

Markets for Water: Time to Put the Myth to Rest?

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Many economists and others argue that the proper solution to water allocation is to allow markets to play the major role in reallocating water among users and in other aspects of water management (Anderson and Snyder 1997; Easter, Rosengrant, and Dinar 1998; Gray 1996; Kaiser 1996; Sterne 1997; Teerink and Nakashima 1993; Thompson 1993). They argue that private property and markets are nearly painless means for resolving the increasing problems of water allocation, distribution, and preservation. Elsewhere I have argued at length against this conclusion (Dellapenna 2000). I summarize the reasons for these conclusions here.

That many professional economists champion private property and markets (or “market-like mechanisms”) as water management tools is only to be expected. The study and employment of markets is, at least in western economics, their stock in trade. Markets, they tell us, will introduce the necessary flexibility into water management while simultaneously fitting the appropriate integration of water quality and water quantity issues into a single managerial model. They also expect that the market results will be accorded the strong presumption of validity that market-based allocations are accorded in capitalist societies. The presumption of validity for market outcomes has only been strengthened by the utter failure of classic socialism. Still, actual markets in free-flowing water have always been extremely rare in practice (Israel and Lund 1995; Kloezen 1998; McCormick 1994).

In fact, when markets for water become a subject of public concern, the debate often becomes highly emotional, a good deal of the emotion going against

markets (Woodhouse 2003). To the extent that markets for water have existed, they have been for the transfer fairly small-scale amounts among similar users (Kloezen 1998; Thompson 1993). Water markets have seldom been used to accomplish significant changes in the ways water is used. Yet, in the face of the existing and impending hydro-political stresses on water management regimes, this is precisely the sort of change that will become necessary. When so-called markets are set up in order to bring about major changes in the time, place, or manner of use, they in fact have functioned only through the rather heavy-handed intervention of the state (Dellapenna 2000; Pigram 1997). Such arrangements hardly qualify as a market at all.

If markets for water are so good, why are they so seldom used? Supporters of markets seldom address this question except to denigrate their critics as holding cultural, religious, even mystical prejudices about water (Brown 1995). This attitude, however, overlooks that water is not like other resources.

Water as a Public Good

Water is not only one of our most essential resources, it has also long been considered as the quintessential “public good.” Even market fundamentalists, who would solve nearly every problem by recourse to markets, customarily use water metaphors to discuss public goods on those rare occasions when they concede that such goods exist: “common pool resource,” “spill over effects,” and so on. Only consideration of the possibility of setting up real markets for water in large quantities demonstrates the wisdom of treating water as a public good.

“Public goods” share two qualities: indivisibility and publicness (Cowan 1992; Kaul, Grunberg, and Stern 1999). *Indivisibility* means that goods cannot be divided among the consuming public so as to allow some consumers access to the resource while excluding other potential consumers. *Publicness* means that the resource is shared freely (if not equally) among the group—consumption by one person does not, at least under most circumstances, interfere with consumption by others. Because a good is indivisible, one cannot simply divide it up and buy as much as one wants, and because it is public, one cannot keep others from accessing and enjoying the good so long as it is accessible and enjoyable by anyone. In other words, a public good is one that all within the relevant public must enjoy more or less equally, or none will enjoy the good at all.

Public goods generally are free goods as far as markets are concerned because consumers cannot (or cannot realistically) be excluded from enjoying them. How much can one charge others for viewing the blue sky over one’s property? The only costs, if any, associated with a public good are the costs of capture, transportation, and delivery, not a cost for the good itself. This gives rise to important problems in managing public goods. If you invest in developing or improving the good, others, who invest or pay nothing, will enjoy the benefits of your investment because you cannot exclude others from enjoying the good (Coase 1974). Such others are “free riders.” Free riders can be a serious inhibition to investment unless the government (or some other institution) ensures that all (or nearly all) pay for the benefits they receive.

For example, if left entirely to the market choices of persons to buy cleaner running cars, others can (and many would) decide to free ride on the efforts of others to clean the air. As more people realize that this possibility exists, fewer would voluntarily buy a cleaner running car. After all, buying a cleaner running car will have little effect on air quality. The solution, of course, is to compel all to buy cleaner running cars. Relying on the market simply won’t work; relying on regulation will.

Water is not indivisible and public in the strictest sense. We have all bought bottled water. Yet when we are talking about raw water—water in bulk in its natural state—transaction costs are simply so high that no market can function with even minimal effectiveness (Chakraborty, Hochman, and Zilberman

1995; Howe, Boggs, and Butler 1990; Shelanski and Klein 1995). Moreover, water is so essential to life that all must receive a “fair” share of the resource. Similarly, consider environmental needs, such as the protection of instream flows (Gillilan and Brown 1997). Less obvious, but no less true, is the public nature of water when withdrawn for private use. A river is an ambient resource that can never be fully controlled or fully owned. Even a dam only delays the flow of the water; it cannot stop it altogether. Thus doing something to water on a large scale necessarily affects many others, making it difficult to procure the contractual assent of all significantly affected persons. Transaction costs on all but the smallest streams, lakes, or aquifers, quickly become prohibitive. This reality underlies the tradition of treating water as a free good—a good available to all at no cost for the water itself, but only for the cost of capturing, transporting, and using the water.

Supporters of markets hardly mention the transaction costs inherent in any attempt to treat water as a private good. Economist Ronald Coase has argued that analyses that ignore such basic concerns as transaction costs are typical of the “blackboard economics” indulged in by most economists (Coase 1988, 1-20). Coase is criticizing the most important and frequent simplifying assumption most economists make in their analyses, the assumption of a “frictionless market”—one without transaction costs. Lawyers, on the other hand, focus precisely on the costs and frictions of the marketplace, for the lawyer’s role is to minimize, accommodate, or overcome such problems (Schwab 1989). Lawyers, unlike economists, simply are not concerned about how ideal markets would function—except as a baseline for measuring the failures of real markets. The reality of transaction costs should give even the most free-market oriented economist pause to consider whether true markets could function effectively for water resources. Those who advocate recourse to private action as the prime means for protecting instream values miss the point entirely (Crammond 1996; Landry 1998; Sterne 1997).

Those who advocate the privatization of water with its allocation and management to be determined by markets are demanding an end to our treatment of water as a free good. Water should not be a free good any longer. Economic incentives should be introduced for those who use water so

they will more realistically evaluate the social consequences of their conduct. Various economic incentives, including fees, taxes, and “water banks,” undoubtedly are useful in managing public property. But resort to economic incentives should not obscure the fact that water remains the prime example of a public good for which prices cannot be set in a marketplace.

Patterns of Property in Water

In thinking about “property” in water, one is likely to have in mind a system of rules that define rights and duties pertaining to water in clear and certain terms, with law serving to protect the resulting entitlements except insofar as the owners agree to changes through market transactions. A close model of such a system is the American law of appropriative rights, although similar systems are found in other countries as well (Dellapenna 2001). On the other hand, a rule that permits anyone to use a “common pool resource” so long as the use is “reasonable” hardly seems like a property rule at all, at least in the foregoing sense. Such a rule leaves courts to sort out conflicting claims of right to the common pool resource solely through the prohibition of tortious interference with other users (Dellapenna 2001). This amounts to a rule of common property, rather than a rule of private property, somewhat as if tenants in common were to dispute the use of land. The American law of riparian rights is the prime example of such a legal regime, although the Roman law of flowing water was similar. The third possibility is active public management of the common resource. The newest system of American law for the allocation of surface water, “regulated riparianism,” corresponds to such a public ownership model (Dellapenna 2001).

While particular legal regimes often contain a mix of two or all three of these systems, analyzing the pure types makes clear their strengths and weaknesses (Munzer 1990). Because water allocation is mostly a matter of state law in the United States, all three approaches are found here. The correspondence between these forms of American water law and the several theoretical models of property enables us to predict with some certainty whether the existing forms are adaptable to changing circumstances, or whether an entirely new form must be substituted when circumstances of water

demand or supply change dramatically. Treating water as common property leads to tragic over exploitation as soon as water begins to become scarce. Therefore, a common property system cannot survive. Markets also fail when one attempts to treat the right to use water as private property. As a result, private property systems like appropriative rights are experiencing increasing stress as demand surges and unappropriated water becomes hard to find. What works best (albeit imperfectly) is to treat water as inherently public property for which basic allocation decisions must be made by public agencies.

Why Common Property Systems Cannot Survive

Under a common property system, each common owner decides individually whether and how to increase her use of the resource without regard to the effect on other common owners (except for direct interference with others’ uses). Each owner is able to appropriate the whole of each additional increment of use, while the whole group will share equally the cost imposed on the common resource (Rose 1991). Consider cows grazing on a common pasture. For each additional cow I add to my herd, I obtain the full benefit, but the common owners as a group share the burden of the reduced carrying capacity of the pasture. The only rational course is to add the cow. At this point, since we have no way of limiting each other, the only rational course will be to add as many cows as possible in order to grab as much of the resource as possible before the resource is completely destroyed (Hardin 1968). Thus the common property system not only fails to protect the resource, it actually accelerates its demise.

Economists have criticized this account as over simplifying the reality of how “commons” functioned in earlier times or in remote areas (McCay and Acheson 1987). In many small communities, commons have functioned satisfactorily over extended periods through informally created and enforced patterns of use. In larger societies, where most persons are strangers to each other, informal sanctions do not function effectively and formal law recognizes no real limits on a person’s exploitation of the commons (Harris 1995). We have witnessed the resulting “tragedy of the commons” over and

over again this century when the rule of common property is not displaced by a different rule. Consider fish in the sea, lobsters in Nova Scotia, national park access, and even national treasuries (Dellapenna 2004; Fort and Baden 1981; M'Gonigle 1980; Sax 1980).

If exploitation of a common pool resource requires significant capital investment, the inability of potential investors to keep others from preempting an investor's use will cause under investment in the resource (Rose 1986). Courts expressed precisely this fear in rejecting riparian rights in the drier, western states of the United States (*Coffin v. Left-Hand Ditch Co.* 1882; Dellapenna 1991b, § 8.01). A private property system, in which the costs as well as the benefits of resource management decisions are concentrated on the particular owner making the decision, would appear to avoid the tragedy of the commons. On the other hand, appeals to moderation and similar forms of moral suasion for managing the commons are self-defeating. Those who respond to the appeal leave the field to other common owners who continue to increase their own exploitation of the resource to the point of exhaustion (Hardin 1968). Heeding a moral appeal only reduce one's own gains with little or no benefit to the common resource. In light of this, even many who agreed with the appeal would not change their behavior.

Why Private Property Systems Fail for Water Resources

Private property is a system whereby resources (tangible or intangible) are used or controlled by particular persons. Private property systems, by concentrating the costs and the rewards of resource use on the owner, allow the owner to balance costs against benefits to determine the most efficient use of the resource. Generally, but not always, private property systems are linked to markets systems for the property in question. A private-property market system is the best mechanism for allocating resources when it works, but the system fails if there are significant barriers to the functioning of a market (Coase 1960). That markets for water as such have never actually played a large role, even in a private-property system like appropriative rights, suggests that markets do not work well for ambient resources like water.

When one user attempts to convey her water right to another, particularly to one seeking to make a completely different use of the water, the problem of "externalities" arises. An externality arises when a use by any person affects uses by others, and hence significant change in any use infringes upon the interests of the other users, perhaps all other uses from the same source (Posner 2003, § 3.7). While theoretically it might be possible for a properly structured market to cope with these concerns, in any hydrologically large and complex system the difficulty and expense of structuring the necessary transactions (transaction costs) prevent markets from developing unless the law chooses to disregard the externalities (Schlag 1989).

Under appropriative rights, senior appropriators (those whose appropriations began earlier in time) have superior rights to junior appropriators. One might think that the law would routinely ignore externalities in appropriative rights states when the transfer is undertaken by a senior appropriator since externalities would affect only junior appropriators. The law of appropriative rights, however, prohibits a senior appropriator from changing the time, place, or manner of use if the change would produce significant injury to a junior appropriator (Gould 1988). The burden of proving that there will be no injury to other water users is on the party seeking to make the change. If the evidence is inconclusive, a court will prohibit the change. Such uncertainty is common when the question is what portion of the water diverted from the stream (the usual measure of the appropriative right) was consumptively used by a senior appropriator and what portion constituted a return flow to the benefit of junior appropriators (O'Brien and Gunning 1994).

A classic example is the Coors Beer case (*City of Denver v. Fulton Irrigating Ditch Co.* 1972). The Coors Beer Co. was unable to produce enough beer to satisfy demand for its product without a greatly enlarged supply of water. Denver is always looking for new sources of potable water for its residents and businesses. Denver and Coors agreed to swap Coors' "clear mountain stream" in exchange for Coors receiving the right to unlimited quantities of Denver sewage water for its brewery. The transaction did not occur, not because of possible outrage on the part of beer drinkers, but because farmers downstream from Denver (organized as the Fulton Irrigating Ditch Co.) obtained an injunction

against it. The trade would have deprived the farmers of the water on which they relied—even though the farmers' rights were junior to those of Denver.

Appropriative rights law does not go as far as it might to inhibit transfers of water to new uses. It protects only the rights of other appropriators. Generalized social costs, such as the loss of tax revenues to a community, usually are not protected from the effects of transfers (Gomez and Loh 1996; Sax 1995). Concern over such generalized social costs generated enough political pressure to bring about "area-of-origin" statutes. Area-of-origin statutes have not been significant barriers to market transactions. The rights of junior appropriators are sufficient deterrents to market transactions that it really does not matter whether social costs are ignored or considered.

Some who champion the free play of markets insist that the protection of third-party rights results from an overly rigid legal regime. If only such requirements were removed, markets would flourish. This mischaracterizes the situation. Area-of-origin statutes have the potential to interfere with or to prevent market transactions. The protection of third-party rights operate differently. Such protections prevent market-generated externalities from destroying the property rights of third parties. Rather than representing government intervention that prevents or distorts markets, such protections are the minimum necessary to assure that property rights—each person's property rights—are transferred only through markets.

Because of the protection of third-party rights, small-scale transfers of water rights among farmers or ranchers—all of whom are making roughly similar uses at similar locations—are the only ones that regularly occur without heavy state intervention (National Research Council 1992). As a result, treating water as private property tends to freeze patterns of use rather than to create a market. What happens when the barriers are removed is shown by, among other examples, the California water bank.

Removing Legal Barriers: The California Water Bank

California, facing a five-year long drought in the late 1980s and early 1990s, sought to transfer water from low valued agricultural uses to higher valued

urban uses, not by replacing its largely private property system with a common property system, but by creating a "market" where none had existed before (Gray 1995; Israel and Lund 1995; O'Brien and Gunning 1994; Wahl 1995). To accomplish this end, California created a "water bank" (Dellapenna 2001, ch. 6, § 6.01(b)(2)).¹

The California Water Bank itself was small by California standards, involving in its peak year (1992) 400,000 acre-feet (500 MCM) when the state's shortfall alone exceeded 6,000,000 acre-feet (7,400 MCM). The California Water Bank moreover was a most unusual "market." For the 350 persons who were willing to sell water rights, the state was the only buyer; for the 20 institutions willing to buy water rights, the state was the only seller. California simply decreed that when it (the state) buys or sells water it need not concern itself with the effects of its transactions on third parties, even if the affected third parties hold valid water rights. The state set the prices (\$125/ac-ft. to sellers, as much as \$400/ac-ft. to buyers) administratively. The state sold to buyers selected administratively on the basis of criteria other than willingness to pay what the market will bear.

Through the California Water Bank, the state used economic incentives to encourage other actors to comply with the state's policy choices while disregarding the effects of the state's actions on actors whose claims, if recognized, would preclude accomplishment of the state's goals (Gray 1995; Wahl 1995). Flexibility was introduced to enable fundamental transformation of water uses within the state, and (incidentally) wealth is transferred from those who formerly used water to those who thereafter would use water (Carter, Vaux, and Scuring 1994; Gray 1994; O'Brien and Gunning 1994). In California, as elsewhere where putative markets have been introduced, the transfers of water (and wealth) went from small (and relatively poor) users to large (and relatively rich) users. There is, however, considerable evidence that at least when it comes to water, equity is more important than efficiency (Howe 1996).

In California, a public management system masqueraded as a market. The water bank used, without being limited to, economic incentives as a management tool (Gray 1994; Harris 1995). The changes introduced through the California Water Bank might very well represent a more rational use of the

water (Zywicki 2003). What does not seem to be addressed is whether the change is equitable. In any event, the means used to achieve these goals did not involve a market—and hardly had anything to do with private property rights in water either. Nor did the recent “sale” of water by the Imperial Irrigation District to San Diego represent a market—the Secretary of the Interior cut the District’s water allocation by 15% and indicated that the District would only recover its full allocation if it sold the 15% to San Diego (Perry 2003). It is hard to see the “invisible hand” of the market place at work in any of this.

The Public Property Option

Today, both eastern and western states in the United States are increasingly turning to active public management for surface water exploitation, for surface drainage, and for groundwater (Dellapenna 2001; 2003). State governments have concluded that, despite the considerable difficulties in defining the proper public goals or in making the right decisions to achieve those goals, a transition to public property offers significant advantages over both common property and private property in terms of efficiency and distributive justice. This seems true for economic values and for non-economic values.

The core concept of a public property system in water is expressed in regulated riparian statutes as the requirement that all uses qualifying for a permit must be “reasonable” (Dellapenna 2001, § 9.03(b)). The factors for determining whether a particular use is reasonable under such statutes are virtually identical with the factors considered under the *reasonable use theory* of traditional riparian rights. The regulated riparian statutes, however, provide a process whereby the decision whether a proposed use is reasonable is made before investment in the use through the issuance or denial of a permit. The permit process fundamentally transforms the operation of the “reasonableness” concept from that under traditional riparian rights. Such an ambitious program of public management might very well fall short of the goals set for it. It undoubtedly would be improved by the introduction of various economic incentives as part of the public management scheme (Cummings and Nercissiantz 1992). One should not confuse economic incentives with markets (Coase 1960; Dellapenna 2000; Gray 1994).

Even with economic incentives, moving fundamental decisions about private use of water from the actors involved into the hands of experts working in an administrative agency presents daunting challenges. At the extreme, public choice theorists would describe the transition to a public property system as simply yet another form of rent seeking by those who are powerful in government yet not powerful (or at least not powerful enough) in the marketplace (Farber and Frickey 1991; Mashaw 1997). Certainly, the administration of a public property system will be less than perfect. Whether such a permit process is superior to traditional riparian rights, to appropriative rights, to a pure market system (if such were possible), or to some other regulatory system has been, and continues to be, hotly debated (Dellapenna 2001, § 9.03(a)(5)(D)). How one resolves the question largely depends on how much confidence one has in the ability of a bureaucratic structure to manage a common pool resource compared to the alternatives. Still, one cannot have much confidence in a market system given the transaction costs and externalities present as barriers to the successful operation of a market for water rights.

The public managerial impulse, however, has substantial monetary costs in terms of money and the risk of poor decisions by the managers. Some of these costs can be reduced by exempting from the administrative process users who consume only small quantities of water or who make low-valued uses, but only by leaving out of the system uses that in the aggregate can amount to a major portion of total consumption (Dellapenna 2001, §§ 9.03(a)(1), 9.03(a)(3)). The occurrence of poor management is more difficult to assess, in part because there is considerable disagreement about what constitutes good management. If one takes a purely economic approach, almost any public management will appear to be a waste if the hydrologic system generally supplies a surplus to all foreseeable potential users (Oates 1996; Posner 2003, § 3.11). Yet to others, such policies will appear to be the management of a major public resource in a socially responsible manner, a manner that does not “surrender” to the marketplace (Butler 1986). Still, there are serious questions about whether experts at any administering agency can realistically be expected to acquire the information necessary to arrive at the right conclusions (Lewis 1992). When one adds the

unrepresentative nature of the bureaucratic process and the tendency of an error to be magnified when applied uniformly through a bureaucratic mechanism, one might well wonder why public management of water is now so popular in the United States—at a time when “privatization” is sweeping the United States and the world for so many other resources.

The question is not, however, whether a public property system creates an ideal model of water allocation, but whether it creates a better model for water allocation than is otherwise available. The rarity of markets for water rights, coupled with the deficiencies of either common property or private property systems in water, suggests that the allocation of water is not particularly efficient under those models either, and that the loss in efficiency, if any, from adopting a public property system is not likely to be high, and might well prove to be a gain. Furthermore, our experience with public management of oil and gas production—through compulsory pooling and managed rates of withdrawal—suggests that such a system can work for water, at least when it comes to conservation and equitable sharing.

As this brief discussion suggests, there is no entirely conclusive answer to whether a public property system is worth its cost, or whether a private property system with “enhanced” markets would work better or at less cost (Komesar 1994). In the end, one must make a judgment based on one’s reading of the evidence at hand. The actual experience with water markets suggests that they cannot be made to work except through dumping great externalities on water users not involved in a particular transaction. But if markets are not workable, one is left with few options other than to attempt to make a public property system work efficiently and equitably.

If one accepts that public management is the preferable way to manage water in the future, one then must design the necessary institutions. This is no easy task. One model of how this could be done is found in the *Regulated Riparian Model Water Code*, adopted by the American Society of Civil Engineers as an official standard of the Association in 2003 (Dellapenna 2003).

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Professor Dellapenna is Director of the Model Water Code Project of the American Society of Civil Engineers and Rapporteur of the Water Resources Committee of the International Law Association. As Director of the Model Water Code Project, he led in the drafting of the Appropriative Rights Model Water Code and the Regulated Riparian Model Water Code, and supervised the preparation of Model Agreements for Sharing and Use of Transboundary Waters and Model Water Regulations for Administration and Trading in Humid Areas. As Rapporteur, he is led the revision of the *Helsinki Rules*, the generally recognized summary of the customary international law on water resources, which resulted in the International Law Association’s approval in August 2004 of the *Berlin Rules on Water Resources* to replace the *Helsinki Rules*. He has served as a consultant on water management problems to the Directory-General of Natural Resources (Direcção-Geral dos Recursos Naturais) in Portugal and has consulted in the United States and abroad on problems of water management. He contributed nearly the whole of volumes 1 and 3, part of volumes 2 and 6, and the annual supplements for volume 5, of the treatise *WATERS AND WATER RIGHTS*, the standard reference on water law in the United States.

Professor Dellapenna has served as a consultant to governments on three continents regarding the reform of water law and on transboundary water disputes. He represented the Connecticut Water Works Association in the case of *City of Waterbury v. Town of Washington*, 260 Conn. 506, 802 A.2d 1102 (2002), successfully persuading the Connecticut Supreme Court to adopt a significant reinterpretation of Connecticut water law. His work on transnational litigation has been cited several times by the Supreme Court of the United States.

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Notes

1. One must be careful in discussing “water banks” as the term is used in the United States in several inconsistent senses.