Company to a state reservoir for environmental and recreational purposes despite little evidence that the transfer posed a threat to other shareholders' entitlements. According to the state, three of the five board members collectively leased most of the state's shares and thus had a vested interest in blocking the transfer. *See* Fort Lyon Canal Co. v. Catlin Canal Co., 642 P.2d 501, 503-04 (Colo. 1982) (en banc); SALIBA & BUSH, *supra* note 76, at 139.

219. *See, e.g., In re* Water Rights of Fort Lyon Canal Co., 762 P.2d 1375, 1380 (Colo. 1988) (standard of review is whether board "acted arbitrarily or capriciously or abused its discretion").

220. *See* Wright v. Bayly Corp., 587 P.2d 799, 800-01 (Colo. Ct. App. 1978); MacDonnell et al., *supra* note 118, at 22; Pratt, *supra* note 95, at 56.

221. Even Richard Wahl and Frank Osterhoudt, who believe that most mutuals have discouraged transfers, *see supra* text accompanying note 217, concede that mutuals have been open to and have even promoted external transfers "in areas of rapid residential and industrial expansion," which is where the demand for external transfers is likely to be greatest. Wahl & Osterhoudt, *supra* note 163, at 120.

222. *See supra* note 71 and accompanying text.

2. *Legal Obstacles*

Why have water districts been unreceptive to external transfers? One impediment has been state common law and legislation governing water districts. The relative rights of districts and their members over district water supplies are typically unclear, leaving open the issue whether transfers require the approval of district boards, individual members, or both. No state expressly authorizes external entitlement transfers (leaving their legality ambiguous), and several states expressly ban them.[223] Most states also limit external district transfers. Although states generally permit districts to lease their water to outsiders,[224] some directly or implicitly ban sales,[225] and a number also limit the length of leases.[226] States that permit sales or leases typically limit external district transfers to water that is not "needed" by district users.[227] Although districts arguably have considerable discretion in determining users' needs for purposes of such limits, the fear of a judicial challenge by opponents of external district transfers can chill transfer attempts.

Several states also place procedural hurdles in the way of external district transfers by requiring a special district election,[228] written per-

223. *See, e.g.*, MONT. CODE ANN. § 85-7-1911(1) (1991) (water entitlements are "appurtenant" to and "inseparable" from land). Many states expressly authorize transfers of entitlements *within* the district, implicitly suggesting that external entitlement transfers are impermissible. *See, e.g.*, NEV. REV. STAT. ANN. § 541.290 (Michie 1986) (permitting internal entitlement transfers in irrigation districts in limited settings with board approval); N.M. STAT. ANN. §§ 73-9-14, -13-4 (Michie 1992) (same); UTAH CODE ANN. § 17A-2-711 (Supp. 1991) (same).

224. *But see* WYO. STAT. § 41-3-742(a)(x) (1977) (authorizing sales and leases of water by conservancy districts only "for use within the district").

225. For examples of direct bans, see N.M. STAT. ANN. § 73-14-47(J) (Michie 1978) (permanent transfers banned); WYO. STAT. § 41-7-815 (1977) (irrigation districts cannot sell or alienate water rights, although they can mortgage them in raising necessary funds). For an example of an implicit ban, see COLO. REV. STAT. ANN. § 37-83-106 (West 1990) (authorizing only "leases" or "exchanges" of water to other Colorado political subdivisions).

Potential distinctions between the terms "water" and "water rights" can confuse the legality of external district sales. Some states, for example, authorize the sale of "water" or "the use of water," leaving unclear whether the sale of permanent water rights is permissible. *See, e.g.*, WASH. REV. CODE ANN. § 87.03.115 (West Supp. 1992) (authorizing the sale and rental of "the use" of water); *id.* § 89.30.136 (West 1962) (same); *see also* SAX, ABRAMS & THOMPSON, *supra* note 19, at 190 n.1 (discussing the distinction in California law).

226. *See, e.g.*, COLO. REV. STAT. ANN. § 37-42-135 (West 1990) (twenty-year limit); N.M. STAT. ANN. § 73-14-47(J) (Michie 1978) (ten-year limit, although it can be expanded with court approval to 50 years under narrow circumstances); UTAH CODE ANN. § 17A-2-711 (Supp. 1991) (five-year limit).

227. *See, e.g.*, CAL. WATER CODE §§ 22259, 35425 (Deering 1992) (permitting transfers only of "surplus water"); COLO. REV. STAT. ANN. § 37-42-135 (West 1990) (only of water "in excess of . . . needs"); IDAHO CODE § 43-318 (1990) (only of water for which "district no longer has use"); MONT. CODE ANN. § 85-7-1911(3) (1991) (only of "surplus water"); OR. REV. STAT. § 545.110 (1991) (same); TEX. WATER CODE ANN. §§ 51.173, .188, 55.197 (West 1988) (same); UTAH CODE ANN. § 17A-2-711 (1989 & Supp. 1992) (only of water "not needed").

228. *See, e.g.*, COLO. REV. STAT. ANN. §§ 37-43-124 to -125 (West 1990) (sales require approval at special election of "two thirds majority of the legally qualified electors"); *id.* § 37-42-135 (leases require "affirmative vote of the district"); S.D. CODIFIED LAWS ANN. § 46A-9-70 (1987)

mission of district landowners,[229] or court approval.[230] Moreover, legislative provisions regarding water districts have grown piecemeal and were typically written before attention was focused on water markets. Thus, the relevant statutory provisions are frequently vague or in conflict, leaving considerable doubt over exactly what water can be sold or leased, and under what conditions.[231] This doubt further chills transfer proposals.

Federal reclamation law and policy can also limit external district and entitlement transfers. Despite troublesome language in the Reclamation Act of 1902,[232] both the Bureau and the courts have concluded that federal law does not directly prohibit external transfers.[233] Various authorizing statutes, however, can restrict the class of users to whom a district or its members can transfer their reclamation water[234]

(sales require majority vote of the district). In some cases, elections are held only if a minimum number of district electors request one. *See, e.g.,* IDAHO CODE § 43-318 (1990) (in the case of sales, 10% of electors can demand a referendum election).

229. *See, e.g.,* MONT. CODE ANN. § 85-7-1910(1) (1991) (leases require written consent of a majority of landowners). Utah reverses the presumption and permits irrigation districts to sell water rights unless owners of a third or more of the district's acreage object in writing. *See* UTAH CODE ANN. § 17A-2-754 (Supp. 1991).

230. *See, e.g.,* COLO. REV. STAT. ANN. § 37-43-126 (West 1990) (requiring court approval of proceedings); *id.* § 37-43-129 (court must find that sale terms will not jeopardize district indebtedness and will protect district landowners).

Statutory provisions requiring auction sales of "property of the district" could also be read to prohibit negotiated sales of water rights. *See* OKLA. STAT. ANN. tit. 82, § 277.6(25) (West 1990).

231. Colorado's provisions governing irrigation districts formed under the state's 1921 legislation offer a good example. *Compare* COLO. REV. STAT. ANN. § 37-42-135 (West 1990) (allowing irrigation district to lease water "in excess of . . . needs" but for no more than 20 years) *and id.* § 37-42-137 (authorizing the sale of "property or assets of the district not needed for district use nor essential to its operation," in a section labelled "Sale of surplus water") *with id.* § 37-43-124 (authorizing the sale or disposal of water rights, without any apparent limitation, if authorized by two-thirds electorate vote).

232. Section 8 of the Act provides that "[t]he right to the use of water acquired under the provisions of this Act shall be appurtenant to the land irrigated." 43 U.S.C. § 372 (1988). According to the principal House sponsor of the Act, this provision was designed to prevent "the evils which come from recognizing a property right in water with power to sell and dispose of the same elsewhere and for other purposes than originally intended." 35 CONG. REC. 6679 (1902) (statement of Rep. Mondell); *see also* United States v. Alpine Land & Reservoir Co., 697 F.2d 851, 858 (9th Cir.), *cert. denied,* 464 U.S. 863 (1983) (quoting and discussing Rep. Mondell's opposition to market transfers).

233. The Bureau argues that the 1902 appurtenancy provision was repealed by implication as early as 1939. *See* WAHL, *supra* note 93, at 148-49. Noting that state law controls transfers of reclamation water, absent explicit congressional provisions to the contrary one federal court has concluded that "Congress intended transfers to be subject to state water law." The 1902 appurtenancy provision was considered not to be sufficiently specific. *See* United States v. Alpine Land & Reservoir Co., 503 F. Supp. 877, 883-84 (D. Nev. 1980), *modified,* 697 F.2d 851 (9th Cir.), *cert. denied,* 464 U.S. 863 (1983).

234. The Reclamation Project Act of 1939, for example, permits delivery of water for municipal and industrial use only if the delivery "will not impair the efficiency of the project for irrigation purposes." 43 U.S.C. § 485h(c) (1988); *see* WAHL, *supra* note 93, at 149-50. Some authorizing statutes also limit the geographical region to which water can be sold. *See id.* at 151-53.

and the price they can demand.[235] Most transfers, moreover, require the approval of the Bureau of Reclamation,[236] which has had an uneven policy toward external transfers.[237] Thankfully, recent Bureau policy has been relatively liberal.[238] In the 1992 Reclamation Act, Congress addressed external transfers of reclamation water for the first time, but only for the California Central Valley Project ("CVP"). The Act expressly authorizes external transfers of CVP water, subject to limited review and approval by the Secretary of the Interior.[239]

3. *Institutional Obstacles*

Even where there are no legal restrictions, however, most water districts have been hostile to external transfers—particularly to long-term ag-urban trades.[240] Here again information is, unfortunately, only anecdotal. Districts have not universally forsworn external transfers. Districts with temporary surpluses, for example, have frequently leased the

235. The Warren Act, under which approximately 10% of current reclamation contracts were signed, appears to outlaw any profitmaking. *See* WAHL, *supra* note 93, at 150-51. *But see id.* at 151 (noting that Warren Act contracts are concentrated in only a few projects in the less arid regions of the West and arguing, partly for this reason, that the Act's profit-making ban is not "as significant a barrier to most water transfers as it first appears").

236. Most reclamation contracts require a district to obtain Bureau approval before assigning or transferring any of the district's reclamation water entitlement. *See, e.g., id.* at 157; Brian E. Gray et al., *Transfers of Federal Reclamation Water: A Case Study of California's San Joaquin Valley,* 21 ENVTL. L. 911, 952 (1991). Many contracts, moreover, contain either bans or restrictions on transfers and thus must be amended before a transfer can occur. *See, e.g.,* WAHL, *supra* note 93, at 167-72; Gray et al., *supra,* at 948, 954-56.

237. For a history of the Bureau's uneven policies toward transfers, see WAHL, *supra* note 93, at 176-77; Gray et al., *supra* note 236, at 928-70.

Contract amendments may also subject districts to higher rates and, in some cases, to new acreage limitations pursuant to the Reclamation Reform Act of 1982. 43 U.S.C. §§ 390aa-390zz (1988). Although the changes will have negligible impact in many cases, a few districts have concluded that the changes are prohibitive. *See* Gray et al., *supra* note 236, at 953-72; Archibald Study, *supra* note 35, at 4-45 to 4-46.

238. *See* BUREAU OF RECLAMATION, U.S. DEP'T OF INTERIOR, VOLUNTARY WATER TRANSACTIONS: CRITERIA AND GUIDANCE (1989); *1992 CVP Transfer Guidelines, supra* note 201; *see also* Gray et al., *supra* note 236, at 929-33.

Even in recent years, however, the Bureau has unnecessarily limited the external transfers that could take place. *See, e.g.,* Gray et al., *supra* note 236, at 948-49 (discussing recent restrictions on transferring Central Valley Project water to municipal and industrial uses); *supra* note 201 (discussing the Bureau's policy forbidding districts from participating in California's 1991 emergency drought bank).

239. 1992 Reclamation Act, *supra* note 9, § 3405(a). Under the Act, the Secretary can decline to approve a transfer only on a limited number of specified grounds, including inconsistency with state and federal law and various environmental considerations. *Id.* § 3405(a)(1). Transfers generally cannot involve conserved water (unless the water would have been "irretrievably lost to beneficial use," *id.* § 3405(a)(1)(D)) or include previously unused contractual entitlements. *Id.* § 3405(a)(1)(A). The Act also gives "a right of first refusal" to other districts in the CVP service area, *id.* § 3405(a)(1)(F), and will typically require buyers to pay higher rates for the purchased reclamation water, *id.* § 3405(a)(1)(B). *See also infra* notes 312-14 and accompanying text (describing the provisions of the Act that govern external entitlement transfers).

240. Howe et al., *supra* note 188, at 443 (noting that most water districts permit internal but not external transfers).

water for short periods of time to urban areas or to other unrelated agricultural institutions.[241] Districts have also willingly *exchanged* current water rights for more usable ones.[242] In these settings, external transfers clearly benefit the district and threaten no entrenched interest.

Most districts, however, have avoided transfers that would either require conservation or lead to a net long-term loss of water to the district.[243] The water conservation agreement between the Metropolitan Water District of Southern California ("MWD") and the Imperial Irrigation District ("IID") illustrates districts' general hostility to external transfers.[244] Under the agreement, which is often touted as a model for future ag-urban water transfers, MWD is paying IID to conserve slightly over 100,000 acre feet of water, in return for which MWD will receive the water for at least thirty-five years.[245]

IID entered into the agreement, however, only because the state required it to conserve the water. IID did not voluntarily pursue conservation measures because of the benefits of the trade. The California Water Resources Control Board had ordered IID to conserve 100,000 acre feet per year by 1994.[246] Even after the board's initial decision held that IID would need to conserve water, IID rejected a memorandum of understanding between IID and MWD embodying a proposed agreement. The final agreement took almost a decade of on-again, off-again

241. *See, e.g.*, Gray, *supra* note 124; *Bexar MWD Buys 'Excess' Irrigation Water from Lakes*, WATER INTELLIGENCE MONTHLY, Oct. 1991, at 5; *City of Roma*, *supra* note 100, at 5-6; *Marin Municipal WD Leases up to an Additional 10,000 af/yr from Sonoma County WA*, WATER INTELLIGENCE MONTHLY, Dec. 1991, at 2; *Napa Acquires up to 7,500 af of Yuba River Water in 1991 and 1992 from Yuba County Water Agency*, WATER INTELLIGENCE MONTHLY, June 1991, at 2, 3; *Placer County WA Leases 40,000 af to San Francisco and Santa Clara*, WATER INTELLIGENCE MONTHLY, Jan. 1992, at 2; *San Luis WD Buys Groundwater from Local Irrigator*, WATER INTELLIGENCE MONTHLY, May 1991, at 4; *Yuba County Water Agency Sells 157,200 af to DWR*, WATER INTELLIGENCE MONTHLY, Oct. 1991, at 3; Archibald Study, *supra* note 35, at 4-45, 4-47.

242. *See, e.g.*, Gray, *supra* note 124, at 33-34; *New Magma IDD Acquires 30,000 af of CAP Water in Exchange with Tempe*, WATER INTELLIGENCE MONTHLY, Sept. 1991, at 2; *Southern San Joaquin MUD and Delano-Earlimart ID Swap CVP Water*, WATER INTELLIGENCE MONTHLY, July/Aug. 1991, at 3.

243. *See* Gisser & Johnson, *supra* note 118, at 151-53; Kevin M. O'Brien, *Water Marketing in California*, 19 PAC. L.J. 1165, 1199 (1988); Smith & Vaughan, *supra* note 7, at 10. Even here, there have been exceptions. *See, e.g.*, Wahl & Osterhoudt, *supra* note 163, at 116; *City of Roma*, *supra* note 100, at 5-6; *Union Water Supply Co. Leases up to 250 af of Rio Grande Surface Water*, WATER INTELLIGENCE MONTHLY, Oct. 1991, at 6.

244. Both the agreement and its history are described in REISNER & BATES, *supra* note 109, at 149-66.

245. Timothy H. Quinn, *Shifting Water to Urban Uses: Activities of the Metropolitan Water District of Southern California*, *in* MOVING THE WEST'S WATER, *supra* note 159, at 23-24.

246. *See* Waste & Unreasonable Use of Water by Imperial Irrigation Dist., Order No. WR 88-20, at 44 (Cal. Water Resources Control Bd., Imperial County, 1988) (Order to Submit Plan and Implementation Schedule for Water Conservation Measures) (on file with author). Lawsuits brought by landowners who claimed that runoff from IID fields was increasing the size of the Salton Sea and flooding their lands further increased pressure on IID. *See* ROBERT GOTTLIEB & MARGARET FITZSIMMONS, THIRST FOR GROWTH: WATER AGENCIES AS HIDDEN GOVERNMENT IN CALIFORNIA 79-80, 84-85 (1991).

negotiations to complete and was signed only after the state board issued its order specifying the exact amount that IID would have to conserve.[247] As noted, moreover, the water transfer is not permanent.

Even districts that have transferred water to outside users on a temporary basis have strongly opposed external entitlement transfers by their members. Although again there is no comprehensive survey, the vast majority of "retailing" districts appear to ban external entitlement transfers.[248] Umbrella agencies that supply water to retailing districts also typically restrict the ability of member districts to transfer water out of the service area of the umbrella agency.[249]

Recent events provide a basis for limited optimism that districts might become more receptive to external transfers in the future. Just as institutions have responded to members' demands for greater internal flexibility by developing intra-institutional markets, districts might ease their current opposition to external transfers if members see valuable opportunities for sizable profit from such transfers and thus push for them. Indeed, some California water districts responded to the state's creation of a water bank during the 1991 California drought by helping their members to sell their district-supplied water to the bank.[250] Nonetheless, the history and strength of district opposition to external transfers remain a serious concern that legislatures interested in promoting agurban transfers cannot ignore.

4. Possible Reasons for the Opposition to External Transfers

A central issue is what motivates institutional opposition. Proponents of water markets have often argued that blanket institutional opposition is illegitimate and that legislatures should therefore limit institutional control over external transfers.[251] Yet institutions may have justifiable reasons for opposing some external transfers.

At least three sets of factors appear to underlie the opposition. First, because property rights in institutional water supplies are not clearly defined, proposals for external transfers often set off intense battles over who should receive the financial gains from the transfers. These battles can understandably lead to a stalemate and may consume the

247. *See* GOTTLIEB & FITZSIMMONS, *supra* note 246, at 80-88; REISNER & BATES, *supra* note 109, at 157-58; Gray, *supra* note 124, at 34-37.

248. For discussions of district rules in specific westeru regions, see Gisser & Johnson, *supra* note 118, at 150-57; Archibald Study, *supra* note 35, at 4-44 to 4-47. In some cases, districts have questioned whether a farmer with land in two districts may even transfer the water from his land in one district to his land in the other. *See* UCLA CONFERENCE, *supra* note 8, at 113.

249. The Kern County Water Agency in California, for example, permits external transfers only where there is no demand for the water within Kern County. *See infra* notes 277-80 and accompanying text.

250. *See* Rodney T. Smith, *District Control of Water Transfers Likely to Benefit Landowners*, CAL. AGRIC., Nov.-Dec. 1992, at 8, 11.

251. *See, e.g.*, Gisser & Johnson, *supra* note 118, at 150-61.

gains that motivate a transfer, unnecessarily impeding valuable external transfers.

Second, external transfers can adversely affect the interests of the institution's members not involved in the transfer. Transfers can impose physical externalities on other water users, undermine the institution's financial well-being, conflict with community goals or institutional ethics, and raise the price of water for members who themselves want to buy more. Some of these—for example, physical externalities—are proper sources of concern and justify limited institutional oversight or regulation of external transfers. Others, such as rising water prices, reflect parochial self-interest that is inconsistent with broader societal good.

Finally, managers or boards may often oppose external transfers due to administrative concerns or because they fear the transfers may reduce their prestige or raise unwanted political fights. The administrative concerns fail to justify the flat bans found in many institutions, while the managers' other fears are improper bases for opposition.

a. Problems in Institutional Incentive Structures

The reticence of many water districts to engage in external district transfers partially stems from problems in current incentive structures that make it difficult to pass transfer profits through to the districts' members. In many states, either districts do not have the authority to distribute profits directly to their members, or their authority is unclear.[252] Even where districts are free to allocate the proceeds as they would like, the determination of how to allocate them can generate costly political disputes. Theoretically, proceeds could be allocated in a variety of ways. Districts could reduce water rates[253] or current property assessments. Alternatively, districts could rebate proceeds directly to current water users or to landowners through any of a variety of formulas. Finally, districts could use proceeds to fund conservation programs or totally unrelated projects.[254] Different equity arguments can be made for

252. *See, e.g.*, COLO. REV. STAT. ANN. §§ 37-42-135, -137 (West 1990) (revenues from 1921 irrigation districts' transfers must be placed in districts' bond or general funds); S.D. CODIFIED LAWS ANN. § 46A-9-65 (1987) (any income from sale or lease of water must go into general water fund); TEX. WATER CODE ANN. § 55.201 (West 1972) (any excess funds must be used "to preserve, maintain, and repair district improvements"); WASH. REV. CODE ANN. § 89.30.136 (West 1962) (income from sale or lease of water must be used "for district purposes").

253. A number of writers have argued that profits cannot be used to lower water rates because this would stimulate demand at the same time that a district must reduce supply. *See, e.g.*, Rodney T. Smith, *Water Transfers, Irrigation Districts, and the Compensation Problem*, 8 J. POL'Y ANALYSIS & MGMT. 446, 450-51 (1989). So long as the district allocates water by entitlement, however, lower prices will not prevent the district from lowering consumption. Nor would the lower prices pressure the district to import more water if users were charged the actual marginal cost of the new supply. Unfortunately, that is not case. *See infra* text accompanying note 354.

254. At one point, New Mexico's Middle Rio Grande Conservancy District considered using revenue from external leases to fund channelization and other community projects. *See* Gisser & Johnson, *supra* note 118, at 159-60.

each alternative. Different coalitions of district members, moreover, will benefit from and favor each alternative.

Because virtually all districts were formed before the recent upsurge of interest in transfers, district rules and governing statutes give no guidance on how profits should be divided.[255] Where, as is typically the case, a district's water supply is viewed as common property, no one can claim a legal or even expectational right to a specific share of the proceeds. A proposed external district transfer, therefore, may generate considerable political debate over who should benefit. Virtually every member of the district is likely to imagine an approach that would benefit her more than the proposal then on the table. Although members theoretically should be able to negotiate an acceptable solution among themselves, a shifting majority may in practice see every proposal as inequitable. Even if a compromise is ultimately reached, the rent-seeking involved in the dispute may prove costly and dissipate enough of the gain from trade to eliminate any incentive to pursue the transfer.

Fear of similar disputes among rent-seekers may largely explain many districts' adamant opposition to external entitlement transfers. The most commonly proposed system for entitlement transfers would award all, or virtually all, the gains from trade to the landowners and lessees who are giving up their water.[256] Others within a district are likely to assert strong claims to the gains, however. Where property taxes have long helped pay for district infrastructure, for example, nonirrigating landowners often argue that some of the proceeds should go toward paying back their contributions.[257] Members of local communities are also likely to argue that some of the gains should go toward community projects. Unless the district "buys off" such claims by providing that a share of any profits will go to these other claimants, entitlement transfer systems are likely to face substantial and often preclusive opposition.

Most mutuals, by contrast, do not face conflicting claims over transfer profits. As noted, most mutuals clearly assign water entitlements by stock ownership. Because shareholders are responsible for financing the mutual in proportion to their stock ownership, and because mutuals are not public agencies with direct responsibilities to the local community, there also are generally no competing equitable claims to the profits from the transfer of mutual stock. Stockholders, therefore, can transfer—and for many years have transferred—their shares to purchasers both within

255. *See* UCLA CONFERENCE, *supra* note 8, at 128-29.

256. Because state laws and district rules do not generally contemplate external transfers, they do not provide any guidance on who should enjoy the right to transfer entitlements if they are tradeable. Most proposed legislation, however, has assumed that irrigating landowners—and lessees for the period of their leases—would "own," and thus have the right to transfer, the entitlements.

257. *See, e.g.*, Gisser & Johnson, *supra* note 118, at 158-59.

and outside mutuals without raising disputes over who should enjoy the profits.

b. Member Concerns

i. Physical Externalities and Financial Instability

The reasons for institutional opposition to external transfers go beyond structural incentive problems. Some degree of institutional control over external transfers is justified by legitimate member concerns. For example, if external entitlement transfers were entirely unfettered, many transfers would impose physical externalities on other users.[258] Although most external transfers must undergo statutory review to ensure that other appropriators are not injured, state law may not protect against some externalities like lost groundwater[259] or against externalities that are purely internal to the institution.[260] Districts also have a proper interest in ensuring that external entitlement transfers do not reduce the revenue available to the district to cover fixed costs.

Institutions, however, could review for technological externalities on a case-by-case basis, blocking only those transfers that would be injurious to their members. This is the approach of many mutuals.[261] Institutions could protect their financial interest by requiring either the seller or purchaser to continue to cover the institution's fixed costs—if necessary, by attaching the obligation to the seller's or purchaser's land.

ii. Negative Community Effects

Worries about community impacts also motivate institutional opposition to external transfers, and they are more difficult to address. With growing frequency and intensity, local farming communities have considered external transfers to be threats to their economy and vitality.[262] As noted earlier, when external transfers lead to the fallowing of fields, communities can suffer increased unemployment, lowered business revenues,

258. Some transfers, for example, would reduce return flow into either the institution's water system or underlying aquifers. *See, e.g.*, UCLA CONFERENCE, *supra* note 8, at 73-74; MacDonnell et al., *supra* note 118, at 25. By decreasing the flow in distribution canals, moreover, transfers could also increase seepage and evaporative losses.

259. *See* UCLA CONFERENCE, *supra* note 8, at 74; *supra* note 40 and accompanying text.

260. Even where state legislation does not explicitly direct the state water agency to consider particular externalities, however, the agency may well weigh the externalities in deciding whether to approve the transfer. *See* UCLA CONFERENCE, *supra* note 8, at 119 (describing how California's state board, and other state boards with similar frameworks, analyze the impact on groundwater, despite the fact that groundwater evaluation is not explicitly within the boards' permit jurisdiction); *id.* at 74 (noting the role of Utah's worry that there might not be enough water for future applications from within the district).

261. *See supra* note 216 and accompanying text.

262. Residents of the Imperial Valley, for example, strongly opposed the initial memorandum of understanding between the IID and MWD. Residents, fearing that the proposed agreement would turn the Imperial Valley into another Owens Valley, defeated several incumbent directors and forced others to retire. *See* GOTTLIEB & FITZSIMMONS, *supra* note 246, at 83-85.

and decreased public resources. External transfers can also sometimes jeopardize the cultural values of the community.[263]

Community concerns are likely to play a larger role in some institutions than in others. As government organizations, districts may feel more responsibility toward community views than private mutuals. Indeed, districts appear to be less receptive than mutuals to external transfers.[264] District boards elected by the popular vote of all local residents are also likely to be more opposed to external transfers, on average, than boards that are elected by small numbers of absentee farmers.[265] Although current information is far too sketchy and anecdotal to prove the hypothesis, California's experience with institutional views on external transfers appears also to support this proposition. Only a few California districts have actively supported permanent external sales. Most have been governed by boards elected by local landowners and dominated by large corporate farms.[266] California districts that permit all residents an equal vote, in contrast, have often expressed strong concerns over external transfers.[267]

The legitimacy of such community-based opposition is open to debate. Some economists have argued that potential community impacts are mere "pecuniary externalities" that should not justify barring external transfers.[268] Under this view, the reduction in community income reflects the fact that, given the value of water elsewhere, local farming or ranching operations are no longer as valuable to society. The reduction is not an unmitigated evil, but instead sends a valuable economic signal to the community that it should consider shifting resources away from farming or ranching. Labelling the community impacts "pecuniary externalities," however, does not dismiss the fact that movements away from farming or ranching will typically be extremely costly and painful

263. *See, e.g.*, Brown et al., *supra* note 118, at 10-11; Shannon A. Parden, Note, The Milagro Beanfield War *Revisited in* Ensenada Land and Water Association v. Sleeper: *Public Welfare Defies Transfer of Water Rights*, 29 NAT. RESOURCES J. 861 (1989).

264. *See supra* text accompanying notes 215-22, 240-49. This is not to say that mutuals are never responsive to community concerns. Where mutuals have been closely tied to local communities, shareholders have occasionally tried to block external entitlement transfers that they believed might injure their community. *See, e.g.*, Pratt, *supra* note 95, at 51, 56.

265. This is not to say that institutional form, rather than community views, dictates transfer policy. Where given a choice under state law, farming regions with vital and closely linked communities may well opt for more democratic voting systems. For differences in voting systems, see *supra* notes 102-03 and accompanying text.

266. *See, e.g.*, GOTTLIEB & FITZSIMMONS, *supra* note 246, at 100-03 (discussing the Wheeler Ridge-Maricopa and Berrenda Mesa water districts).

267. Here again the IID, in which board members are elected by a general popular vote, is a prime example. *See id.* at 83-85; *supra* notes 244-47 and accompanying text; *see also* Smith, *supra* note 250, at 11 (concluding that the best prospects for external trades are in districts that do not give an equal vote to all residents).

268. *See, e.g.*, Charles V. Moore, *Discussion, in* WATER SCARCITY: IMPACTS ON WESTERN AGRICULTURE 266, 268-69 (Ernest A. Engelbert & Ann Foley Scheuring eds., 1984).

and that external transfers will often redistribute income away from the community and may even destroy the community itself.[269]

Local water institutions, however, may not be the proper forum in which to address such community impacts. First, the relevance of community impacts raises broad social questions that go beyond the narrow issue of water markets. Many market decisions, including factory or store closings and the development of new technologies, can lead to similar community impacts.[270] Traditionally, the law has not given local community institutions veto power over such decisions.[271] Instead, governments have tried to soften the impacts through unemployment insurance, job retraining, community redevelopment funds, and other generalized programs. There is no convincing reason to differentiate society's handling of water transfers. If government is concerned that current programs inadequately mediate the negative fallout from market-inspired changes, it should address the problem across all instances rather than singling out water transfers for unique treatment.

Second, state and regional governments seem better positioned than local water institutions to address the social questions raised by external transfers. The secondary effects of water transfers are not all negative; the transferring community will sometimes lose income and wealth, but the community to which the water is brought will typically enjoy offsetting beneficial effects.[272] The community issue is at heart a geographical question of income distribution: Should society permit an external water transfer if it redistributes income and wealth from rural to metropolitan areas? State and regional governments, unlike local water districts, can weigh both sides.

iii. Conflicts with Institutional Ethics

External entitlement transfers can also conflict with the ethic of many agricultural districts. As noted earlier, district members often view the district's water supply as a common resource that should be equitably shared among members and used to promote local agriculture.[273] Public subsidization of the water supply, either by the district itself or by another governmental agency, reinforces this community ethic. External entitlement transfers directly violate the ethic: rather than returning

269. *But see* Elliot Diringer, *Cities Try to Ease Central Valley's Water Fears,* S.F. CHRON., Feb. 5, 1993, at A23 (increased transfers from farmers to urban users would not necessarily cause significant community impacts).

270. *See* Moore, *supra* note 268, at 268-69.

271. *See, e.g.,* Joseph W. Singer, *The Reliance Interest in Property,* 40 STAN. L. REV. 611, 652-63 (1988) (discussing the lack of community oversight of plant closings).

272. *See* Robert A. Young, *Local and Regional Economic Impacts, in* WATER SCARCITY, *supra* note 268, at 244, 261 (arguing that losses to agricultural sectors giving up irrigation water will be "dwarfed" by gains in nonagricultural sectors).

273. *See supra* note 192 and accompanying text.

unneeded water to the community, users convert the water and any public subsidy into a purely personal monetary profit.

Ethical conflicts, like community concerns, are again more likely to influence districts than mutuals. Unlike district members, mutual shareholders typically do not view the mutual's water supply as common property. Mutuals are private corporations, and stockholders view their shares, and the water that goes with the shares, as personal property. Partly as a consequence, most mutuals have long promoted active internal markets in their shares, and external entitlement transfers are relatively natural extensions of these markets.

Whether institutions should be permitted to block external entitlement transfers for ethical reasons is again open to debate. First, one can question the strength of the ethical precept against profit-making, especially in those districts dominated by sizable commercial farmers. As described in Section C, similar ethical objections to internal transfers have eroded when institutions have seen advantage in increasing local flexibility.[274] Second, the view that water users should equitably share water among themselves at a society-subsidized price conflicts with the modern need to conserve water and to meet constantly, and often quickly, changing needs with limited supplies. Most local water districts, and their ethical foundations, arose in a day when water use was encouraged and any new demands were met with new water projects. To date, although one might wish that water users would voluntarily conserve and share their supplies with new consumers, only the profit motive has been powerful enough to achieve this goal.

iv. Members' Interest in Preserving Restricted Markets and Low Prices

Underneath the veneer of community and ethical concerns may often lie the entirely self-interested desire by many members to maintain the currently restricted market for any surplus water within their institution. Because competition for district water is currently limited, users who need additional water can generally obtain it from others within their institution at relatively inexpensive prices. If institutional water supplies were opened to outside users (particularly to urban areas which are willing to pay far more than most farmers for their water), the price of internal institutional transfers would almost certainly rise.[275]

Whether this concern would lead an institution to forswear external transfers depends both on how many members view themselves as likely

274. *See supra* notes 192-208 and accompanying text.

275. Henry Vaux estimates that water prices in agricultural regions of California would be "modestly higher" or "significantly higher" (depending on the region) if interregional trades were unencumbered. *See* Henry J. Vaux, Jr., *Economic Factors Shaping Western Water Allocation*, 68 AM. J. AGRIC. ECON. 1135, 1139-41 (1986). The size of the impact on any particular region would depend in part on the accessibility of the region to likely urban purchasers.

purchasers or sellers of excess water and also on the institution's decisionmaking norms. Price rises resulting from external transfers would injure likely purchasers within the institution, but, of course, simultaneously enrich likely sellers. In an institution that makes its decisions by pure majority vote, support for external transfers will depend on the relative preponderance of likely purchasers and sellers. As noted already, however, many local water institutions are governed by consensus. In such institutions, the opposition of a significant number of likely purchasers will often defeat proposals to abandon the status quo and permit external transfers.[276]

Reactions to transfer proposals by two California water districts illustrate the opposition generated by vested interests in currently restricted markets. Faced with agricultural bankruptcies and cutbacks in the mid-1980s, and thus excess water, two districts in California's Kern County investigated the possibility of selling their excess water to outside districts.[277] However, the Kern County Water Agency ("KCWA"), which wholesales the water to both districts, opposed transfers outside the KCWA.[278] Most of the districts in the KCWA are interested in acquiring more water at current, or lower, prices.[279] To these districts and the KCWA directors, external transfers threaten to drive up prices and thereby deprive other local districts and their users of water that they "need."[280] In more direct terms, the local districts want to preserve the current restricted market and purchase water at less than its current economic worth to society.

276. Similar protectionist interests can also impede transfers in districts that allocate water by pricing. Assuming that the district charges a market-clearing price, external transfers will decrease the district's water supply and force an increase in internal prices. Depending on how any profits from a transfer are allocated, some users may believe that their gains from trade will not offset the price increase that they will confront and may therefore oppose the transfer.

277. *See* GOTTLIEB & FITZSIMMONS, *supra* note 246, at 100-04. A number of other districts in Kern County expressed a similar interest. *See id.* at 102.

278. *See id.* at 103-04. In 1986, the KCWA embodied its opposition in a formal "plan" that requires member districts to make every effort to find purchasers within the agency before the KCWA, whose approval is required for any transfer, will consider a proposal to transfer water out of the agency. *See* Kern County Water Agency, Plan for Redistribution of State Water Project Contract Entitlement (Apr. 1986) (on file with author). To date, the KCWA has approved only one short-term, drought-related transfer out of the agency. *See* Gray, *supra* note 124, at 13-20; Archibald Study, *supra* note 35, at 4-44.

279. *See* GOTTLIEB & FITZSIMMONS, *supra* note 246, at 103-04; UCLA CONFERENCE, *supra* note 8, at 93. The State Water Project, which supplies water to KCWA, has never been completed and therefore provides KCWA with only a fraction of the water KCWA originally requested. *See* NATIONAL RESEARCH COUNCIL, *supra* note 70, at 223; Vaux, *supra* note 77, at 72-73.

280. Urban water districts have also sometimes opposed transfers involving other water institutions in an effort to protect their own monopsonistic position. *See infra* note 349 and accompanying text.

c. Managerial Opposition

Managers of institutions also often oppose external transfers. Managers often publicly justify this opposition on administrative grounds. To protect against the potential negative effects of external transfers,[281] managers claim that they would need to engage in expensive and time-consuming case-by-case reviews of transfer proposals if external transfers were widely allowed.[282] Furthermore, as discussed earlier, many districts still have only rudimentary systems for recording and monitoring water transfers.[283] Finally, districts often complain that unfettered external entitlement transfers would make long-range planning far more difficult.[284] In deciding whether to construct new pipelines or storage reservoirs and in determining needed water supplies, most districts rely on existing crop patterns and expected future growth in their service areas. The possibility that water might be traded to users outside the service area threatens to complicate this planning task.

Though large numbers of external transfers would undeniably increase districts' administrative costs, this consideration should not be overstated. Conservative hydrologic assumptions can considerably reduce the costs of case-by-case reviews, and institutions can require sellers to pay the review costs.[285] Recording and monitoring costs are unlikely to exceed those that districts already bear in connection with internal institutional transfers. Finally, external transfers should pose no greater problem for long-range district planning than the uncertainties already posed by droughts and agricultural markets.

Managerial self-interest might be a far more powerful source of managers' opposition to external transfers. Economic studies of bureaucracies suggest that district managers and boards may find it in their self-interest to oppose both external district transfers and external entitlement transfers.[286] Drawing on such studies, Micha Gisser and Ronald Johnson have argued that the power and esteem enjoyed by managers and institutional boards depend on the size and budgets of their institutions.[287] And indeed managers and board members frequently seem

281. For a discusion of some of these negative effects, see *supra* notes 258-60 and accompanying text.

282. In trying to determine the impact of Colorado's proposed transfer of water out of its service area, for example, the Catlin Canal Company is estimated to have spent over $15,000 in engineering studies. *See* SAX, ABRAMS, & THOMPSON, *supra* note 19, at 670.

283. *See supra* notes 189-91 and accompanying text.

284. *See, e.g.*, Archibald Study, *supra* note 35, at 4-46 to 4-47.

285. While both steps would reduce the attractiveness of external entitlement transfers, they would still provide greater freedom than current bans.

286. *See, e.g.*, Young, *supra* note 51, at 1148. *See generally* BUDGETS AND BUREAUCRATS: THE SOURCES OF GOVERNMENT GROWTH (Thomas E. Borcherding ed., 1977); WILLIAM A. NISKANEN, JR., BUREAUCRACY AND REPRESENTATIVE GOVERNMENT (1971).

287. *See* Gisser & Johnson, *supra* note 118, at 157-60 (discussing New Mexico's Rio Grande Conservancy District).

eager to annex new lands or develop additional water uses within their districts.[288] By reducing the institution's water supply and perhaps its customer base, external transfers directly threaten managers and boards.

Like most political officials, managers and board members also have strong incentives to avoid controversial issues. Most agricultural districts are politically sleepy; policy stability, and thus consensus decisionmaking, are prized.[289] Board elections are rarely contested, and managers are seldom fired.[290] Inaction is safe. Yet, as discussed above, external transfers create controversy. When external transfers have been forced on districts,[291] boards have found themselves facing an uncontrollable political maelstrom and, in some cases, have been defeated for reelection.[292] Few managers and boards are likely to brave such a maelstrom voluntarily.

Here, as with several of the previously discussed sources of opposition, the strength of managerial opposition to external transfers is likely to depend on the nature of the institution involved. In institutions that are controlled by small numbers of farmers or other water users, managers and boards typically have little latitude and strongly promote the members' preferences, even when that means pursuing external transfers.[293] In large irrigation districts, by contrast, managers and boards may well have more discretion to pursue their own long-term interests.

III.
LEGISLATIVE REPONSES TO INSTITUTIONAL OPPOSITION TO EXTERNAL TRANSFERS

Although most of the legislative debate over ag-urban transfers to date has centered on possible changes to the statutory transfer process, a legislature that wants to encourage such transfers must also address the

288. *See, e.g.*, UCLA CONFERENCE, *supra* note 8, at 94; Minutes of Regular Meeting of the Board of Directors of the Central California Irrigation District 4 (June 12, 1991) (on file with author) (discussing the possibility of annexation).

289. *See, e.g.*, BAIN ET AL., *supra* note 23, at 279 & n.43.

290. Studies of California water districts, for example, have found virtually no contested elections in districts with property-weighted electoral systems, and relatively few (20 to 30%) in those using one-person-one-vote systems. *See* GOODALL ET AL., *supra* note 102, at 18-19. According to the authors, the one-person-one-vote numbers are probably high, because it is likely that many districts with uncontested elections did not file reports. *Id.* at 18. At least until recently, districts have been moving toward property-weighted systems. Goodall & Sullivan, *supra* note 102, at 216-17.

291. For example, the Imperial Irrigation District was forced to accept an external transfer. *See supra* notes 243-47 and accompanying text.

292. *See* GOTTLIEB & FITZSIMMONS, *supra* note 246, at 85.

293. For example, the managers of California's Wheeler Ridge-Maricopa and Berrenda Mesa water districts have actively promoted external transfers that their members wished to make. *See id.* at 100-03. Both are dominated by no more than a score of large farming operations. *See* Merrill R. Goodall & John D. Sullivan, *Water System Entities in California: Social and Environmental Effects, in* SPECIAL WATER DISTRICTS, *supra* note 2, at 71, 73-74.

institutional obstacles just discussed. First, the legislature should expressly authorize institutions to engage in external district transfers and to set up mechanisms for external entitlement transfers—thereby eliminating the legal uncertainties discussed in Part II. Second, the legislature should ensure that members of a water district have an incentive to engage in external transfers by providing for a clear and predetermined method of passing transfer profits to a district's membership.

Although a start, resolving the current legal and structural incentive problems will not always be sufficient to free the way for external transfers. As discussed, many members, managers, and boards may still oppose external transfers for other reasons. Because many of these reasons are improper bases for opposition, the legislature will also want to consider giving individual members of an institution the right to transfer a set portion of the institution's water supply and eliminate or restrict the institution's right to regulate such transfers, thus permitting individual members to override institutional opposition. Congress has recently adopted this approach in trying to free up water in California's Central Valley. Unfortunately, this approach can also strip institutions of legitimate input into external transfers and thus should be adopted only after careful thought. Finally, the legislature might consider expanding institutional borders, or creating new umbrella institutions, in the hope of enabling regional transfers through internal institutional transfer systems.

A. Clarifying Legal Authority

As discussed in Part II, state and federal law currently stands in the way of, or at least chills, external transfers by many water districts.[294] These legal obstacles are unnecessary and should be promptly remedied. A large part of the problem stems from state codes or judicial opinions that were written long before the current interest in regional water trades and are thus silent or ambiguous on the legality of external transfers. Where state law addresses external transfers, it often erects procedural barriers or substantive limits that appear designed to protect a district's membership against capricious decisions to transfer water out of the district. As described above, the problem today is unwarranted institutional *opposition* to external transfers. Legislatures should therefore begin by clearly authorizing districts to engage in external transfers, subject merely to approval by the district's board, and by authorizing districts to adopt a system for external entitlement transfers by their members.

294. *See supra* notes 223-39 and accompanying text.

B. Increasing Financial Incentives

Legislatures can also increase institutional receptivity to external transfers by providing a clear mechanism by which an institution's members can directly benefit from external transfers. The share structure of most mutuals, as emphasized earlier, already provides for a direct flow of transfer profits to the shareholders selling their water.[295] Irrigation districts, in contrast, typically have no provision for the flow of transfer profits to their members—creating both uncertainty about whether members can profit directly and setting the stage for costly disputes and rent-seeking over how profits should be used.[296] Legislatures could cure this problem and give district members a greater incentive to favor external transfers by enacting "profit allocation legislation" that would (1) authorize districts to pass profits from external transfers through to their members, and (2) establish a set formula for allocating the profits (overridable only by a majority vote of the district).[297]

Any entitlement formula currently used by a district to allocate its yearly water supply among its members (the district's "internal entitlement formula") could serve as a starting point for allocating transfer profits. Revenues from any external sale or rental would initially go toward covering any expenses that the district incurs as a result of the transfer, compensating for any externalities, and paying for a pro rata share of the district's fixed costs.[298] If the transfer involves an across-the-board percentage of the district's entire water supply, remaining profits would then be allocated to the district's members in the same proportion as the water would have been distributed. If the transfer entails water conserved or freed up by a particular user, profits would be allocated to that user. Such a profit allocation system would give water users not only an incentive to support external transfers but also an economically efficient signal of their water's social value.

Districts' existing entitlement formulas, however, will only be a starting point for allocating transfer revenues. Profit allocation legislation, for example, will also need to address whether landowners, or their renters, should receive the entitlement to profits from external transfers.[299] Prospectively, landowners and renters can resolve the issue contractually through their lease agreements and should be permitted to do

295. *See supra* text following note 257.

296. *See supra* notes 252-57 and accompanying text.

297. In some cases, legislation simply authorizing districts to pass profits through to their members might be adequate. In many cases, however, such legislation would still leave room for costly and difficult intradistrict disputes over how the profits should be used.

298. To avoid uncertainty and ensure that rent-seeking does not creep in through the allowance for costs or externalities, the legislature must carefully specify the costs and externalities that are covered.

299. For a discussion of the potential importance of who receives the entitlement, see Rosen, *supra* note 146; Smith, *supra* note 250.

so. Because current leases will not address the issue, however, a "default" rule is needed. To ensure that all ownership decisions rest in one person, profit allocation legislation should award profit entitlements to whoever, landowner or renter, decides what water is currently used on the leased land. If relevant leases and institutional rules do not address this issue, the renter should be presumed to control the water because renters typically make the day-to-day decisions regarding irrigation and are in the best position to institute conservation measures.

Legislatures may also wish to spread the profits more widely than a district's internal entitlement formula would dictate, both to maximize support for external transfers and to address equity claims. A portion of the profits, for example, might be used to offset any property taxes or other levies imposed by the district (and long used to subsidize the water use) or to finance local community improvements. The appropriate allocation requires balancing the potential impact of each allocation on support for external transfers, along with both equity and efficiency considerations. By allocating profits away from the actual water users, the legislature reduces the incentive that the users have to support external transfers and theoretically risks discouraging some cost efficient transfers.[300] But the legislature garners support for other transfers from members that might otherwise oppose them[301] and can achieve a more equitable allocation. Moreover, given the high prices that many urban areas are willing to pay today relative to the agricultural value of water, small reductions in the percentage of profits going directly to water users are unlikely to have a significant impact on user receptivity to the ag-urban transfers that are currently most likely to be proposed.

Applied to those districts that already allocate water internally by entitlement ("entitlement districts"), profit allocation legislation would not radically change the character of the districts nor strongly intrude into district decisionmaking. Although district members would hold a financial stake in exterual transfers, district boards and electors would still decide through the local democratic process whether and under what conditions to engage in external transfers. Individual district members would not have the power to override a district's decision to avoid external transfers. In addition, districts would not need to take any administrative action to implement the legislation until a transfer is actu-

300. A simple hypothetical helps illustrate the efficiency concern. Assume that the value of an acre foot of water to a district user is currently $70. If a nearby city values the water at $80 an acre foot, a transfer is efficient. However, if $20 of the purchase price goes to other members of the district or to projects that only marginally benefit the water user, the user will oppose the transfer.

301. Given that many districts are governed by a consensus process, broad support for transfers may often be critical. Legislatures, of course, must also guard against encouraging support for cost-inefficient transfers. If too high a percentage of the net profits is allocated to nonwater users, this group might demand a transfer even when the water users value the water more than the potential purchaser or lessee.

ally made, and then application of the legislative formula to the district should be relatively straightforward.

As noted in Part II, however, a few agricultural districts use pricing systems to allocate some or all of their water supplies ("pricing districts"). Pricing districts pose a unique problem in drafting profit allocation legislation: no internal water entitlements generally exist upon which to build a profit allocation mechanism.[302] Instead, the water is an undivided district resource. To give district members a direct financial stake in external transfers, therefore, the basic structure of the district must be changed. There are two basic options, "conversion" and "profit-sharing," neither of which is ideal.[303]

The first option is to convert pricing districts into entitlement districts. Every user would be given an entitlement that could be used or traded internally and that would form the basis for allocating profits from external transfers.

Though simple in theory, such a conversion would raise several practical problems. Because water entitlements do not already exist in most pricing districts, the legislature would typically need to determine how to allocate entitlements among current members. To avoid redistributing wealth (and thus generating opposition to transfers), entitlements would need to approximate water use under the district's pricing system. Actual water use at the time of implementation could not be used, however, because that would give district members an incentive to increase water use prior to any transfer in order to maximize their entitlements or shares. The legislature thus would need to adopt a formula that estimates likely water use based on two or three objective and easily determined factors such as acreage and crops. Because ultimately inexact and lacking a basis in existing legal or contractual entitlements, any such formula is likely to prove controversial.

The conversion option, by converting pricing districts into entitlement districts, would also destroy the advantage that pricing systems can offer local users. As discussed in Section II.C, districts typically choose pricing systems because of the lower administrative costs imposed on water users.

Alternatively, therefore, the legislature might adopt a profit-sharing approach that, rather than converting pricing into entitlement districts, would simply give the district's members a share in the proceeds of any external transfers by the district. Here again, however, complexities

302. Some pricing districts have underlying entitlement allocations that are not currently used because there is sufficient water to meet all members' needs, but that could form the basis for a legislative allocation of transfer profits. *See* Archibald Study, *supra* note 35, at 4-58 (citing California's Gleun-Colusa Irrigation District as an example).

303. To avoid unnecessary change, actual implementation of either option should occur only when a district makes a transfer or when a majority of district electors so votes.

would quickly arise. First, the legislature would be faced with the same controversial problem of how to allocate shares in a district's water supply when no individual entitlements currently exist; as with the conversion approach, any workable formula will be inexact and difficult to defend. Second, the profit-sharing approach raises the additional issue of what portion of any transfer profits should be divided among the "shareholders." To avoid overencouraging external transfers, the share must be adjusted to reflect the value to the district of retaining the water for use internally. If members received the full net profit from external transfers, district members might favor external transfers even when internal use was economically more valuable.[304] Again, no simple formula can resolve the problem.[305]

Without pursuing a conversion or profit-sharing option, however, legislatures can still encourage members of pricing districts to support external transfers by requiring them to move toward a marginal cost pricing system. Faced with significantly higher water rates, district water users would find ways of conserving or otherwise reducing their water use—freeing water for external transfers or other beneficial uses.

C. Limiting Institutional Control over Transfers by Individual Members

Increased incentives will not always be a total solution. As discussed earlier, inadequate incentive structures are merely one of the reasons for institutional opposition to external transfers. Indeed, many mutuals discourage external transfers even though profits go directly to the selling shareholder.[306] If the reasons for institutional opposition were all legitimate, such continued opposition would not be troubling. Yet as discussed, institutions oppose external transfers for varied reasons, many of which are socially improper or questionable. In at least some settings,

304. To illustrate with a simple hypothetical, assume that a district currently markets its water at the water's cost of $50 per acre foot. Also assume that the district sells the water to a neighboring city for $150 per acre foot, and that the transfer costs the district nothing except the loss of the water. Finally assume that 30% of the district's residents value the water at more than $150 an acre foot. If all transfer profits were distributed, a majority of the electors might favor selling all of the water to the city, although the water used by 30% of the residents would be used more valuably in the district.

305. As noted, the profits distributed to members should reflect the value to the district of the water that is lost. The simplest approach would be to subtract from the transfer profits the price at which the district would have sold the water internally. But water prices in most districts are often well below the actual value of the water to many users. Districts could also temporarily modify their water rates to vary the profits going to their members.

A way around this computational problem would be to award members a continual share of the net proceeds from the district's use of its water, whether from external transfers or internal sales. But this would openly turn districts into profit-making associations, antithetical to their traditional governmental status, and would require a new and costly apparatus to calculate and distribute profits on a constant basis.

306. *See supra* notes 217-20 and accompanying text.

therefore, legislatures might consider giving the authority to engage in transfers directly to the individual members of each institution and restricting or eliminating oversight by the institution ("member transfer legislation").[307]

Both the California legislature and the United States Congress have recently debated such legislation. In 1991, California Assemblyman Richard Katz introduced a bill that, in its early versions, would have given anyone receiving water from a public water agency the right to sell his or her individual "allocation" to outside users even over the opposition of the agency.[308] Katz extolled the bill as "breaking the backs of water districts who are blocking water trades."[309] Agricultural water institutions vigorously opposed the bill, and it ultimately died in the California Senate, even though a variety of committee amendments had already weakened it.[310] A similar bill, however, was introduced earlier this year and is under active consideration.[311]

In the meantime, Congress has virtually eliminated the power of California water districts to veto or condition external entitlement transfers involving water from the Bureau of Reclamation's Central Valley Project (CVP). Under the 1992 Reclamation Act, any individual receiving CVP water can transfer the water "to any other California water user or water agency, State or Federal agency, Indian Tribe, or private nonprofit organization." In most cases, the transfer is subject only to limited restrictions and circumscribed review and approval by the Secretary of the Interior (and, where appropriate, to approval by the state water per-

307. *See, e.g.*, H.R. 5099, 102d Cong., 2d Sess. § 5(a) (1982); H.R. 2687, 102d Cong., 1st Sess. § 101 (1981); Assembly Bill 2090, *supra* note 10, § 2. There have also been isolated academic calls for legislative action. *See* BAIN ET AL., *supra* note 23, at 667; Smith, *supra* note 253; Smith & Vaughan, *supra* note 7.

308. Assembly Bill 2090, *supra* note 10, § 1745.6 (as amended May 13, 1991). In its early versions, the Katz bill did not explain how each water user's "allocation" would be calculated. Later versions included a method for such calculation. *See id.* § 492.2. Water agencies were required to "assist in the transfer," but they could charge water users for their "actual costs in effecting the transfer." *Id.* § 1745.6.

309. Assemblyman Richard Katz, Address at the Meeting of the Environmental Water Leadership Council (Jan. 8, 1992).

310. As amended, the bill would have permitted water users to make permanent transfers of conserved water. Assembly Bill 2090, *supra* note 10, § 495 (as amended June 11, 1992). The bill would have authorized the long-term transfer "of that part of a water user's allocation from a public agency which the user conserves other than in connection with an agency-sponsored water conservation program." *Id.* § 495(a).

The bill would also have permitted water users to make temporary transfers of any other portion of their individual "allocation," subject to both specific limitations and circumscribed agency oversight. *Id.* § 492. Under the bill, temporary transfers would have been barred if they resulted in the fallowing of more than 20% of the acreage irrigated within the agency's borders. *Id.* § 493.2. Agencies would also have been permitted to impose terms and conditions designed to protect the agency's financial conditions, operations, supply contracts, and ability to comply with permit and license conditions, so long as the terms and conditions were not "more stringent than the terms and conditions applied to transfers undertaken by the public agency." *Id.* § 492.3(b).

311. Assembly Bill 97, 1993-1994 Reg. Sess. (Cal.)

mitting agency).[312] A district can veto a transfer only if the transfer involves more than twenty percent of the CVP water received by the district, and then only on narrow grounds.[313] The Secretary of the Interior and, where relevant, the district must act on a proposed transfer within ninety days; if a transfer is disapproved, the Secretary or district must explain why and describe any alternatives that would be approved.[314]

1. Must Legislatures Limit Institutional Control?

Given the significant barriers that water districts can pose to external transfers, both Congress and California should be applauded for finally turning their attention to institutional issues. Yet other legislatures should not rush to adopt member transfer legislation. In overriding what the legislature sees as improper institutional opposition to external transfers, such legislation also threatens to bar legitimate institutional concerns. By radically restructuring the traditional relationship between water institutions and their members, member transfer legislation also threatens to break down institutional cohesion generally and perhaps sacrifice the institutions' ability to address other issues effectively. The wisdom of member transfer legislation should thus depend to a significant degree upon two issues: first, what the legislature believes is motivating institutional opposition in the region at issue; and, second, whether the legislature believes the major sources of opposition are legitimate.

Member transfer legislation may not be necessary if the legislature both resolves the legal uncertainties regarding the power of water districts to engage in external transfers and provides members with a clear incentive to engage in external trades. Although some institutions may still unjustifiably block external transfers, an efficient market in water rights does not require the opening up of *all* institutional supplies. Active and effective markets can develop around a relatively small percentage of the total water supply.[315] In areas where institutions control

312. 1992 Reclamation Act, *supra* note 9, § 3405(a); *see supra* note 239 (describing the limited conditions on transfers and the grounds on which the Secretary of the Interior can disapprove transfers).

313. 1992 Reclamation Act, *supra* note 9, § 3405(a)(1). Of most relevance, a district can veto a transfer if the transfer is inconsistent with state or federal law, *id.* § 3405(a)(1)(D), (H), or involves conserved water that would not otherwise have been "irretrievably lost to beneficial use," *id.* § 3405(a)(1)(I).

The 1992 Reclamation Act contains a potential inconsistency. The Secretary of the Interior can approve a transfer only if "the transfer is consistent with State law," *id.* § 3405(a)(1)(D), yet California law does not provide for external entitlement transfers absent district approval. Given the Act's express limitations on district review and approval, however, the most reasonable interpretation is that state law is overriden in this instance.

314. *Id.* § 3405(a)(2). Although the Act does not expressly provide for judicial review, a water user could also seek review of a negative decision under the Administrative Procedure Act. 5 U.S.C. § 702 (1988).

315. The region inside the Northern Colorado Water Conservancy District, for example, has

only a fraction of the available water or where some institutions are receptive to external transfers, legislatures might not need to break down the barriers of "closed" institutions because a tradable margin might already be available. Removing the remaining barriers would still achieve marginal efficiency gains, but such gains could easily be offset by the loss of effective institutional input.[316]

Legislators should direct their reform efforts at those regions where institutions control and shelter a high percentage of the most tradable water, and where institutional opposition to external transfers seems widespread and unjustified. In evaluating the importance of the institutional supplies to water markets, legislatures should consider at least three factors: the distance between the institutions and water-short areas; the availability of any water transportation facilities between the institutions and potential purchasers; and the current value of water in the region. Not surprisingly, the principal reform proposals to date have focused on those areas in California where potential transfers between agricultural and urban regions present the opportunity for sizable gains from trade, where water districts control high percentages of water in many of the agricultural areas, and where institutional opposition to external transfers has been highly inflexible.[317]

2. *Relevant Issues*

Member transfer legislation also raises a variety of important questions that deserve careful consideration. These include issues of implementation, as well as the question of what continuing role, if any, institutions should play in external transfers. Experience to date, however, suggests that the details of member transfer legislation receive little legislative attention. As a result, the legislation leaves critical questions open and sometimes even yields counterproductive results.[318] Consider

developed an effective market around the district's water supply even though the supply constitutes less than 20% of the total water used in the area. *See* Howe et al., *supra* note 22, at 172.

316. Where all institutions in a locale are opposed to external transfers but control only a percentage of total supplies, removing the institutional barriers might also permit urban regions to enjoy the economies of scale of buying water through institutions. Thus, urban regions could avoid having to assemble a block of water to purchase from dozens of individual water users. Here again, however, any legislative effort to break down institutional barriers will carry some degree of offsetting costs.

317. *See* Vaux, *supra* note 275, at 1139-41. In California, districts control 56.8% of irrigation water, which is the highest percentage for any state. *See supra* Table 2.

318. The 1992 Reclamation Act presents a good example. In an effort to overcome institutional opposition to external transfers, the Act limits institutional veto power, and places the power to review and approve transfers instead in the Secretary of the Interior. 1992 Reclamation Act, *supra* note 9, § 3405(a). The Act applies the secretarial review process, however, to "[a]ll transfers of Central Valley Project water," apparently including internal institutional transfers. *Id.* In an attempt to free up external transfers, therefore, the Act threatens to increase the administrative burden on internal transfers where, as explained in Section II.C, there is already an active market. The Bureau of Reclamation's interim guidelines under the Act try to remedy this problem at least

three questions that have been slighted or ignored in most member transfer legislation.

First, how should individual rights to transfer water be assigned among the various members of each institution? If an institution already assigns entitlements for yearly water allocation among its members, member transfer legislation can be relatively straightforward and simple to administer: members become entitled either to use their traditional entitlements or to rent or sell the entitlements to other users within or outside the institution.[319] As with profit allocation legislation, however, there are complications. Again, for example, the legislature must address how to allocate entitlements between landowners and lessees. Again, member transfer legislation raises special problems when applied to pricing districts.

As with profit allocation legislation, there are two principal approaches to assigning individual rights in pricing districts. Under a "conversion option," pricing districts would convert into entitlement districts, with each member receiving an entitlement that would both determine internal use and be freely transferable. Under a "share option," each member would be awarded effective title to a share of the district's water supply, which the member could either sell externally or provide to the district for internal sale. Each member would decide individually whether her share of water is best used internally or sold to outsiders; internally, however, water would still be allocated by the district's pricing structure. The problems under both options would be similar to those under profit allocation legislation.[320] Both options would ultimately require somewhat arbitrary allocations of entitlements or shares. The conversion option would also eliminate the advantages of pricing systems.

Recent bills and legislation, unfortunately, have tended to ignore the need to determine member allocations. Some have awarded each mem-

---

partially by providing, without any express authority under the Act, that "project water users who have existing water transfer provisions in their current contracts . . . will be allowed to continue annual short-term transfers in accordance with the provisions of those contracts" and without secretarial review under the 1992 Act. Bureau of Reclamation's Interim Guidelines for Implementation of the Water Transfer Provisions of the Central Valley Improvement Act, Feb. 19, 1993, at 2.

319. Because transfer decisions will be made by individuals rather than the district as a whole, the legislature need not be as concerned about allocating a share of any profits to nonwater users, a problem that arises in other situations. *See supra* notes 300-01 and accompanying text. The legislature, however, may still want to allocate a portion of any profits to reducing property taxes or financing community projects either out of concern for equity or to temper any discretion that districts retain to veto individual transfers.

320. *See supra* notes 302-05 and accompanying text. Because of the special problems of applying member transfer legislation to pricing districts, a pricing district should not be forced to implement such legislation until its members wish to transfer a significant amount of water—perhaps 10% or more of the district's supply. Members who singly or jointly wish to transfer less than that amount should not be given the power to force upon the district the expense of implementation.

ber the right to transfer his or her "allocation" without saying how to determine the allocation, while others have provided that the institution itself should determine each member's allocation.[321] When bills have ventured to define each member's transferable allocation, the definitions have often been troublesome: one current California bill, for example, provides that institutions should consider each member's consumptive use over the preceding ten-year period in determining how much each member can transfer.[322] As noted earlier, such a rule may actually encourage increased use of water and discourage conservation.

Second, legislation must address what veto power, if any, the institutions should retain over individual transfers.[323] As stressed earlier, external transfers can threaten legitimate institutional interests: at a noncontroversial level, for example, transfers can violate the institution's contractual obligations, reduce groundwater recharge, or cut flow head (and thus deliveries) to neighboring users. If the institution is provided no veto power, transfers may occur even when their costs outweigh their economic benefits. Moreover, even when the transfers are beneficial overall, injuries to the institution, its members, or the community could go unaddressed. Any veto power, however, will inevitably provide the institution with some degree of discretion with which to block transfers for illegitimate reasons.

Recent legislation has often tried to overcome this dilemma by narrowly specifying the grounds on which institutions can prohibit external transfers.[324] As with all attempts to write relatively crystalline rules, such lists fail to resolve the dilemma fully. Because the impacts of external transfers on institutional interests are diverse, complex, and uncertain, the grounds on which an institution is permitted to bar transfers will inevitably be too narrow, provide institutions with too much leeway, or both simultaneously; attempts to broaden overly narrow grounds will raise concerns over discretion, and vice versa.

Some bills have tried to overcome this problem by leaving the grounds for veto relatively broad while providing a mechanism for

321. The 1992 Reclamation Act, for example, provides simply that "all individuals or districts who receive Central Valley Project water under water service or repayment contracts . . . are authorized to transfer all or a portion of the water subject to such contract," but never specifies what "portion" of the water each individual member can transfer. 1992 Reclamation Act, *supra* note 9, § 3405.

322. *See* Assembly Bill 97, *supra* note 311, § 492.8(a)(2).

323. Because of the importance of transportation facilities to water transfers, member transfer legislation should also provide for the mandatory wheeling of transfer water, at cost, through any public transportation facility that has available capacity. *See* DRIVER, *supra* note 8, at 55 (arguing that in order to assure that conveyance facilities are open to anyone who can pay the price, states should consider regulating major conveyance facilities as common carriers); UCLA CONFERENCE, *supra* note 8, at 126-27 (proposing to treat the state aqueduct on a common carrier basis). California has already enacted such legislation. *See* CAL. WATER CODE §§ 1810-1814 (West Supp. 1992).

324. *See, e.g.*, H.R. 5099, *supra* note 307, § 5(a).

resolving any disputes between an institution and one of its members over the legitimacy of a transfer veto.[325] Absent explicit constraints or guidelines, however, which again would raise concerns of under- or over-inclusiveness, institutions will retain considerable discretion. Any dispute resolution mechanism, moreover, will involve at least some expense and delay and thus threaten marginal or short-term transfers.[326]

Because the concern is that the local institution will abuse its discretion by blocking transfers for illegitimate reasons, the legislature may instead wish to move the authority to condition or block external transfers out of the local water institution and into a more trusted institution. The 1992 Reclamation Act, for example, bars district review in most cases but provides for constrained review by the Secretary of the Interior.[327] State legislation might shift the right to veto or condition transfers because of potential community impacts from water institutions to local county boards of supervisors. County boards might adequately represent local community concerns while being less susceptible to the pressures of small groups of water users with vested economic interests in maintaining restricted markets. State legislation could also restrict institutional control while broadening review by the state water agency, which would typically need to review and approve an external transfer in any case.[328] In choosing an alternative reviewing agency, legislatures must try to balance the need for political representativeness, objectivity, and familiarity with the relevant issues. In many cases, there will be no ideal reviewing agency.[329]

A final issue is the degree to which the institution should be

325. The California Katz bill adopts this approach. *See* Assembly Bill 2090, *supra* note 10, § 492.4 (as amended June 11, 1992).

326. The California Katz bill illustrates the problem. Recognizing that water districts might use their permitted discretion improperly to veto or condition a proposed transfer, the bill provides for arbitration if a water user and her institution cannot agree on terms for short-term transfers. Recognizing the importance of time to most short-term transfers, the legislation sets out strict timetables guaranteeing an arbitration decision within 30 days of the initial arbitration request. But out of concern for due process, the legislation goes on to provide for judicial review of arbitration decisions. *See id.* § 492.4(h). In California, such review frequently takes half a year or more.

327. 1992 Reclamation Act, *supra* note 9, § 3405(a).

328. *See supra* Section II.B. The state agency and the institution might already share some parallel authority, for example, to bar transfers that would decrease local groundwater recharge. Indeed, where a state agency is authorized to bar a transfer on general public interest grounds, the agency should already be able to bar any transfer that would interfere with or injure a legitimate institutional interest.

Providing the state agency with ultimate authority over the transfer would both remove the opportunity for local institutional abuse and potentially streamline the review process. The local institution would be entitled to file recommendations and argue its opposition, but only the state agency would have the power actually to condition or disapprove a transfer. Moving authority over institutional impacts into the state review process, of course, risks complicating and lengthening the state process. But an institution opposed to a transfer is typically already entitled to contest the transfer before the state agency, although perhaps on narrower grounds.

329. Apparently fearful that all relevant governmental agencies are hostile to external transfers, one member of Congress recently introduced a bill that would have permitted only state water

involved in the negotiation of any transfers. Two general models merit discussion. Under an "unconstrained" model, prospective purchasers or renters would be free to approach individual water users without dealing with the institution. Under a more complex "paternalist" approach, all offers would have to flow through the institution. When an offer came into the institution, the manager and board would negotiate the best deal that they could for the institution's water users. The offer would then be presented to the water users along with the board's or manager's views on the offer; each water user could then decide how much, if any, of her water to tender. If an offer for a fixed amount was undersubscribed, the prospective buyer or renter could improve the offer, go elsewhere, or accept the offered quantity; if the offer was oversubscribed, subscribing water users would be entitled to participate in the transfer on a pro rata basis.[330]

The 1992 Reclamation Act and recent state bills have adopted the unconstrained approach[331]—presumably because it is simpler, more consistent with the traditional free market model, and still permits buyers or sellers to decide voluntarily to use the institution as an intermediary.[332] The paternalist model, nonetheless, carries a number of advantages. To begin, water users frequently have little information regarding urban water supplies and needs or regarding what prices urban water agencies may be willing to pay. Largely for this reason, water users who in the past have sold water on their own to cities or large industrial users have often been far less satisfied with the process and result, after the fact, than water users who have negotiated as a group.[333] Although water

agencies to restrict transfers and then only "to protect the holders of water rights who are not party to a transfer from the impairment of their water rights." H.R. 2687, *supra* note 307, § 101(d).

330. As Rodney Smith has noted in urging a similar proposal, institutional water trades would be structured much like a negotiated corporate tender offer. Smith, *supra* note 253, at 452-59.

331. *See* H.R. 5099, *supra* note 307, § 5(a); H.R. 2687, *supra* note 307, § 101; Assembly Bill 2090, *supra* note 10 (as amended June 11, 1992).

332. Because of the transaction costs involved in assembling a large quantity of water, many prospective purchasers might prefer working through an institution rather than negotiating with dozens of separate water users. Both to reduce transaction costs and for the reasons discussed in the remainder of the textual paragraph, water users might also prefer to have their institution negotiate on their behalf. The difficult issue is whether prospective purchasers and water users should be *forced* to negotiate through the institution.

333. The major study of the impact of the negotiation process on sellers' satisfaction looked at two sets of water transfers in Utah in the late 1970s. *See* RONALD L. LITTLE & THOMAS R. GREIDER, WATER TRANSFERS FROM AGRICULTURE TO INDUSTRY: TWO UTAH EXAMPLES (Institute for Social Science Research on Natural Resources, Utah State Univ., Research Monograph No. 10, 1983). In one transfer, agricultural water users formed a sellers collective, known as the Joint Venture, to negotiate a water sale to the Intermountain Power Project ("IPP"). *Id.* at 36, 132. In the other, farmers individually negotiated and sold water rights to Utah Power and Light ("UP&L"). *Id.* at 35-36, 133. The IPP sellers felt quite happy about both the process and the transfer they ultimately negotiated. *Id.* at 133. By contrast, the UP&L sellers received most of their information regarding the water market from UP&L and, after the fact, felt poorly advised and often deceived—largely because many later sellers received better deals than earlier sellers. *Id.* at 133-34.

users who are knowledgeable about water markets may already be aware of the advantages of group negotiation and may voluntarily choose to work through the institution, many ag-urban transfers will be large, one-shot transactions involving water users who have never before engaged in external transfers.

The market power that many urban purchasers or lessees enjoy intensifies the problem. The power arises because at most a few large institutions control the water supply in the typical urban area, and because transportation costs limit the number of urban areas that are likely to be interested in the water of any given agricultural region.[334] At the moment, at least, urban offers are likely to be infrequent, and only one urban institution at a time is likely to offer to buy water from a given agricultural region. The paternalist model would help offset this market power by binding the potential sellers together.

Finally, the paternalist model would help maintain a modicum of the joint decisionmaking that was often a major goal behind the creation of water institutions. By forcing water users to negotiate as a group, the legislature can help ensure that water users think about and debate external transfers as a community—even though the ultimate decision whether to sell is left to the individual members themselves. The paternalist model would similarly provide institutions with an opportunity to consider area-wide impacts and concerns and to try to address them in early negotiations. Such institutional involvement would likely reduce the chances of legal or administrative challenges to the external transfer. Although these advantages might lead many purchasers and water users to work through the institution in any case, the paternalist model both ensures and promotes community decisionmaking.

Member transfer legislation, in summary, presents a number of difficult issues. Consequently, legislatures should be careful before assuming that mere legal and incentive changes will not adequately encourage external transfers and engaging instead in a significant restructuring of water institutions. Legislatures that do choose to adopt member transfer legislation should devote careful attention to its details.

D. Broadening Institutional Borders

A final means of easing current barriers to external transfers may be to enlarge existing institutional borders. The borders of present institutions could be expanded to include new territory; two or more institutions could be merged; or a new umbrella institution could be created to manage interactions between two or more current institutions. Under each of these scenarios, some transfers that previously would have involved movement outside a district would be internalized.

334. *See supra* note 143 and accompanying text.

Although only the institutional borders and not the transfers would change, larger institutions might look more favorably on the internalized transfers for several reasons. First, the institutions would maintain at least some control over the transferred water. Many agricultural districts fear water markets because they believe markets may work in only one direction; once water is transferred out of a district, farmers worry that they will never be able to buy the water back if their demands increase.[335] As noted, managers and boards also fear that external transfers would decrease their status and power.[336] Internalizing a transfer through expansion or consolidation could help mollify such concerns.

Moreover, larger institutions might reduce protectionism, as well as interregional suspicions. As noted, institutions often resist external transfers for protectionist reasons.[337] Farmers also appear to believe, legitimately or not, that urban areas are looking to agricultural areas to cure water problems created by the failure of the urban areas to conserve water and control growth.[338] Enlarged or consolidated institutions would be less responsive to the parochial interests of individual segments. Over time, they could also help realize a larger political and social community where what once was seen as a threatening external transfer becomes viewed as a useful intraregional reallocation.[339] Expanded institutions would also permit greater regional planning and thereby might help eliminate concerns that urban areas are placing the entire burden of water conservation on the backs of farmers. Finally, large regional or even interregional institutions might better address and resolve the economic concerns of exporting areas by linking the exporting and importing areas in a common decisionmaking forum.[340]

The advantages of expanded institutions could go beyond greater institutional receptivity to transfers. If appropriate legislation were passed, the newly internalized transfers could bypass the statutory transfer mechanism, thereby reducing the legal costs of the transfers.[341] If

335. Farmers view the agricultural economy as highly cyclical, following a boom and bust pattern. Their fears therefore center on the possibility that they will be economically compelled to sell water during cyclical downturns and be unable to recover water when the agricultural economy recovers. (Such fears, of course, assume a naive shortsightedness.)

Farmers are seldom clear on why they believe the market will work only in one direction. Farmers may partly believe that they will never place as high a marginal value on the water as urban residents. Farmers, however, also seem to believe that there are unspecified imperfections in urban water institutions that make the urban agencies unlikely ever to part with water they have acquired.

336. *See supra* notes 286-92 and accompanying text.

337. *See supra* notes 275-80 and accompanying text.

338. There is some legitimacy to this complaint. *See infra* notes 369-83 and accompanying text.

339. *Cf.* HODGSON, *supra* note 13, at 7-8 (discussing how institutions help frame our social interpretations of events and market transactions).

340. *See* CY R. OGGINS & HELEN M. INGRAM, DOES ANYBODY WIN? THE COMMUNITY CONSEQUENCES OF RURAL-TO-URBAN WATER TRANSFERS: AN ARIZONA PERSPECTIVE 39-40 (Udall Center for Studies in Public Policy Paper No. 2, 1990).

341. Legislation would need to transfer water rights to the new, expanded institution and

borders were properly defined, moreover, larger water institutions could provide more effective planning and management of supplies and of groundwater withdrawals. Currently, regions susceptible to common water planning are often divided into scores of small institutions that have little coordination with each other.[342] In addition, few institutional borders bear any resemblance to the boundaries of groundwater aquifers, which complicates any effort at groundwater management.

Despite the potential advantages of creating larger water institutions, however, attempts to enlarge or consolidate current institutions will inevitably encounter numerous problems and limitations. Enlarging or consolidating retailing institutions may diminish local flexibility and decisionmaking. As noted earlier, most retailing institutions are still small enough that members can closely monitor their institution's policies and activities;[343] significant expansion risks a loss of member oversight and presents a greater potential for managerial abuse. And although the borders of current institutions are not always rational, the problems and conditions confronting even neighboring institutions are frequently different. Attempts to combine institutions can thus lead to serious disputes over policy and a loss of the consensus decisionmaking that prevails in many water institutions.[344] Finally, large retailing districts have often proven quite unstable, ultimately breaking up or downsizing.[345] Creation of new umbrella institutions in which existing retailers are nested can help alleviate these problems, but will still inevitably result in some loss of local decisionmaking and flexibility.

In any event, most local institutions are likely to resist strongly any attempt to *force* them to consolidate or become members of larger umbrella agencies. Local institutions prize their autonomy and historically have feared "outside" control.[346] Forced expansion, in short, will generate considerable opposition and problems. Legislatures therefore may do best by merely encouraging institutions to examine the advantages of forming larger units,[347] and then making it as easy as possible for them to do so.[348]

---

authorize use anywhere within the new institution's borders. In most states, this would permit members of the new institution to transfer entitlements between them without seeking a statutory transfer. *See supra* notes 152-53 and accompanying text.

342. *See* BAIN ET AL., *supra* note 23, at 230; *cf.* Ann J. Gellis, *Water Supply in the Northeast: A Study in Regulatory Failure,* 12 ECOLOGY L.Q. 429, 469-79 (1985) (discussing the need for greater consolidation of domestic water institutions).

343. *See supra* Tables 4, 5; *supra* text accompanying note 65.

344. *See* BAIN ET AL., *supra* note 23, at 282.

345. *See id.* at 318-19.

346. *See id.* Members of an institution fear change given the uncertainty of the political and economic policies of the modified institution. *See* EGGERTSSON, *supra* note 13, at 71-73.

347. As a general matter, "induced" or "evolutionary" institutional change—flowing from an internal perception of the advantages of change—is far more stable and successful than change that is coerced from outside. *See* BROMLEY, *supra* note 1, at 18-22; Coleman, *supra* note 12, at 21-22.

348. There is some evidence that the legal complications of changing borders and creating new

IV
PURCHASING INSTITUTIONS AS A SOURCE OF MARKET DISTORTION

The role of institutions as *buyers* in ag-urban transfers also raises several efficiency problems that previous analyses of water marketing have not considered. Of relevance to Parts II and III, the layered and concentrated structure of urban water institutions again creates an opportunity for uncompetitive suppression of water transfers. As discussed in Part I, many urban retailers receive some or all of their water supply from large wholesaling institutions. These wholesalers sometimes try to protect their legal or economic power over regional water resources by ordering or pressuring member institutions not to pursue transfers on their own. Large retailing members, moreover, sometimes try to protect their legal or economic power over water that becomes available within the wholesaling agency by pushing for bans on transfers to users outside the wholesaler.[349] Where this occurs, legislatures may also wish to override the power that such urban institutions have to block or otherwise control transfers.

This Part addresses yet another potential problem. Because of various agency and political imperfections, metropolitan water institutions may pursue water transfers even when other options are economically less expensive. As explained below, increases in metropolitan water prices may, by promoting conservation, often be the cheapest and best means of meeting growing urban water needs. But political and bureaucratic considerations discourage managers of metropolitan agencies from adopting such increases. If deprived of additional sources of water, metropolitan agencies might ultimately be forced to increase prices or otherwise pursue efficient conservation measures. Facilitating transfers could remove such pressure and thus lead in some cases to less, not more, efficiency.

A. Ag-Urban Trades Versus Conservation

Most of the academic support for ag-urban water transfers builds on the traditional arguments for a market economy.[350] At the margin, water today is often much more valuable in urban use than in agricultural use.[351] If farmers were free to trade water to the cities, the standard

umbrella agencies partly impede the formation of more rational water institutions. *See* BAIN ET AL., *supra* note 23, at 319.

349. *See, e.g.*, GOTTLIEB & FITZSIMMONS, *supra* note 246, at 38-41, 103 (discussing the Metropolitan Water District of Southern California).

350. For examples of the traditional market economy argument, see MEYERS & POSNER, *supra* note 4, at 2-7; SALIBA & BUSH, *supra* note 76, at 11-31.

351. Recent estimates of the marginal value of irrigation water and of the marginal value of water in the nonagricultural sector (usually considered lawn watering) suggest that the latter is three or more times the former in most regions of the West. *See* Lawrence J. MacDonnell, *Shifting the*

argument proceeds, both parties would be better off and economic efficiency would be higher. Although debates have raged over the relevance of potential impacts on third parties,[352] all commentators have assumed that the principal parties would act rationally. The farmer would sell only if the water was more valuable in the hands of the urban users, and urban areas would buy only if the purchased water was less expensive than other means of meeting their demands. That urban buyers will be institutions, with various agency and political imperfections, however, undermines the latter assumption.

Ag-urban trades will typically be a cheaper and more efficient means of meeting growing urban water demands than new water projects, particularly when the environmental costs of new projects are factored in. Yet ag-urban trades are not the only alternative to new projects. Increased prices, in particular, could encourage conservation and free up considerable quantities of water for future growth—perhaps at less real cost than many ag-urban trades.[353]

As noted earlier, no major urban institution currently charges its users the marginal cost of their water. Instead, most institutions charge users a melded "average" cost that fails to directly reflect the higher cost of the most recent additions to the institution's water supply.[354] Many institutions further encourage high levels of water use by subsidizing water rates, charging flat monthly rates that do not vary by water use, and/or using declining rate structures that charge lower prices for the highest volume uses.[355] These varied practices lead urban users to

Uses of Water in the West: An Overview, in MOVING THE WEST'S WATER, *supra* note 159, at 8; Young, *supra* note 51, at 1144; Young, *supra* note 272, at 252, 254 (marginal value of water for agriculture is $5 to $30 per acre foot; marginal value for lawn watering is $150 per acre foot).

352. Debate has focused on three sets of impacts. First, although western transfer law explicitly protects surface appropriators from the injurious effects of transfers, not all water users who rely on the return flow from the transferred right are protected. Second, trades can adversely affect the environment in the exporting region. Although many states now require state water agencies to consider at least some environmental impacts in deciding whether to approve a trade, review processes still frequently ignore a number of potential environmental effects. Finally, as discussed earlier, ag-urban trades that lead to the fallowing of fields can have a ripple effect on the entire local economy, leading to unemployment, reduced business revenues, and diminished governmental budgets. Here again, many states do not provide explicit protection against such "pecuniary" externalities.

353. *See* Brent Blackwelder & Peter Carlson, Survey of the Water Conservation Programs in the Fifty States: Model Water Conservation Program for the Nation 5-51 (Aug. 1982) (unpublished report to U.S. Bureau of Reclamation, on file with author) (discussing various methods and benefits of water conservation).

354. *See* MOHAMED T. EL-ASHRY & DIANA C. GIBBONS, TROUBLED WATERS: NEW POLICIES FOR MANAGING WATER IN THE AMERICAN WEST 56-57 (1986) [hereinafter EL-ASHRY & GIBBONS, TROUBLED WATERS]; WILLIAM E. MARTIN ET AL., SAVING WATER IN A DESERT CITY 43-45 (1984); Mohamed T. El-Ashry & Diana C. Gibbons, *New Water Policies for the West, in* WATER AND ARID LANDS OF THE WESTERN UNITED STATES, *supra* note 91, at 377, 381-82; Vaux, *supra* note 91, at 263-64.

355. *See* EL-ASHRY & GIBBONS, TROUBLED WATERS, *supra* note 354, at 38-40; B. Delworth

demand and consume an inefficiently high amount of water.[356]

Changes in urban pricing policies could significantly reduce per capita demand, making room for sizable population growth. Urban suppliers that charge flat rates, for example, can often reduce domestic water consumption by over a third merely by switching to volume rates.[357] Moreover, although urban water institutions have frequently claimed otherwise,[358] empirical price studies indicate that rate increases can lead to sizable decreases in water use, particularly in the long run, as consumers retrofit plumbing and redesign landscaping.[359]

Such urban conservation can sometimes be a less expensive means of meeting growing urban water demand than can ag-urban water trades. Most policymakers assume that ag-urban transfers are currently the cheapest means.[360] Perhaps this is because the marginal value of water in many agricultural uses is only a small fraction of the marginal value of water in urban use.[361] Yet this assumption ignores the large transportation costs often involved in moving agricultural water to urban areas and the expenses that can stem from the lower quality of some agricultural water supplies. When such costs are included, the total marginal cost of transferred agricultural water can sometimes exceed the cost of freeing up additional water through local urban conservation.[362]

The conservation agreement between the Metropolitan Water District of Southern California ("MWD") and the Imperial Irrigation

---

Gardner, *Water Pricing and Rent Seeking in California Agriculture, in* WATER RIGHTS, *supra* note 2, at 83, 107-09; Blackwelder & Carlson, *supra* note 353, at 46.

356. *See* EL-ASHRY & GIBBONS, TROUBLED WATERS, *supra* note 354, at 38-39; Vaux, *supra* note 91, at 263-67; Blackwelder & Carlson, *supra* note 353, at 46-48.

357. *See, e.g.*, Steve H. Hanke, *Demand for Water Under Dynamic Conditions*, 6 WATER RESOURCES RES. 1253, 1258 (1970) (average use in metered rate period 36% lower than in flat rate period).

358. *See, e.g.*, MWD WATER MANAGEMENT PLAN, *supra* note 105, at 130-37 (arguing that price elasticity of urban water demand is much lower than generally claimed); Richard W. Wahl & Robert K. Davis, *Satisfying Southern California's Thirst for Water: Efficient Alternatives, in* SCARCE WATER AND INSTITUTIONAL CHANGE, *supra* note 2, at 102, 116 (quoting an earlier report by the Metropolitan Water District of Southern California arguing likewise).

359. *See* EL-ASHRY & GIBBONS, TROUBLED WATERS, *supra* note 354, at 60; RODNEY T. SMITH, TROUBLED WATERS: FINANCING WATER IN THE WEST 90-93 (1984); C. Vaughan Jones & John R. Morris, *Instrumental Price Estimates and Residential Water Demand*, 20 WATER RESOURCES RES. 197, 201-02 (1984); James E.T. Moncur, *Urban Water Pricing and Drought Management*, 23 WATER RESOURCES RES. 393, 397 (1987); Michael L. Nieswiadomy, *Estimating Urban Residential Water Demand: Effect of Price Structure, Conservation, and Education*, 28 WATER RESOURCES RES. 609, 613-14 (1992); Wahl & Davis, *supra* note 358, at 115-16.

360. *Cf.* Higginson & Barnett, *supra* note 119, at 3 (noting how much more valuable water is in urban than in agricultural use). *But see* EL-ASHRY & GIBBONS, TROUBLED WATERS, *supra* note 354, at 72-73 (urging cities to consider transfers only after instituting marginal cost pricing).

361. *See supra* note 351 and accompanying text.

362. The frequently quoted costs of ag-urban transfers also do not generally include environmental and community impacts, both adverse and beneficial. However, because my interest here is in showing that municipal water institutions sometimes favor water transfers even when the cost *directly* facing the consumer is greater than that of urban conservation, I iguore these impacts in this Part.

District ("IID"), discussed in Part III,[363] illustrates this point. As noted, MWD (which wholesales water to a large number of Southern California communities) will pay IID to undertake a variety of conservation measures, in return for which MWD will receive the saved water for thirty-five years. MWD estimates the direct cost of the IID water, including conservation costs, lost hydroelectric power,[364] and litigation expenses, to be $128 per acre foot—well below the current average cost of MWD water of approximately $230 per acre foot.[365] But this figure does not include the added transportation and quality costs of the IID water.[366] When these are factored in, the cost of the IID water rises to over $300 per acre foot.[367] By simply moving toward a marginal cost pricing system, MWD might well be able to make a similar amount of water available at a lower cost: assuming even a relatively low elasticity of demand, increasing MWD's average wholesale rates by fifty dollars per acre foot to slightly less than $300 would free up approximately 100,000 acre feet of water in MWD's service area for use by new residents.[368]

363. *See supra* notes 243-47 and accompanying text.

364. Because the Imperial Valley is downhill from the Colorado River, the IID generates considerable hydroelectric power in transporting its water to the valley. *See* STAVINS, *supra* note 109, at 69-72.

365. In the 1988-1989 fiscal year, the average cost of MWD water to its member agencies was $231 per acre foot. *See* MWD WATER MANAGEMENT PLAN, *supra* note 105, at 122 tbl. VII-2.

366. The real cost of the IID water is difficult to determine. MWD claims that transportation costs add approximately $20 per acre foot. *See* Marc Reisner & Sarah Bates, OVERTAPPED OASIS: RETURN OR REVOLUTION FOR WESTERN WATER 158 (1990). Yet actual transportation costs may be considerably higher. MWD needs approximately 2,000 kilowatt-hours of energy to pump an acre foot of water from the Colorado River to its service area. *See* Wahl & Davis, *supra* note 358, at 124. Assuming current low energy costs of $0.027 per kilowatt-hour, *see* Monthly Report of Avoided Cost Pricing Filed by Southern California Edison Company (July 6, 1992) (on file with author), the cost of transporting the IID water is about $54 per acre foot.

Quality costs are also difficult to pin down. Although the Colorado River water that MWD will receive from IID is extremely saline, MWD will not specially treat it, but instead will blend it with its less saline supplies from the California State Water Project. *See* Wahl & Davis, *supra* note 358, at 124. Based on a 1982 California study, however, the overall higher salinity content will impose about $172/af (in 1991 dollars) in additional expenses on users as a result of plumbing and appliance deterioration. *See* STAVINS, *supra* note 109, at 76-81 & n.25.

367. Earlier estimates of the marginal cost of a transfer from IID to MWD were even higher, ranging in 1983 from $481 to $725 per acre foot, depending on the amount of water transferred and thus on the particular conservation measures adopted. *See* STAVINS, *supra* note 109, at 67 tbl. 15.

368. The 100,000 acre foot savings assumes that MWD's member agencies pass on the $50 rate increase to their domestic consumers and that the elasticity of demand in MWD's service area is at least -0.26. Independent studies of urban water supply in Southern California have indicated elasticities of from -0.26 to -1.09. *See* Wahl & Davis, *supra* note 358, at 116. MWD, based on in-house studies, argues that available data "suggest that price by itself is not a very powerful conservation alternative." MWD WATER MANAGEMENT PLAN, *supra* note 105, at 136. However, even MWD's own studies produce single-family elasticities of up to -0.50 in the summer and -0.30 in the winter. *Id.* at 137 tbl. VII-7.

B. Institutional Bias Against Conservation

The potential cost effectiveness of urban conservation would not be a concern if urban water purchasers were individuals rather than institutions. If agricultural water cost more than local conservation, urban consumers acquiring water on their own presumably would not buy it. As elsewhere, policymakers could generally trust urban users to compare the purchase cost against the expense of conserving an equal volume of water.[369] Urban water institutions, however, do not always accurately reflect the economic interests of their water users. Due both to agency and political imperfections and to legal limitations, urban institutions may well purchase water when conservation would be less expensive.

Institutional managers may find expanding the water supply a more appealing growth solution than reducing per capita demand (through price increases or other means) for several reasons. First, cities and counties have traditionally rewarded managers for ensuring that water supplies stay ahead of, and thus do not choke off, growth.[370] By turning down an opportunity to acquire a sizable new water supply, managers may well fear that they will permanently lose the supply to another institution[371] while permanently forgoing the opportunity to make additional water available through conservation.

Second, managers have long relied on the conservation capacity within their institution to ride out droughts with minimal consumer backlash. Many cities have historically been able to manage short droughts merely by calling on their residents to save water voluntarily;[372] even where cities have been forced to ration water, the existing conserva-

369. Problems could arise if the law did not protect against the adverse environmental and community impacts of water transfers or require purchasers to compensate for such impacts. *See supra* note 352.

370. *See, e.g.*, NATIONAL RESEARCH COUNCIL, *supra* note 70, at 137-39 (discussing the aequisitiveness of Denver and other Colorado towns). For this reason, many western cities and urban water suppliers have developed considerable redundant capacity. *See* SAX, ABRAMS, & THOMPSON, *supra* note 19, at 675-76 (noting that publicly owned water suppliers often accommodate demands for municipal growth by planning and building water supply systems far in advance).

371. *Cf.* BAIN ET AL., *supra* note 23, at 302-09, 419-63 (describing rivalries for water among California water agencies); EL-ASHRY & GIBBONS, TROUBLED WATERS, *supra* note 354, at 40 (stating that institutions act defensively in aequiring water supplies). Early negotiations between MWD and IID were partially driven by MWD's fear that failure to acquire the water now might lead to the water's permanent loss to San Diego (which had also originally expressed an interest in a trade) or to other Southern California irrigation districts (which claimed the first right to any water being wasted by IID). *See* GOTTLIEB & FITZSIMMONS, *supra* note 246, at 80-85.

If competitive and robust water markets developed, of course, an urban agency would not need to fear losing a water supply to another institution because it could always buy that or a similar supply in the future. At least currently, however, agencies expect markets to remain quite shallow and imperfect.

372. *See* RICHARD A. BERK ET AL., WATER SHORTAGE: LESSONS IN CONSERVATION FROM THE GREAT CALIFORNIA DROUGHT, 1976-1977, at 71-72 (1981) (discussing Humboldt County's conservation program).

tion capacity has softened the impact.[373] Managers may reasonably fear that, if they use up their conservation capacity to meet growth, droughts will lead to far greater political controversy—making their lives more difficult and possibly even endangering their jobs.[374]

Third, most managers of urban water agencies have traditionally been engineers who believe that their responsibility is to meet local demand, rather than to control it.[375] Urban agencies, therefore, have typically looked to new water projects, of which transfers are today's poor cousin, rather than to conservation.

Finally, as a political matter, managers may find water trades easier to justify to their constituents than the steps necessary to achieve significant conservation. Urban residents have seldom questioned the cost of new water supplies. Average cost pricing ensures that few water trades will lead to dramatic increases in water rates,[376] and managers can easily argue that any rate increases are necessary to cover the actual cost of the water. Most water users do not directly recognize or consider other water transfer costs, such as lower water quality.[377]

The various conservation options, in contrast, present managers with unwanted problems. Marginal cost pricing would be the most effective means of conserving water, but few managers wish to incur the wrath of water users angry about a rate increase,[378] particularly when the exact impact of rate increases on local water consumption is uncertain.[379] In many states, moreover, legal and regulatory requirements limit the degree to which urban suppliers can adopt marginal cost pricing.[380]

Other conservation methods are likely to be less effective, yet still raise political or other problems. Although voluntary conservation cam-

373. *See* SAX, ABRAMS, & THOMPSON, *supra* note 19, at 696 (comparing drought programs of Santa Barbara and Los Angeles).

374. *Cf.* Gary C. Woodard, *Urban Water Conservation: The Last Water Hole or Mostly a Mirage?, in* MOVING THE WEST'S WATER, *supra* note 159, at 22 ("One of the oft-mentioned concerns with proposed vigorous conservation programs is that they may leave no room for further reductions in the face of sudden, temporary supply interruptions."). Although urban consumers might be willing to pay for some cushion against droughts, managers are likely to favor a far greater cushion than is economically justified.

375. *See* EL-ASHRY & GIBBONS, TROUBLED WATERS, *supra* note 354, at 39-40.

376. If a water agency with a current supply of one million acre feet and an average price of $250 per acre foot, for example, purchases 100,000 acre feet at $350, the average cost rate charged to consumers will increase only by $9 (or by 3.6%).

377. *See supra* notes 362-66 and accompanying text.

378. The public is particularly sensitive to non-cost-related rate increases in water supply because of the prevalent view that water is a public resource and a necessity of life that should be provided at cost or perhaps even subsidized. *See supra* note 168 and accompanying text; *see also* Young, *supra* note 51, at 1147 (discussing the extent to which various nonefficiency goals may inform water allocation decisions).

379. As discussed earlier, the degree of elasticity in any area's urban water demand is open to considerable dispute. *See supra* notes 358-59, 368 and accompanying text. No manager wishes to raise rates and find only a slight decrease in demand.

380. *Cf.* Woodard, *supra* note 374, at 21-22 (discussing factors affecting rate structure design).

paigns have achieved limited success in some cities, many areas have found them effective only during droughts.[381] Additionally, the reduced water purchases of cities that voluntarily conserve water in anticipation of new growth may force suppliers to raise their fixed rates to meet their fixed costs—giving residents the impression that they are being punished for their cooperation. Mandatory conservation or rationing programs, by contrast, raise both political and policing problems, and lead to long-run pressure on managers to increase the water supply, because they force water users to give up practices they prefer to the ones mandated. Targeted conservation incentive programs (where, for example, residents are paid to install low flow toilets) have had mixed success,[382] are intrinsically limited in scope, and are often costly.[383]

C. *Legislative Options*

These institutional biases against conservation present policymakers with a potential second-best problem. Unconstrained markets for ag-urban trades may not yield the most efficient result given the political and managerial obstacles to urban conservation. By promoting ag-urban trades, states may simply provide urban institutions with a means of avoiding more efficient pricing structures or other conservation measures. A ban on ag-urban trades, however, would not necessarily increase efficiency because trades, or some combination of trades and conservation, will often be less expensive than pure conservation.

If water trades were the only practical alternative to conservation, state legislatures could increase efficiency by permitting urban institutions to purchase water only if they adopted a marginal cost pricing system (or otherwise achieved an efficient level of conservation). Legislatures in several states have considered requiring institutions to pursue at least minimal conservation efforts before purchasing water from a current rightholder.[384] Because cities have other alternatives to pricing changes and similar conservation measures, however, linking trades to pricing changes or other conservation measures risks an even

381. *See* EL-ASHRY & GIBBONS, TROUBLED WATERS, *supra* note 354, at 60 ("Programs for encouraging conservation by appealing to the consumers' goodwill usually work best in the atmosphere of public camaraderie and civic responsibility brought on by a drought."); *see also* David H. Getches, *Water Use Efficiency: The Value of Water in the West,* 8 PUB. LAND L. REV. 1, 12 (1987) (arguing that the low cost of water eliminates incentives to adopt voluntary conservation measures).

382. *See* Nieswiadomy, *supra* note 359, at 613-14; Woodard, *supra* note 374, at 16.

383. *See, e.g.,* MWD WATER MANAGEMENT PLAN, *supra* note 105, at 102 tbl. VI-1 (indicating the high costs of various conservation credit programs).

384. *See, e.g.,* S. Bill 555, 1992 Sess. § 2(g) (Kan.). A recent California bill would give purchasing preference to any district "which conserve[s] water pursuant to a conservation plan." Assembly Bill 2994, 1991-1992 Reg. Sess. § 1 (Cal.). No bill has demanded a showing of marginal cost pricing or other rigorous conservation measures.

worse result. State legislatures may simply push urban institutions to pursue even more costly alternatives such as new water projects.

A simpler and less problematic solution would be to require all institutions, urban and agricultural, to adopt either marginal cost pricing or other systems designed to achieve an efficient level of conservation. Yet increased water rates and mandatory conservation are no more popular at the state than the local level. For this reason, few legislatures have ever seriously considered requiring local agencies to increase water rates or adopt tough conservation measures.[385] Indeed, legislatures often have been unable to muster the votes necessary even to require metered pricing in cities that impose flat monthly charges.[386]

In summary, there is no easy legislative solution to the potential second-best problem presented by the urban institutional bias against conservation. In many cases, legislatures can both eliminate the second-best problem and encourage urban conservation by prohibiting water purchases except by urban institutions that have adopted a marginal cost pricing system or taken similar conservation measures. Yet, given the importance of ag-urban transfers in satisfying the demand of the West's growing metropolitan areas, legislatures should not insist on linking pricing reform to water transfers if such linkage will either block all efforts at reforming water markets or push urban institutions back to engineering solutions to their water problems.

CONCLUSION

Local institutions are central to any issue of water policy in the western United States. By reconfiguring water rights and reshaping

385. Some state legislatures, at their gutsiest, have changed the plumbing codes for new buildings. *See, e.g.*, CAL. HEALTH & SAFETY CODE § 17921.3 (West Supp. 1992); *see also* Blackwelder & Carlson, *supra* note 353, at 36-39 (stating that revision of plumbing codes is the water conservation step most implemented at the state level). Others have required local institutions simply to prepare toothless conservation plans. *See, e.g.*, CAL. WATER CODE §§ 10610-10656 (West 1992). When, occasionally, legislators propose strong bills, the bills generally languish in committee. *See, e.g.*, S. 6258, 1992 Sess. (Wash.).

Negotiations between urban and environmental interests in California have recently produced a voluntary "urban water conservation pact" under which most urban agencies have promised to adopt 16 measures to reduce urban water consumption. *See Water Agencies Sign Conservation Plan*, S.F. CHRON., Dec. 12, 1991, at A24. Although the pact is a large step in the right direction, even some urban agencies have attacked the pact as not requiring sufficient action. *Id.*

Federal reform of the California Central Valley Project has brought the boldest reform to date. Under the 1992 Reclamation Act, all new or amended reclamation contracts under the Project must require the retailing district to use an inverted block rate structure. *See* 1992 Reclamation Act, *supra* note 9, § 3405(d).

386. After many years of opposition, Califoruia finally passed a bill in 1991 requiring water meters in all new buildings. *See Water Meter Bill Signed by Wilson*, L.A. TIMES, Sept. 18, 1991, at A14. However, the bill does not require meters in existing buildings, and more importantly, it does not require water agencies to use the meters. *Id.*; *see also* 1992 Reclamation Act, *supra* note 9, § 3405(b) (requiring districts in the Central Valley Project to install meters); Richard C. Paddock, *Tide Rises to Impose Water Meters on Last Holdouts*, L.A. TIMES, Apr. 20, 1991, at A1.

water regulation, institutions help local water users overcome the problems of state and federal water law—many of which are the result of inherent difficulties in addressing local water use and allocation at the state or federal level. Local water users have used—and have sometimes specifically formed—institutions to deal with such problems as water reallocation during shortages, user flexibility, and groundwater management. As discussed in Parts I and II, these institutions have responded quite successfully to the evolving needs and conditions of their members, changing policies to meet new demands.

Because of the sheer quantity of water controlled by local institutions in the West, any effort to change water policy must also take into account such institutions. And it is here that problems arise. By nature and, in the case of water districts, by structure, local institutions are highly parochial in their policies. Local institutions are likely to resist any changes unless those who control the local institutions—typically their members, but in some larger institutions, the management and board—view a change to be in their interest.

Water markets provide an excellent illustration of these general observations. Institutional transfers have provided members of local water institutions with substantial flexibility—far more flexibility than state statutory transfer systems. Because many members of water districts see few benefits and a variety of risks in external transfers, however, water districts have largely opposed them. In those parts of the West dominated by water districts, therefore, efforts at the state and federal level to ease legal restraints are unlikely to open up ag-urban water markets significantly unless they also address institutional obstacles.

Legislatures are beginning to recognize this fact. Thus Congress, in the 1992 Reclamation Act, barred California water districts from vetoing most external entitlement transfers of water from the Central Valley Project and closely constrained their veto power over other transfers. Legislatures must address these institutional obstacles carefully. While institutions often ignore broader societal interests, they form a political nucleus for many agricultural communities and provide a valuable mechanism for addressing and resolving local concerns. To avoid destroying the advantages that local water institutions provide, legislatures should address institutional obstacles incrementally. Legislatures should first eliminate legal obstacles and provide members of institutions with financial incentives for change; only where such efforts are likely to be inadequate should legislatures consider more radical surgery on institutional structure.

At a broader level, the importance of institutions to western water policy requires that any efforts at reform—whether concerning water transfers, groundwater management, or any other issue—address the role that institutions will play. Policy recommendations have too frequently

looked at how the law should be changed, without either asking how institutions will affect the success of the legal reform or inquiring how institutions can be used to help achieve the policy goal. In the case of water markets, most legal thinking to date has also been too abstract. Consideration has been paid to lowering legal barriers and protecting third parties from unfettered transfers, but little focus has been placed on what an effective water market one or two decades from now should or could look like. An institutional perspective suggests that in many states effective water markets would largely revolve around local and regional institutions that would serve both as sponsors of internal markets and as facilitators of interinstitutional trades.

Unfortunately, we still do not know enough about local water institutions to form detailed hypotheses or to make strong policy recommendations on many issues. Some significant research has been done, but we need much more. In the case of water transfers, for example, we have a good feel for internal markets, but only anecdotal evidence on institutional policies regarding external transfers and only sketches for a political-economic framework explaining the institutional policies.

Fifteen years ago, Professor Harrison Dunning concluded a perceptive article on water transfers by urging that more empirical information be collected.[387] A number of economists and legal academics have since heeded his call and collected valuable data on statutory transfers and their procedures. The time has now arrived to turn our attention to the still highly veiled world of local water institutions.

387. Dunning, *supra* note 192, at 117.