MARKETS FOR NATURE

BARTON H. THOMPSON, JR.*

I. INTRODUCTION: REGULATORY MARKETS VERSUS MARKETS FOR NATURE

The environment is a good in more than one sense of the word. The environment is beneficent to humanity, nurturing us, entertaining us, enlightening us, and providing us with the foundations of life—air, water, food, and a sustaining climate. To many, the environment reflects innate virtue as either God's handiwork or the aesthetic consequence of elegant physical laws. For these reasons, there is also human demand for protecting, sustaining, and enjoying the environment. The environment, in short, is also an economic "good." Although we are used to receiving for free many of the services and amenities provided by the environment, those services and amenities have value to us for which we would each be willing to pay some sum. "Natural" resources such as water, petroleum, and fish are already economic commodities, but as a consequence of their consumptive values. The values provided by a preserved nature raise the possibility that market systems also can support efforts to protect watersheds and other natural ecosystems. Markets for nature hold out the promise of a third rail, along with regulation and education, for preservation efforts.

The last several decades have experienced growing interest in and use of environmental markets. The 1990 Clean Air Act Amendments included pollution emission trading as a central element of their acid rain program.\(^1\) Los Angeles and other regions of the nation have developed emission trading systems as part of their local efforts to meet national air quality standards.\(^2\)

* Vice-Dean and Robert E. Paradise Professor of Natural Resources Law, Stanford University. I would like to thank the organizers of and participants at the William and Mary Environmental Law and Policy symposium Water Rights and Watershed Management: Planning for the Future for their tremendous hospitality and their valuable feedback on the presentation out of which this essay grew. Thanks also to Greg Thomas and David Fullerton of the Natural Heritage Institute for their comments and for their work in promoting markets for nature.


Wetland banks have sprouted across the country, allowing developers to trade off the development of one stretch of wetlands for the restoration of a different reach. Once quiet water markets have grown dramatically in the western United States as regulators have limited new water diversions and, in a few cases, required actual reductions in withdrawals.

These markets, however, are not primarily markets for nature in which market participants are seeking to restore or preserve nature, but "regulatory markets" enabling regulated entities like factories or developers to trade entitlements to consume the environment. The principal purpose of these markets is to reduce the cost of environmental regulation by providing the regulated community with greater flexibility. In each of the examples just cited, a traditional regulatory system determines the level of environmental protection. The Clean Air Act fixes the amount of sulfur dioxide that utilities can emit; state implementation plans set local emission levels; the Army Corps of Engineers determines how many acres of wetlands to preserve; water agencies direct how much water can be diverted from waterways. Governments superimpose market structures onto these regulatory systems primarily to ensure that the limited rights to pollute, develop wetlands, and divert water are used efficiently, thus minimizing the cost of the regulation to the economy.

Even "regulatory markets" can benefit the environment indirectly, as traditional water markets illustrate. First, regulatory markets may reduce opposition to regulatory initiatives both by reducing the economic cost of regulation and by reducing tension between interest groups fighting over who will bear the regulatory cost. Assume, for example, that the government is considering reducing all diversions from a stream by fifty percent. Current water users are almost certain to oppose the reduction. But the addition of a water market may help soften the opposition. Without a market, water users

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4 For a recent survey of the growth in California water markets over the last two decades, see Richard Howitt & David Sunding, An Overview of Water Markets in California (Aug. 1999) (unpublished manuscript, on file with the William and Mary Environmental Law and Policy Review). The Water Strategist, a monthly water newsletter, provides regular surveys of the increasing number of market transactions in the western United States.
will view the reduction as a pure and simple loss; those who do not believe they can get by with significantly less water and have considerable capital invested in their current business will be adamant opponents of the reduction. A water market would permit these users to purchase whatever water is needed to remain in operation, reducing the size of their potential loss and thus perhaps the strength of their opposition. Other water users may see a potential to profit by selling a portion of their water allocation to those unable to reduce their water use as readily. If the cost to the user of reducing water use is sufficiently low and water prices are sufficiently sensitive to supply changes, the profit could even exceed the value of the water that the user loses through regulation. Not surprisingly, efforts to reduce water use in California’s Sacramento-San Joaquin rivers system, and to preserve the delta east of San Francisco Bay, have recognized the importance of water markets in gaining needed consensus.5

Reducing the cost of regulation is only one of the ways regulatory markets can make it easier to adopt water reductions. A politically difficult question facing any state wishing to order a reduction in water use is how to allocate the reduction. Water users with historically high consumption levels, such as farmers, are likely to argue that, for equitable reasons, reductions should be proportional to historic use or reflective of seniority. Other water users such as cities or industries are likely to urge that allocations instead should reflect the economic value of water or predicted increases in future demand. Water markets provide a means by which the government can meet the concerns of both groups. The government can allocate reductions based on historical use or seniority and rely on the market for meeting economic needs and changing demands. The Texas legislature adopted exactly this approach in regulating withdrawals from the overdrafted Edwards Aquifer, pairing proportionate reductions in withdrawals with a water market through which San Antonio and other local cities can lease or purchase more water for their growing populations.6

By providing an alternative mechanism for individuals and entities to satisfy their resource demands, markets also can reduce pressure to further injure the environment. Water markets again provide a useful illustration. Like it or not, growth is all but inevitable in many regions of the United

5 See CALFED BAY-DELTA PROGRAM, PROGRAMMATIC RECORD OF DECISION 71-72 (Aug. 28, 2000) (discussing steps to be taken to promote water marketing).
States, and to the degree that local water conservation is costly or technologically limited, growing regions will look elsewhere for new water supplies. Absent water markets, the regions will likely look to distant watersheds with untapped supplies, lobby to relax existing instream standards, or construct new storage reservoirs to catch every drop of available water. Water markets open up a potentially more benign means of meeting growing demand: the acquisition of existing water rights from other users. With agriculture consuming over 80 percent of water in the western United States, the transfer of merely a tenth of current agricultural water can more than double the water available for growing metropolitan areas.7

Finally, by providing an economic incentive to reduce resource consumption, markets in theory can promote the development and implementation of new conservation technology. Consider water markets yet again. Because water is scarce and costs something to transport and store, farmers already have a reason to find and implement new irrigation technologies to reduce their water use. But markets provide an important added incentive by giving farmers the option of selling conserved water for more than the water’s opportunity cost. The installation of new irrigation equipment, moreover, often requires significant capital that farmers may not have absent marketing opportunities. Here again, the value to the environment is only indirect. The development of new technology is unlikely to increase instream flows unless regulators insist that a percentage of any conserved water be returned to the river. Oregon has taken this approach, requiring that a quarter of any water conserved by existing users (up to 75 percent if public funds are used to finance the conservation) be returned to the state for instream flow or use by others.8 But most states do not link conservation and streamflows.

Beyond the odd anecdote, unfortunately, the actual value of pure regulatory markets to environmental preservation remains questionable. Although water users may prefer water reductions paired with a market to unadorned reductions, most water users will still prefer the status quo and oppose any reductions. Texas cities have fought implementation of the


8 See OR. REV. STAT. § 537.470(3) (1998). The Oregon Water Resources Commission determines whether the state’s share of the conserved water is needed for instream flow purposes; if the Commission decides that it is not, the state’s share becomes available for appropriation by junior water users. See id.
Edward Aquifer reductions noted earlier, despite the ability to purchase groundwater rights from willing farmers. Growing metropolitan areas are engaged in constructing far fewer and smaller water projects than several decades ago, but the change is probably attributable more to tougher environmental laws, fewer available project sites, and scarcer funding than to the opportunity to purchase needed water. Water markets are now helping to meet the needs of growing cities in the Southwest, but pressure for new water projects continues.9

Similar stories can be told about other forms of regulatory markets. Addition of a trading system to the 1990 Clean Air Act Amendments reportedly won crucial support for inclusion of SO2 acid rain provisions in the legislation.10 Wetland mitigation banks have permitted government regulators to do a more effective job of restoring and enhancing wetlands by trading off the development of small, isolated wetlands for the restoration and preservation of larger wetlands with greater ecosystem value.11 Economists and others have long touted local emission trading systems as providing an incentive for the development of new emission reduction technology—and thus stricter pollution standards.12 But most of the potential advantages to the environment are more theoretical than proven.13

The question thus becomes whether there is a more robust and direct role for markets in preserving the environment. This Essay briefly surveys three other potential types of market approaches and illustrates how they

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13 Some legal academics, for example, have suggested that the empirical evidence to date does not support the contention that pollution markets have led to the creation of new pollution control technology. See David M. Driesen, Is Emissions Trading an Economic Incentive Program?: Replacing the Command and Control/Economic Incentive Dichotomy, 55 WASH. & LEE L. REV. 289, 313-22, 324-36 (1998). Wendy E. Wagner, The Triumph of Technology-Based Standards, 2000 U. ILL. L. REV. 83, 109 n.102.
might be used to preserve and restore watersheds. Part II examines purchases or leases of water rights by governmental agencies or nonprofit organizations for instream flows needed by fish and wildlife. Such acquisitions are an example of a "public goods market" where the government or a philanthropic organization uses the marketplace rather than regulation to provide a public good with diffuse benefits to a large segment of the population. Because of collective action problems, public goods markets are unlikely to provide a societally optimal level of instream flows, open space, and other environmental goods. But they might play an invaluable role in supplementing regulatory efforts.

Part III considers the degree to which the economic benefits of watershed protection, in the form of higher water quality or reduced flood threats, might encourage water suppliers, flood control districts, or others to invest in the acquisition and preservation of critical watershed land. In contrast to "public good" markets, acquisitions of watershed rights by water suppliers or flood control districts are motivated by direct economic benefit; watersheds provide a variety of natural services that are economically valuable to the purchasers. Such acquisitions thus are examples of "ecosystem service markets." Where the economic value of ecosystem services is large, such markets may significantly augment public preservation efforts.

Regulatory markets, public good markets, and ecosystem service markets will often constitute overlapping subsets of a broader generic market. Water markets, for example, have traditionally served as regulatory markets but are increasingly being used by governmental agencies and nonprofits to acquire instream flows; a farmer interested in selling water, moreover, is unlikely to care about the purpose to which a purchaser plans to put the water. Water markets in some states thus have become undifferentiated markets for both regulatory flexibility and public goods. Where instream flows provide a valuable ecosystem service to commercial interests (e.g., as habitat for a commercial fish species), water markets also theoretically could serve as ecosystem service markets. Ideally the government would permit water markets to be used for all three forms of market transactions. In a similar fashion, environmental groups have sometimes purchased pollution emission credits, using what is largely a regulatory market for the acquisition of a public good.

Although markets might frequently serve multiple purposes, the distinction among regulatory markets, public good markets, and ecosystem service markets is analytically important for several reasons. First, some states currently preclude one or another form of market. As explained in Part
II, for example, many states prohibit the acquisition of water for instream flow—precluding both public good and ecosystem service transactions; in these states, water markets serve as purely regulatory markets. Some states also preclude the acquisition of other rights, such as grazing permits, by nonprofit organizations interested in retiring them. Second, each type of market has different needs and generates different policy issues. If a government is interested in creating a public good market, it will face quite different issues than if it wishes to foster a regulatory market. Finally, the debate over using markets to promote the environment has historically focused on regulatory markets, ignoring or marginalizing other important ways in which markets can prove environmentally beneficial.

Part IV examines the more radical concept of integrating market concepts into the regulatory process itself by creating what might be called an “environmental broker.” Regulatory markets are adjuncts to regulation, providing the regulated community with useful flexibility but not directly affecting the regulatory decision itself. Acquisitions of instream and watershed rights through public good markets or ecosystem service markets are merely substitutes for or additions to traditional regulation. The concept of an “environmental broker,” by contrast, would alter the very structure of regulation by making regulators themselves market participants. Under an environmental broker approach, the regulator would receive a set quantity of environmental rights—e.g., instream flows—or the monetary equivalent and then engage in market transactions to maximize the environmental value of its “portfolio” in light of changing scientific information and market opportunities. As discussed in Part IV, such an approach offers the potential for more rapid and disciplined regulation, but may require greater scientific expertise and institutional flexibility than currently exists.

II. PUBLIC GOOD MARKETS: ACQUIRING WATER RIGHTS FOR INSTREAM FLOWS

The growing number of water acquisitions by governments and nonprofit environmental groups interested in dedicating the water to instream flows is one of the best examples today of an effective public good market. Instream flow markets are found almost exclusively in the western United States. To understand why, and to appreciate the significance of instream flow markets, it is useful to provide a brief primer on western water resources and policy.

In the United States, East and West—defined for water purposes by the 100th meridian that forms the eastern edge of the Texas panhandle—differ
dramatically both in their hydroscape and water law. The East is characterized by high levels of precipitation and massive rivers. All four of the nation’s largest rivers—the Mississippi, Missouri, Ohio, and St. Lawrence—flow through the East. In this setting, the health of rivers is threatened far less by water diversions than by pollution and dams. In most of the West, by contrast, rainfall is sufficiently low that farmers must irrigate their crops, and few cities of any size can depend on purely local water supplies to support their burgeoning populations. Rivers, moreover, pale by comparison to their eastern compatriots. The Colorado River, which dominates the Southwest and is the West’s second largest river, ranks only 25th in the nation and carries less than 5 percent of the streamflow of the Mississippi. As a result, the West for the last 150 years has drained many of its rivers dry, and left many others mere trickles, with obvious and serious repercussions for the fish and wildlife dependent on the rivers.

The water law of the two regions has reflected the regions’ differing uses of water. In the East, rivers are as much a means of transportation and power as a source of consumptive water for cities, industry, and agriculture. Water diversions are governed by the riparian doctrine, which entitles all riparian landowners to a reasonable share of water but, more importantly, has always respected the instream needs for water. In the West, consumption has been the name of the game. To develop the urban and agricultural regions that dominate today’s West, the region had to divert and move massive flows of water. These diversions have been governed by the prior appropriation doctrine, which awards the right to divert and consume water on a first-come, first-served basis and, for many years, promoted the very depletion of the West’s rivers that is now a source of serious environmental

14 Thompson, supra note 7, at 479.
15 Id. at 479.
From the standpoint of both hydroscape and law, stream depletion thus is a problem primarily of the western United States.

Over the past several decades, the West has made major strides toward protecting its remaining streamflow. The federal and some state governments have adopted wild and scenic river protections; some states have authorized their environmental agencies to "reserve" unappropriated water from future appropriation; a growing number of state agencies, sometimes bolstered by new legislative requirements or court-recognized public trust responsibilities, have scrutinized and denied new appropriation requests because of instream concerns; environmental statutes such as the Clean Water Act and Endangered Species Act have precluded new diversions. But protecting what water remains in the West's rivers and streams is the easy part. Tremendous work remains to restore the West's waterways by reducing historic diversions and thus increasing instream flow from its currently low level. One potentially important tool for accomplishing this goal is the purchase, by government or private entities, of current appropriative water rights and dedication of the water to instream flow.

As shown in Figure 1 at the end of this article, instream flow

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18 As the Montana Department of Fish, Wildlife, & Parks explains current Montana law, there is no flow level where new appropriations are no longer granted, nor does it specifically matter the extent to which there are other rights on the stream. If water can reasonably be expected to be available (even 1 in 10 years or less), a permit can be issued. The historic system, then, encourages maximum diversion and use of water from Montana's streams.


21 See Sterne, supra note 16, at 207 (describing Washington law); Thomas, supra note 16, at 15-16 (describing California law). But see Williams & McHugh, supra note 19, at 140-42 (discussing the weaknesses of such provisions as a means of protecting instream flows).

22 Thompson, supra note 7, at 485.
acquisitions grew significantly during the 1990s.1 At the beginning of the decade, governmental and private entities were annually acquiring less than 100,000 acre feet of water for instream flow throughout the western United States. Acquisitions peaked in 1995 at more than 600,000 acre feet of instream flow acquisitions in eight western states.2 Since 1995, annual acquisitions have remained relatively steady at slightly more than 500,000 acre-feet of water (with the exception of 1998 when acquisitions temporarily declined to about 350,000 acre-feet).

A sense of the growing importance of the market for instream flow can be gained by comparing commercial market transactions for surface water rights with instream acquisitions. Instream acquisitions in 1999 exceeded commercial transfers in Arizona, New Mexico, and Oregon. In Nevada, instream purchases returned to waterways almost half the amount of water involved in commercial purchases. In California, which had a very active water market, leases of water for instream flows protected about the same quantity of water as agricultural and municipal interests leased—and approximately 40 percent of the total quantity of water purchased or leased for commercial purposes. Only in Colorado did instream acquisitions constitute only a small fraction of total water transfers (and Colorado permits only donations of water for instream purposes, severely restricting the potential market for instream flows).

The federal government has been responsible for the bulk of instream acquisitions. The Bureau of Reclamation has active and sizable programs to acquire instream flow rights, principally in California’s Central Valley, Oregon’s Klamath River Basin, and Washington’s Yakima River Basin.3 The federal Fish & Wildlife Service also has acquired instream flows for its wildlife refuges (most notably the Stillwater Wildlife Refuge in Nevada).4

With few exceptions, states have not adopted aggressive instream acquisition programs. Colorado was the first state to actively solicit instream rights, but its law prohibits the state to pay for the rights, making Colorado’s

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24 The states in which governmental agencies or non-profit organizations acquired instream flow rights between 1995 and 1999 were Arizona, California, Montana, Nevada, New Mexico, Oregon, Utah, and Washington. In research for this essay, I was unable to find reports on any instream acquisitions in any of the other western states. See id. at 7.
25 See LANDRY, supra note 23, at 7-8, 26-27, 29 (summarizing the reclamation acquisition programs).
26 See id. at 9, 31.
program dependent entirely on donations of instream rights. Montana and Nevada both have active instream acquisition programs, but their scales are relatively small; Arizona has established a fund to purchase water from the federal Central Arizona Project that can then be used to help restore instream flows; New Mexico has perhaps the largest program for purchases of instream rights, but only on the Pecos River and only because of its legal obligation to ensure a specified instream flow under its interstate compact with Texas.

The Oregon Water Trust is the oldest and most active private acquirer of instream rights. Modeled after non-profit land trusts such as the Nature Conservancy and the Trust for Public Lands, the Oregon Water Trust within five years of its founding in 1994 built up a portfolio of over fifty instream rights involving over thirty streams in eight basins. Recognizing its limited funding, the Oregon Water Trust has focused on acquiring crucial flows in smaller streams. According to two water specialists involved with the trust, these flows "provide critical spawning and rearing habitat for anadromous (migratory) and resident fish during the irrigation season." Since 1994, environmental interests in other states have formed non-profits modeled after the Oregon Water Trust. National environmental organizations, such as the Nature Conservancy and Trout Unlimited, have also entered the market on a selective basis. Finally, a few private companies that benefit from instream

27 See id. at 5, 27-28. In some cases, however, nonprofits have purchased water rights and then donated them to the Colorado instream program. See id. at 11 (noting donation of water from the Conservation Trust).
28 Nevada's program is the larger, involving the purchase of over 6,000 acre-feet of water at a cost of several million dollars. See id. at 5, 10. For a detailed description of Montana's program, see MONTANA ENVIRONMENTAL QUALITY COUNCIL, MONTANA DEPARTMENT OF FISH, WILDLIFE & PARKS' WATER LEASING STUDY: ENVIRONMENTAL QUALITY COUNCIL FINAL REPORT TO THE 56TH LEGISLATURE (Nov. 1998) [hereinafter FINAL EQC REPORT].
29 See LANDRY, supra note 23, at 25.
30 See id. at 10, 30-31.
32 Neuman & Chapman, supra note 31, at 136. The flows total in excess of thirty cubic feet per second. Id. at 149.
33 Id. at 149.
34 These entities include Great Basin Land and Water (based in Nevada) and the Washington Water Trust. See LANDRY, supra note 23, at 11, 53, 55.
flows, such as Trendwest Resorts, have acquired instream flow rights to promote their commercial interests.\textsuperscript{35}

A. Governmental Acquisitions

1. Why acquisitions?

The government can provide a desired level of instream flow in a variety of fashions other than through acquisition, including regulation and condemnation. Why acquisition? Regulation avoids a drain on the public fisc and is more consistent with the traditional view that water is a public resource to which individuals should hold only limited, usufructuary rights and only when consistent with the overall public interest. If the government believes for policy or constitutional reasons that water users subject to reduced diversions should be compensated, condemnation of the needed water rights would provide adequate compensation. Market acquisitions run the risk that water users will hold out for prices greater than the "market value" of the water, raising the specter in some people's minds of unjust enrichment. Voluntary acquisition would seem the inferior approach.

Political feasibility explains much of the reason for the government's turn to voluntary acquisition.\textsuperscript{36} Existing water users have strongly and successfully opposed efforts to return significant amounts of water to western waterways. Legislatures and administrative agencies sometimes have mustered the political courage to reserve unappropriated water for instream purposes or to strip water users of unexercised paper rights. But legislatures and agencies have balked at stripping users of water they are currently using.\textsuperscript{37} Virtually all of the major regulatory reallocations of water to the environment have involved the judicial invocation of either the court-created public trust doctrine\textsuperscript{38} or the Endangered Species Act, which few, if any,
members of the adopting Congress ever expected to interfere with longstanding water uses. Even in these limited contexts, administrative discretion and political opposition have combined to limit the law's potential value in restoring instream flow. The major exception to the dearth of mandated reallocations are the reallocation provisions of the Central Valley Project Improvement Act, whose implementation has been mired in administrative squabbling and litigation for almost a decade. Legislative efforts to reduce historic diversions, moreover, raise constitutional takings questions.

Political opposition is also high to condemnation of existing water rights. Some opposition may stem from the fear that court-ordered compensation will not reflect the true value of the water to the user. Although users seems unlikely to attach a high idiosyncratic value to their water rights (which is frequently the reason why compensation does not make a condemnee whole), the high variability of water rights (in seniority, geography, and reliability), combined with low numbers of comparable market transactions, makes any effort to set a market price for water a highly speculative endeavor. More importantly, because condemnation is involuntary, many water users view condemnation as only a step removed

denied, 464 U.S. 977 (1983) (holding that the public trust doctrine limits Los Angeles' diversions from Mono Lake); Thomas, supra note 16, at 36-40 (describing the application of the public trust doctrine to instream flows in California and concluding that, given current levels of discretion, the doctrine has limited value).

39 For an evaluation of several other limited legal tools available to return water to the stream in California, see Thomas, supra note 16, at 15-19.


42 See, e.g., O'Neill v. United States, 50 F.3d 677 (9th Cir. 1995).

43 For overviews of the takings issues raised by restrictions on water use (and from somewhat different perspectives), see Joseph L. Sax, The Constitution, Property Rights, and the Future of Water Law, 61 U. COLO. L. REV. 257 (1990); Barton H. Thompson, Jr., Takings and Water Rights, in WATER LAW: TRENDS, POLICIES, AND PRACTICE 43 (Kathleen Marion Carr & James D. Crammond eds., 1995). See also Williams & McHugh, supra note 19, at 157-158 (discussing possible takings challenges to the application of the public trust doctrine to increase instream flows).

from uncompensated regulation and thus as a dangerous precedent.

Voluntary acquisition programs themselves are not politically easy sells. A 1989 proposal to establish a voluntary instream acquisition program in Montana "created a public policy controversy seldom seen in the halls of the [Montana] Capitol."\footnote{1999 WATER LEASING STUDY, supra note 18, at 2.} Although the legislature ultimately approved the proposal by a narrow margin, opponents succeeded in closely circumscribing the program—limiting acquisitions to short-term leases and to only five stream stretches, requiring the approval of the state water board, and providing for an automatic sunset after four years.\footnote{Act of May 11, 1989, ch. 658, Mont. Laws § 6.} When the program proved less contentious in operation than it had on paper,\footnote{See FINAL EQC REPORT, supra note 28, at A-15 (noting that instream leasing has not proven the "bogeyman it was first thought to be").} the legislature voted overwhelmingly to extend the life of the program, but the program remains restricted to leases on a limited number of stream stretches.\footnote{MONT. CODE ANN. §§ 85-2-436 to 85-2-438 (1999). See 1999 WATER LEASING STUDY, supra note 18, at 3 (noting overwhelming support for renewal of water leasing program). For a history of the Montana instream leasing program and its authorizing legislation, see FINAL EQC REPORT, supra note 28, at A-2 - A-8.}

Any effort to reallocate water to instream flow, whether compulsory or voluntary, raises concerns within the water community. Downstream water users, for example, fear that reallocations will negatively affect the timing of flows that are crucial to their operations.\footnote{See FINAL EQC REPORT, supra note 28, at 10, B-3 (noting concerns regarding the effect of instream transfers on return flow timing); Neuman & Chapman, supra note 31, at 164-65.} In the dry season, farmers often depend on the return flow from earlier upstream irrigation; if an upstream irrigator transfers his water to instream flow, the delayed return flow upon which the downstream users rely will disappear. Agricultural communities also fear that irrigators who transfer their water to instream flow will fallow their lands, injuring the local economy. Water users also fear a slippery policy slope. The legislative adoption of an instream acquisition program endorses the importance of instream flows and undercuts the traditional preference in western water law for consumptive uses; instream acquisition programs thus undermine policy arguments against involuntary instream reallocations.\footnote{See FINAL EQC REPORT, supra note 28, at A-6 (noting concern of agricultural community that instream leases "would go against the traditional concept of water use, opening the door for other changes in water use that would be unacceptable").} Finally, water users who anticipate needing more water in the future may not want the added competition of the government

\footnote{1999 WATER LEASING STUDY, supra note 18, at 2.}
bidding for instream flows; an instream acquisition program might bid up the cost of water available on the market. Where the government acquires water that otherwise might have gone unused, the acquisition might also take water away from junior appropriators. Under prior appropriation law, moreover, water that remains unused for a sufficient period of time is "abandoned" or "forfeited" and becomes permanently available to other appropriators.

None of these concerns are unique to a voluntary acquisition program. On many "over appropriated" rivers, junior appropriators receive water only because some seniors are not using their full rights. Any reallocation of water from consumptive uses to instream flow, however accomplished, raises concerns for downstream users and local communities. By reducing the amount of water available for consumptive appropriation, regulatory reallocations will also increase the price of any water available on the market and make it less likely that junior appropriators will receive their full appropriations. Voluntary acquisitions actually provide protections to third parties that other forms of reallocations do not. Most states ban water transfers that would injure other water users or negatively affect local communities. Voluntary acquisitions might pose concerns to a nervous water community, but they strike far less fear than instream mandates or exercises of eminent domain.

Actual experience with voluntary instream acquisitions, moreover, have not borne out the water community's initial fears. Virtually all voluntary acquisitions have proceeded forward expeditiously without opposition, and state water agencies have consistently found that proposed acquisitions satisfy state standards protecting other appropriators, local communities, and the public interest. Not surprisingly, opposition to voluntary acquisition programs has declined over time as experience has proven favorable. Even prior to such experience, legislatures were far more

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51 A similar concern has led farmers within large irrigation districts, which often have active internal water markets, to oppose permitting outside entities to bid for the water. See Barton H. Thompson, Jr., Institutional Perspectives on Water Policy and Markets, 81 CAL. L. REV. 671, 736-37 (1993) (explaining that opposition to water transfers often may stem from farmers' interest in preserving restricted markets and thus low water prices).

52 See, e.g., SAX ET AL., supra note 41, at 230-42 & 246-54.

53 See FINAL EQC REPORT, supra note 28, at A-5 - A-8 (describing the leases entered into under the Montana instream leasing program); Neuman & Chapman, supra note 31, at 165 (noting that an objection has been filed to only one of the over fifty instream transfers negotiated by the Oregon Water Trust).

54 See FINAL EQC REPORT, supra note 28, at 9 (Nov. 1999) (noting that instream leasing is
receptive to voluntary acquisition programs than to mandated cutbacks.

The advantages of voluntary acquisition programs do not stop with their comparative political expediency. Mandatory reallocation programs are typically static. Water users may ultimately comply, after judicial challenges and administrative foot dragging, but they have no incentive to go beyond compliance and develop new conservation opportunities. By contrast, voluntary acquisition programs in theory encourage users to develop new conservation opportunities. If supply is sufficiently robust, users may well compete for the limited purchase funds available by offering water at a lower unit rate—increasing the amount of water that the government can acquire. Users also may become supporters of greater funding for acquisitions, aligning environmental and user support for increased instream flow.\(^5\) Voluntary acquisition programs are still too young and scattered to have produced firm evidence that they lead to the development of significant new conservation measures and to user support of instream funding, but in theory the advantages could be substantial.

2. The Tension Between Acquisitions and Mandatory Reallocations

Some environmental advocates, nonetheless, have questioned the political wisdom of using voluntary acquisition programs to increase instream flows.\(^5\) Budgetary outlays for voluntary acquisitions have historically been quite low,\(^5\) and political theory would suggest that legislative appropriations are unlikely to fully reflect public support for instream acquisitions. Because support for environmental amenities such as higher stream flow is relatively diffuse, demands from more concentrated constituencies are likely to

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\(^5\) Taxes on water use, like voluntary acquisition programs, also provide a continuing incentive to develop new conservation opportunities. Increased conservation translates to lower taxes, but users are likely to oppose taxes vigorously.

\(^5\) Professor John Echeverria raised the issue in the discussion that followed my presentation of this essay at the William and Mary symposium. He since has raised the issue in the context of governmental support for land preservation. John Echeverria, What Would Aldo Leopold Say?, at http://www.tompaine.com/opinion/2000/05/11/1.html (last visited Oct. 27, 2000).

\(^5\) See, e.g., FINAL EQC REPORT, supra note 28, at A-14 (noting that annual appropriations for the Montana leasing program began in FY 1990 at $40,000 and, after rising as high as $55,000 in the mid-1990s, has since declined to only $33,000). As of 1997, neither the Oregon nor Washington legislatures had ever appropriated any money for instream acquisitions even though state law authorized acquisitions by state agencies. Sterne, supra note 16, at 208, 216.
dominate the appropriation process. Although some instream acquisition programs have gotten around the appropriation process by funding acquisitions through a fee on water use,\textsuperscript{58} water users are likely to oppose such fees as strongly and effectively as they have opposed mandated instream flows. Many water users, moreover, have refused to participate in instream acquisition programs either out of lingering suspicions that the programs are regulations in disguise or because of local community opposition to water transfers.\textsuperscript{59} For these reasons, voluntary acquisition programs may never provide levels of instream flow reflective of the actual public demand for stream restoration.\textsuperscript{60}

None of this would argue against voluntary acquisition programs if they did not reduce the chances of increasing instream flows through other means. Instream proponents could enjoy the limited fruit of voluntary acquisitions while pursuing other avenues of restoration. But by paying some water users for instream flows, the government may undercut the argument for direct regulation. Opponents of regulation are likely to point to the voluntary acquisition program as evidence that mandated reallocations are unfair and unnecessary. While mandatory reallocations may be a tough political sell, some environmentalists would prefer that fight over underfunded acquisition programs that give regulatory opponents yet another argument against mandatory reallocations.

Some environmental advocates, moreover, fear that, by paying for instream flow, the government also may undercut an ethos of conservation. Aldo Leopold believed that the only effective means to achieve sustainable resource use was by developing a new norm, a "land ethic," under which property owners would incorporate the needs of the ecosystem as a whole into their stewardship of land, water, and other resources.\textsuperscript{61} Several recent

\textsuperscript{58} See, e.g., Thomas, supra note 16, at 51 (describing the fee system under the Central Valley Project Improvement Act).

\textsuperscript{59} See, e.g., FINAL EQC REPORT, supra note 28, at A-6 (observing that some potential lessors were scared off by perceived community opposition); Neuman & Chapman, supra note 31, at 169.

\textsuperscript{60} See FINAL EQC REPORT, supra note 28, at 9 (concluding that instream leases will never "solve all of Montana's stream dewatering problems, because of; (1) the complexity of obtaining leases, (2) the small quantities of water that are usually involved, and (3) the potential effects on existing water users"). Cf. Echeverria, supra note 56 (quoting Aldo Leopold for the proposition that public acquisition of environmentally sensitive land "can cover only a fraction of what needs to be done, and then only awkwardly, expensively, and with frequent clashes of interest").

\textsuperscript{61} ALDO LEOPOLD, SAND COUNTY ALMANAC 217-241 (1949).
scholars, in turn, have suggested that legal regulations or standards may encourage the development of new norms consistent with those regulations or standards. Some have worried that government acquisition programs, by contrast, might undermine the fostering of a new land ethic by making environmental stewardship an issue of money rather than fundamental values.

These issues are ultimately empirical and, unfortunately, we currently have no studies that shed reliable light on the interactions of government regulations, voluntary acquisitions, and norms. Experience suggests that voluntary acquisitions need not be inconsistent with mandatory reallocations. Normative and political support for mandatory reallocations vary. Where the need for instream flows is particularly acute (e.g., where crucial to endangered fish species) and water users can readily reduce their use, a strong argument can be made for mandated reductions. Legislative reductions will prove more difficult where needs are less acute or reductions more expensive to water users. Governments can turn to voluntary acquisitions in the latter situations without undermining the argument for mandatory reductions in the former. The Central Valley Project Improvement Act (CVPIA) takes this approach, mandating reallocations in excess of 800,000 acre feet of water while authorizing voluntary acquisitions of several hundred thousands of acre feet more.

Both theory and experience, moreover, suggest that instream advocates stand a better chance of increasing funding for acquisition programs than mandating significant reductions in existing withdrawals. Regulatory efforts must overcome the concerted opposition of agriculture and other water users, who still wield considerable political power. At least during periods of growing governmental revenue, increasing the appropriations for acquisition programs should prove a far easier political task. In recent years, moreover, voters in a number of states have approved bond issues for the acquisition of water and sensitive lands, demonstrating

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63 See Echeverria, supra note 56 (worrying that government acquisition might "undermine, rather than reinforce, the land ethic").
strong political support for such environmental expenditures. As noted earlier, water users themselves may come to support increased funding if voluntary acquisition programs serve as an enticing reward for conservation. By contrast, legislative efforts to reduce existing withdrawals have been almost singularly unsuccessful.

How different methods of increasing instream flow may affect norms of water usage is highly speculative. Voluntary acquisition programs seem unlikely to develop independent conservation norms; why voluntarily return to the river what one can sell to the government? But there is no evidence that mandatory reallocations, particularly when strongly opposed by water users, will generate new conservation norms. Nor does it seem likely that new norms will result in significant reductions in withdrawals. Domestic water consumers sometimes have voluntarily reduced their water use in response to droughts or other unavoidable limitations in the water supply, but the reductions have generally proven only temporary. When the drought or shortage ends, consumers return to prior consumption practices. Experience suggests that people may internalize environmental norms that are easy to meet, particularly when the norms have high symbolic value—such as recycling norms. But this is a far cry from expecting that farmers and other users of large quantities of water will voluntarily implement often expensive conservation measures to increase instream flow. Failure to inculcate conservation norms in other high-cost areas suggest that economic self-interest will prevail.

The potential tension between voluntary acquisition and mandatory conservation, it should be noted, can work both ways. In some cases, regulatory threats can encourage water users to participate in voluntary

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65 See Williams & McHugh, supra note 19, at 192-96 (discussing the various interest groups benefited by instream flows).
66 See 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 El-Ashry & Diane Gibbons eds., 1988) (concluding that “[r]ationing to manage demand is probably effective only for short periods when there is a commonly perceived water-supply deficit”); see also JOSEPH L. SAX ET AL., LEGAL CONTROL OF WATER RESOURCES 690 (1991) (suggesting the same, but also noting exceptions).
68 For a brief discussion of the problems involved in changing environmental behavior through the encouragement of norms, see Barton H. Thompson, Jr., Tragically Difficult: The Obstacles to Governing the Commons, 30 ENVTL. L. 241, 267-69 (2000).
acquisition programs; if the water users do not sell, they face the risk of regulation. But just as voluntary acquisitions in theory could undermine political support for mandatory regimes, regulatory efforts can undermine voluntary acquisitions. To participate in voluntary acquisition programs, water users must come forward with conservation opportunities. This is one of the advantages of voluntary acquisition programs over regulatory reallocations which, as noted earlier, encourage water users to conceal conservation opportunities and overstate the real cost of conservation. Voluntary acquisition programs reward development and disclosure of conservation opportunities. If there is a significant chance that the government will use information gleaned from voluntary acquisition programs to regulate current water use, however, water users may hesitate to participate in a voluntary acquisition program for fear the information will be used to support a mandatory reallocation.

Governments thus must walk a careful balance between mandatory reallocations and voluntary acquisitions if they wish to obtain the advantages of each. If voluntary acquisition becomes the norm or expectation, mandatory reallocation will become even more difficult to enact; excessive regulatory zeal may scare water users away from participating in voluntary acquisition programs. A careful balancing of the two, however, can ensure a higher level of instream flow than either pure regulation or voluntary acquisitions can provide, as well as a more cost effective and equitable reallocation.

3. Designing an Acquisition Program

The creation of an instream flow market presents a number of institutional or design issues. Several of the issues stem from the novelty of instream flow rights within the prior appropriation system. In some important respects, instream flow rights are radically different from consumptive rights and thus require modifying or rethinking existing state

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70 For an explanation of how regulatory efforts can undermine voluntary acquisitions in the context of commercial water markets, see Barton H. Thompson, Jr., Water Law as a Pragmatic Exercise: Professor Joseph Sax’s Water Scholarship, 25 ECOLOGY L.Q. 363, 378 (1998) (noting that “[e]ntities with unmet water needs may hesitate to pay for water if there is a chance they can use the regulatory system to get the water for free”).
water law. Start with the manner in which an instream flow right must be defined. Consumptive water rights historically have been defined based on a “point of diversion”: water users are entitled to withdraw a set quantity of water at a particular point on the river and can “call” upstream junior appropriators whose diversions interfere with this entitlement; any water not consumed that finds its way back to the river can be withdrawn and used by downstream water users. Flow rights necessarily involve an additional physical dimension and thus require a new definition. The flow right could extend along a limited and specified stretch of river or to the entire length of the river downstream from the point at which the water used to be diverted. In theory, the governmental purchaser should receive a right to an instream flow that extends the entire length of the river from the old point of diversion because any water that was previously consumed reduced the entire downstream flow of water.\textsuperscript{71} If the flow right extends a considerable length of the river, however, the quantity of the flow right at any particular point along that length should reflect the natural loss of water from the river due either to seepage or evaporation; otherwise, the right could interfere with the diversion rights of downstream appropriators. Calculation of such flow loss, however, is likely to be complex and controversial. Rough approximations often will be needed.\textsuperscript{72}

\textsuperscript{71} Defining the right is even more complicated than the text suggests. Offstream water users generally consume a percentage of the water they divert, with a portion of the remainder often finding its way back into the stream and being used by downstream appropriators. Assume that a particular offstream user has historically diverted 10 cubic feet per second (cfs) of water and consumed 6 cfs, with 4 cfs returning to the river and being diverted 1 mile downstream by another user. As suggested in the text, if the water right is purchased for instream flow by a governmental agency, the agency arguably should have a flow right to 6 cfs extending downstream to the mouth of the river. Should the agency also have the right, however, to an additional 4 cfs along the stretch from the old point of diversion downstream one mile to the other appropriator’s diversion? Although it might be tempting to award such a right, downstream users enjoy the right to change their point of diversion. The agency therefore should be given an additional 4 cfs flow right only between the old point of diversion and the point at which the water historically returned to the river and thus was available for reappropriation; this latter point, however, may not be easy to determine.

\textsuperscript{72} The Oregon Water Resources Department is one of the few state agencies to have addressed the question. Its administrative regulations provide:

> Normally, a new instream water right shall be maintained downstream to the mouth of the affected stream; however, it may be maintained farther downstream if the amount of the instream water right is a measurable portion of the flow in the receiving stream or for a point or shorter distance if needed to account for return flow or to prevent injury.

Another critical definitional question is how the instream right should relate to mandated flow requirements. Instream acquisitions should not count toward mandated flow requirements on any stretch of the waterway; otherwise, the acquisition would simply free up junior appropriators to divert more from the waterway.73 If state law requires a flow of \( X \) cubic feet per second (cfs) of water through a particular river stretch, acquisition of \( Y \) cfs should not count toward the \( X \) cfs requirement but should result in a stream flow of \( X + Y \) cfs. To ensure that acquisitions are additive, however, states will generally need to modify their existing laws.74 An interesting legal question is whether a state can constitutionally provide that any acquisition does not count toward federal instream requirements. Where federal law permits states to set higher standards, as under the Endangered Species Act, any such state provision would arguably fall within the federal non-preemption provision and not constitute an unconstitutional attempt to directly modify federal law. Where federal law such as the Federal Power Act preempts state efforts to set both lower and higher instream flow requirements,75 however, such a state provision may well be illegal.76 Congressional action thus might also be needed.77

31, at 166 (observing that this provision generally “allows in-stream flows to be protected to the mouth of the stream”).

73 See Thomas, supra note 16, at 48-51 (describing the need for such a provision and the history of the early unsuccessful efforts to pass such a provision in California); Delp, supra note 35, at 47-48 (discussing the issue in connection with Washington law).

74 To date, California is the only state to have addressed the issue. Under § 1707(c) of the California Water Code, the state water board, on the request of someone petitioning to change a consumptive water right to an instream right, may specify, as part of its approval of the petition, that the water . . . shall be in addition to water that is required, if any, to be used for instream purposes to satisfy any applicable federal, state, or local regulatory requirements governing water quantity, water quality, instream flows, fish and wildlife, wetlands, recreation, and other instream beneficial uses. If the request is approved by the board, state and local agencies, as well as the courts, shall not credit the water subject to that petition towards compliance with any of the regulatory requirements described in this subdivision.

CAL. WATER CODE § 1707 (C) (1998). The decision whether to make acquisitions additive, however, is in the discretion of the state water board. Id.


76 See Thomas, supra note 16, at 49 n.217.

77 California, which as noted is the only state to date to have considered the interrelationship
A separate issue rising from the unique nature of instream flow rights is how to ensure effective enforcement of such rights. The solution might seem simple: the government should monitor streamflows and police against illegal diversions of its instream rights. Most states today, however, do not continually monitor most streams, and most state agencies do not have sizable enforcement staffs, leaving enforcement of private water rights up to the right-holders themselves. Of more importance, the watermasters in charge of rivers often have proven uncooperative, at least initially, in enforcing instream flow rights. Unfamiliar with the concept of instream rights, watermasters often have allocated any available instream flow to consumptive users with unmet needs. Some governmental agencies also have found it politically difficult to seek enforcement of instream flow rights during drought periods when the instream flows are most needed, but when cities and farmers are also frantic for water. Effective enforcement of instream flow rights therefore may require active education of watermasters, offstream water right holders, and the general public, as well as additional

78 See Delp, supra note 35, at 56 (discussing the lack of monitoring and enforcement staff in Washington); Sterne, supra note 16, at 216-17 (discussing the problem of lack of enforcement staff in Oregon and elsewhere and also suggesting possible conflicts of interest where enforcement is performed by agencies responsible for allocating water among consumptive users).

79 See, e.g., FINAL EQC REPORT, supra note 28, at A-10 - A-11 (noting problems in getting water commissioners initially to enforce instream rights). See also Sterne, supra note 16, at 217 (suggesting that watermasters might be more receptive to the concerns of consumptive water users because such users usually pay some or all of the salary of the watermasters).

80 In 1988, for example, a small subdivision objected when the Montana Department of Fish, Wildlife, and Parks (FWP) tried to enforce an instream right—even though the subdivision had obtained its appropriative right after the instream right was established and knew that its consumptive right was inferior. A local newspaper headlined that the FWP was "taking away the drinking water" of local citizens. Despite its superior legal right, the FWP did not end up insisting that the subdivision reduce its diversions. At one meeting, a local politician opined that "Montana citizens have a constitutional right to water for drinking and hygiene purposes and FWP shouldn't be interfering with that right." Liter Spence, Improving Instream Flow Protection in Montana 12 (Apr. 1997) (unpublished briefing paper prepared for the Montana Department of Fish, Wildlife, and Parks, on file with the William and Mary Environmental Law and Policy Review).
funding for monitoring of instream flows.\textsuperscript{81}

Beyond the issues stemming from the novel nature of instream flow rights, a government interested in establishing an instream acquisition program must also think about whether there are mechanisms by which the government can ensure that the acquisition program goes toward producing \textit{new} instream flow rather than simply rewarding water users who would have reduced their diversions in any case. A voluntary acquisition program will attract the attention not only of water users who otherwise would continue to divert water as before but also of water users who were already planning to install new conservation equipment (because it is economically profitable to conserve even without selling the conserved water) or to otherwise reduce their water use (perhaps because their farming operations are losing money). Some of these water users may have other marketing opportunities (e.g., selling or leasing water to a municipality); many will not. Where the water users do not have other marketing opportunities, the government would be paying for water that would be returned to the river in any case for free.\textsuperscript{82} In an ideal world, the government could distinguish between water users, paying only those who otherwise would have continued using water. If the government announced such a rule, however, few water users are likely to admit that they plan to reduce their water use voluntarily.

Although governments cannot eliminate this problem, they may be able to minimize the problem through a reverse auction system. The government would invite all water users to submit their best (i.e., least cost) bid for the provision of instream flow. The government would then accept bids in the order that is most advantageous to the government, factoring in both the cost and the environmental benefit of the water; assuming that all water would furnish a similar environmental benefit, the government would accept the lowest bids first. If government funding is constrained, a reverse auction system would drive down the price that water users demand. Someone who is planning to reduce water use in any case and has no other market for their water would be driven down toward a price of zero, the effective value of the water that they are offering to sell. By forcing potential

\textsuperscript{81} Cf. \textit{Final EQC Report}, \textit{supra} note 28, at A-11 (observing that education of water commissioners is effective in increasing cooperation in enforcement of instream rights); \textit{1999 Water Leasing Study}, \textit{supra} note 18, at 11 (noting success of educational efforts, but also pointing out room for improvement).

\textsuperscript{82} If the water were returned to the river rather than sold to the government for instream flow, the water might be appropriable by someone else. But if this were a concern, the government could wait until the water were returned to the river and then reserve the water from appropriation.
sellers to be more honest in their asking prices, a reverse auction system would also address another problem: the difficulty of measuring the value of water rights. Unlike widgets, water rights each have a unique value varying by the right’s location and seniority, and the lack of extremely active water markets in much of the West means that “comparables” often are not available.83

A final set of issues concerns whether and how to structure an instream acquisition program to address concerns of local water communities. A state that is concerned about the potential effect of instream flow acquisitions on the economic health of agricultural communities, for example, might choose to limit acquisitions to water that is freed up through conservation or other salvage operations, rather than fallowing of fields. Although there is no legal limitation in Montana law, community sensitivity has led Montana’s instream acquisition program to focus almost entirely on conserved water.84 States also might choose to limit acquisitions to leases, either to provide time to evaluate the impact of an instream acquisition program on water users and local communities or to ensure local communities that any loss of water for local economic use will be only temporary. Montana, as noted earlier, limits its instream program to leases, initially capping the length of leases at four years.85 Any effort to meet the concerns of local communities, however, risks undermining the effectiveness of the instream acquisition program. Because the financial life of many conservation programs is thirty years, for example, programs that are limited to only short-term leases are unlikely to encourage critical conservation measures.86 As a result, Montana’s legislature has repeatedly increased the lease terms permitted under the state’s instream acquisition program, until today leases involving “salvage” water are authorized for up to thirty years.87 Efforts to meet community concerns thus must be carefully balanced against the incentive effect on conservation.

83 See Neuman & Chapman, supra note 31, at 160-67 (discussing the scientific uncertainty regarding the benefits of particular instream flow).
84 See FINAL EQC REPORT, supra note 28, at A-6 - A-8 (summarizing Montana’s instream leases).
86 See FINAL EQC REPORT, supra note 28, at 10-11 (noting the need to lengthen leases to thirty years).
87 See id. at A-3; 1999 WATER LEASING STUDY, supra note 18, at 3.
B. Private Acquisition of Instream Rights

1. Authorization of Private Acquisitions

Individual citizens may favor a higher level of instream flows than the government chooses to provide. The government will provide the level of instream flow preferred by the median voter—or, given the political bias against goods desired by a diffuse segment of society, an even lower level. Where the law permits private individuals or entities to acquire instream flows, those individuals who prefer a higher level of instream flows are not limited by the government's choice. Such individuals can arrange for a higher aggregate level of instream flows or provide for increased flows in individual waterways. Except in the unlikely circumstance that a higher level of instream flow is injurious, the opportunity for private acquisitions of instream flows will increase societal welfare. Those who prefer a higher level than the government provides can increase their satisfaction by contributing to private acquisitions; those who are happy with the government level need not contribute. Like competitive options in the marketplace, the option to acquire a higher level increases overall consumer satisfaction.

Opening up instream flow markets to entities other than the government also carries a variety of related advantages. Scientists, for example, may disagree on the levels of instream flows needed during various seasons to protect particular fish species. Private acquisitions permit those scientists who believe that the governmental level of instream flow is inadequate to shop their views to other concerned entities. In protecting instream flows, private entities can also take innovative approaches that the government may have rejected or missed. The Oregon Water Trust, for example, has taken the inventive approach of providing some ranchers with food for their cattle in return for the water that the ranchers had been using to grow hay or alfalfa.

Non-profit water trusts, like land trusts, also can play a useful brokerage role for the government. The government may not be in a position

88 Cf. Sterne, supra note 16, at 218-19 (noting the political pressure that is sometimes brought against governmental acquisitions of instream rights).
89 The Oregon Water Trust, for example, has supplemented the federal government's focus on large waterways by acquiring smaller amounts of instream flow on smaller streams. See LANDRY, supra note 23, at 17.
to acquire water rights that are on the market because it currently does not have the necessary appropriations. Water trusts can acquire water when it comes on the market and then resell it to the government when public funds become available. Similarly, water trusts often have better contacts in the water user community (and thus hear of more opportunities when they arise) and can acquire water from individuals who are hesitant or resistant to working with the government. Non-profit water trusts also are not burdened by the lengthy review process that most governmental agencies must go through before acquiring instream rights and therefore water trusts often can act faster on market opportunities, acquiring available water before consumptive users do.

Yet only a handful of states explicitly authorize private acquisitions. Montana authorizes private individuals and entities of any kind to lease water for up to ten years for instream purposes. Oregon permits “any person” to acquire an instream right by purchase, lease, or donation. Precedent also exists in Washington for private instream acquisitions. California permits anyone, including implicitly the private purchaser of a water right, to dedicate some or all of their water to “preserving or enhancing wetlands habitat, fish and wildlife resources, or recreation in, or on, the water.” The law in several other states can be read to permit private acquisitions of instream rights, although neither administrative agencies nor courts have yet addressed

91 Sterne, supra note 16, at 212. But see Neuman & Chapman, supra note 31, at 169 (citing a study showing that water right holder antipathy toward selling directly to the government was not as widely held an attitude as expected).
92 Sterne, supra note 16, at 218.
93 Private entities may also be able to acquire instream flow rights in other states, but the law does not provide explicit authorization, and the question is therefore open to potential litigation. See, e.g., Delp, supra note 35, at 13-14 (discussing the legal issues involved in the potential acquisition of instream rights by water trusts in the state of Washington).
97 CAL. WATER CODE § 1707 (1999). See Thomas, supra note 16, at 47-48 (discussing the implementation of this provision of California law).
the question. Where bills have been proposed in these states to explicitly authorize private acquisitions, however, the legislatures have rejected them.

Even existing programs in states like Montana and Oregon were not easy to legislate and, in some cases, have faced repeated efforts to repeal the authorizing legislation.

Why have only a limited number of states authorized the private acquisition of instream flow—and then only reluctantly? Some observers have suggested that legislatures may view instream flows as uniquely public in character, reflecting collective decisions about the commonweal.

Although governments must be involved in the provision of instream flows, however, there is no reason why governments must monopolize the field. Instream flows are largely public goods: the benefits of instream flows are nonexclusive, and one person can enjoy the benefits without taking away from someone else's enjoyment of them. As a result, nonprofits and private organizations cannot be counted on to provide a level of instream flows that maximizes societal benefits (not to mention the potential nonutilitarian benefits of instream flows); although some individuals will

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98 See, e.g., Sterne, supra note 16, at 209-10, 227-28 (noting the uncertainty in Arizona and Idaho law regarding private appropriations of instream flows). Alaska and Nevada also both explicitly define "beneficial uses" to include some environmental purposes (ALASKA STAT. § 46.15.260(3) (Michie 1987); State v. Morros, 766 P.2d 263 (Nev. 1988), but the question remains open whether that permits private individuals or nonprofits to acquire water for environmental uses.


100 See Neuman & Chapman, supra note 31, at 177-78 (describing efforts at repeal in every Oregon legislative session between 1995 and 1999, one of which passed the house of the state legislature); Sterne, supra note 16, at 211-12 (describing initial agricultural and development opposition to private acquisition legislation in Montana). Cf. Sterne, supra note 16, at 222-31 (describing general opposition of existing water users to private instream acquisition legislation).

101 See, e.g., Neuman & Chapman, supra note 31, at 170-71 (raising, and rebutting the argument, as grounds for requiring that any instream flow right be held by the state rather than a nonprofit organization).

102 There are exceptions to this generalization. Laws could privatize the recreational or transportation benefits of instream stretches, and if too many people began to play in streams or use them for navigation, that could ultimately undercut the benefits to others. But this does not undercut the primary character of instream flows as public goods. See Carol Rose, The Comedy of the Commons: Custom, Commerce, and Inherently Public Property, 53 U. CHI. L. REV. 711, 768 (1986) (observing that the benefits of some forms of common property, such as instream flows, might actually increase as more people use the commons).
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contribute toward instream flows, many others will free ride on the contributions of others. This is an argument for public provision of instream flow, but it does not justify banning those who wish even greater levels of instream flows from using the marketplace to achieve those levels—any more than the public character of education or welfare justifies banning their provision by nonprofits or other private entities.

The legal nonreceptivity to private instream acquisitions found in most states is, more likely, a vestige of the historic prohibition of private instream flow rights in the West. To appropriate water in the West, you traditionally needed to divert water for a reasonable and beneficial use (which did not generally encompass environmental, recreational, or aesthetic uses), thus precluding instream appropriations. 103 Although a growing number of states now authorize specifically enumerated public agencies to appropriate new instream flows, the historic ban on private instream appropriations remains uniformly in place. One reason is political. Agricultural interests and other water users worry that, if instream appropriations were permitted, private environmental groups could seek to appropriate all remaining unappropriated waters, potentially foreclosing any new appropriations for consumptive uses. 104 (The water community worries less about governmental appropriations over which water users enjoy some political leverage). Part of the reason may also be a legitimate fear that private individuals could appropriate instream flow for speculative reasons, preserving the water in the river only until a good marketing opportunity comes along. 105 Such speculation is antithetical to the prior appropriation system, which historically has sought to ensure that unutilized water is available free of charge to anyone seeking to put it to a reasonable and beneficial offstream use.

Similar but somewhat weaker concerns likely motivate opposition to private instream acquisitions. Private instream acquisitions cannot tie up what little unappropriated water remains in the West’s waterways because acquisitions are limited to currently consumed water. But private instream acquisitions (like public instream acquisitions) increase market demand for existing water rights and thus potentially increase the market price of water that other water users might wish to purchase. In addition, private acquisitions might tie up water that would otherwise be forfeited, abandoned,

104 See Delp, supra note 35, at 80-81 (discussing the traditional opposition to private instream rights from agricultural organizations and other water users).
or left unused to satisfy junior consumptive needs. In public debates, these concerns often get swept up into a more general concern that private instream rights would give environmentalists “too much power in water distribution.”\textsuperscript{106} If private acquisitions were permitted, moreover, someone wishing to acquire water rights for purely speculative purposes could purchase water rights and hold them as instream flow until an acceptable future offer to purchase came along.\textsuperscript{107} Under traditional prior appropriation doctrine, water rights can be transferred only to someone with an immediate beneficial use for the water, precluding such speculative acquisitions.

These concerns do not justify limiting instream acquisitions to the public sector. If the concerns over market competition are any different in the private rather than public context, it is because of a fear that private entities will not be as responsive to the needs of consumptive users as a public agency.\textsuperscript{108} Even if this is problematic rather than beneficial,\textsuperscript{109} any private instream acquisitions will involve a change in the appropriations’ purpose and thus require approval of the state water agency. Most western states now require their water agencies to determine whether the change is in the overall public interest, which should include consideration of alternative consumptive uses of the water.\textsuperscript{110} Most states that authorize private instream acquisitions also require the acquirer to show that the requested amount of water is needed for fish or wildlife purposes.\textsuperscript{111} If the standards for public interest evaluation are inadequate, the standards can be easily supplemented. Public interest evaluations, however, should keep in mind that the very value


\textsuperscript{108} See Final EQC Report, supra note 28, at C-11 (noting concern “that some people with a lot of money may not be as benevolent” as a state agency).

\textsuperscript{109} The question is whether the public interest calls for special protection for some market segments. Given the traditional bias in western water law in favor of consumption, it seems hard to argue that the government should protect water consumers from market competition from private organizations seeking water for environmental purposes.

\textsuperscript{110} See Sax et al., supra note 41, at 246-54.

\textsuperscript{111} Mont. Code Ann. § 85-2-408(3)(b) (1995) (requiring instream lessors to show that the requested amount of water is needed to benefit fishery resources). See also Cal. Water Code § 1707(b) (1999) (water board must find that dedication of water for instream purposes “will best develop, conserve, and utilize, in the public interest, the water” involved).
of private acquisitions is in permitting private individuals to disagree with state determinations of the need for instream flows. The adoption of numerous and complex safeguards may also make the instream acquisition process prohibitively expensive or time consuming.\footnote{112}{Cf. Final EQC Report, supra note 28, at B-2 (noting testimony by Montana Trout Unlimited representative that Montana review process must be streamlined to be more cost effective).}

Administrative reviews of proposed changes in appropriation permits also provide some protection against entrepreneurs using private instream flow authorization to engage in speculative water acquisitions. Indeed, nonprofit preservation organizations have acquired virtually all of the instream flow rights to date in those states authorizing private acquisitions, and there is no evidence of speculative purchases. If states were concerned with such problems, however, several approaches could be taken. States could permit only non-profit organizations to acquire instream flows, thus precluding personal profitmaking from a later commercial sale of instream rights. Or states could require that any private entity acquiring a water right dedicate the right to the state, which would then hold and control the rights. The Oregon state water agency initially argued that any instream right acquired by the Oregon Water Trust had to be dedicated to the state, but later backed away from the position.\footnote{113}{See Neuman & Chapman, supra note 31, at 167-171 (also suggesting that the Oregon water agency took this approach because of the belief that instream flows are uniquely public in character); Sterne, supra note 16, at 213 (describing the original Oregon position).}

A similar proposal has been made in Montana to require private parties to transfer any instream right to the Department of Fish, Wildlife & Parks. Final EQC Report, supra note 28, at C-11. In Oregon, the Water Resources Department later decided to permit the Oregon Water Trust to hold a “flow augmentation” right in the trust’s own name. Neuman & Chapman, supra note 31, at 170.

2. Government Subsidization of Private Instream Acquisitions

Should governments not only authorize private instream acquisitions, but also subsidize such acquisitions? The government already subsidizes acquisitions of land and conservation easements by nonprofit land trusts such as the Nature Conservancy and the Trust for Public Lands. When someone contributes money to a nonprofit land trust, the federal government provides the contributor with a tax deduction which, depending on whether the contributor itemizes his taxes, the contributor’s tax bracket, and various other computational rules, can provide an effective subsidy equal to almost forty
percent of the contribution;\textsuperscript{114} states provide an additional subsidy through state tax deductions.\textsuperscript{115} If someone offers to donate their land or a conservation easement to a nonprofit land trust, federal and state governments provide a similar subsidy through a tax deduction equal to the value of the property interest.\textsuperscript{116} The federal government also gives preferential estate tax treatment to land in which conservation easements have been donated to a nonprofit organization.\textsuperscript{117}

Several arguments combine into a relatively strong justification for providing tax subsidies of both land and water preservation (although not necessarily for the specific level of subsidy provided through the tax provisions). First, subsidization of nonprofit efforts can achieve a higher level of preservation than if the funds were invested in public acquisitions. At the current federal tax level, providing a tax deduction attracts more in contributions than the government loses in tax payments.\textsuperscript{118} The government thus can leverage its limited funds to preserve more land and water. Second, contributions to nonprofit environmental trusts reflects an unmet demand for preservation beyond that provided directly by the government. Because of collective action difficulties, however, contributions only reflect a portion of the actual demand for additional preservation. Many individuals who value additional preservation do not contribute to environmental trusts but instead attempt to free ride on the contributions of others. Tax incentives can be seen as a means of correcting for the sub-optimal level of contributions by encouraging a higher level of contributions through governmental supplementation.

For reasons that were probably unintentional, however, tax incentives for water trusts are not as clear cut as those for land trusts. Federal tax laws provide the same incentive to someone making a \textit{monetary} contribution to a nonprofit water trust as to a land trust. Someone contemplating donating

\textsuperscript{114} I.R.C. § 170 (1994).
\textsuperscript{116} I.R.C. § 170 (1994).
\textsuperscript{118} The price elasticity of charitable deductions, in more technical terms, is greater than one.
water, however, may not receive a federal tax incentive, depending on the context of the donation. Consider first a farmer who is interested in donating his appropriative or riparian right to a water trust for instream purposes. The Internal Revenue Code proscribes charitable deductions for “partial interests” in property. Is an appropriative or riparian right a partial interest? That is an open question that might well depend on whether the state views the water right as an independent property interest separate from the land or, alternatively, as an integral part of the land interest. If the latter, the farmer might have to donate the land in addition to the water in order to qualify for a charitable deduction, a donation that neither the farmer nor the trust might be interested in pursuing. Further questions are raised if the farmer wants to donate his water for only a period of years. Under the Internal Revenue Code, a contribution of merely the “right to use property shall be treated as a contribution of less than the taxpayer’s entire interest in such property” — which in most situations may preclude charitable deductions for the equivalent of leases. As noted earlier, however, the bulk of instream acquisitions have come in the form of leases.

III. ECOSYSTEM SERVICE MARKETS: PRESERVING WATERSHEDS

Markets for instream flow are primarily markets for public goods. Although some private commercial interests such as resorts, fishing groups, or downstream hydroelectric facilities may have economic reason to invest in instream flows, virtually all instream acquisitions to date have been made by governments and nonprofit organizations interested in promoting the

120 The Internal Revenue Code does provide an exception for a “qualified conservation contribution” of real property. Id. But this exception applies only where a property owner donates his “entire interest . . . other than a qualified mineral interest” or a “perpetual conservation restriction,” I.R.S. Reg. § 1.170A-14, neither of which would appear relevant in the context of water donations. For a more detailed discussion of this issue (as well as the question of whether water must be considered “real property” to be deductible), see Kelly A. Cole, A Market-Based Approach to the Protection of Instream Flow: Allowing a Charitable Deduction for the Donation of a Conservation Easement in Water Rights, 6 HASTINGS W.-NW. J. ENVTL. L. & POL’Y 325 (2000).
122 See Sandra Postel & Stephen Carpenter, Freshwater Ecosystem Services, in NATURE’S SERVICES: SOCIETAL DEPENDENCE ON NATURAL ECOSYSTEMS 195, 196, 198-204 (Gretchen C. Daily ed., 1997) [hereinafter NATURE’S SERVICES] (listing and discussing the economic and other benefits from instream flows).
general public values of instream flows—species protection, recreation, and aesthetics. As noted in Part II, funding almost inevitably will be a concern because of the diffuse and shared qualities of these benefits. Environmental groups typically are at a disadvantage in lobbying to increase the share of governmental budgets devoted to public goods such as instream flow, and nonprofit organizations face a significant collective action problem in attracting contributions (although federal tax policy partially mitigates this problem). These funding concerns raise the question whether there are commercial values to various forms of watershed protection that might provide significant further funding for watershed preservation.

In this regard, interest has been growing in ecosystem services. Healthy ecosystems provide a variety of commercially valuable services that we take largely for granted because, for millennia, we have received the services free of charge. Such services include partial stabilization of climate, detoxification and decomposition of wastes, air purification, generation and renewal of soil and soil fertility, crop pollination, and pest control. Because many of these services are extremely valuable, efforts to preserve ecosystems may be able to capitalize on the value to bring in additional funding. The key is to find institutions or individuals who benefit from these ecosystem services and are willing to invest in their preservation.

This Essay focuses on the ecosystem services provided by healthy and relatively undisturbed riparian lands. These lands are central to watershed management—the focus of the conference out of which this Essay grew. These lands also provide two commercially valuable services on which watershed preservation efforts might readily capitalize—water purification and flood control. Indeed, because these services are valuable and enjoy a readily identifiable and organized constituency, riparian lands provide the

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123 For the best general introduction to ecosystem services, see the multiple essays in NATURE’S SERVICES, supra note 122.
124 See Gretchen C. Daily, Introduction: What Are Ecosystem Services?, in id. at 1, 3-4.
125 Only a few efforts have been made to quantify the value of ecosystem services, and most of those efforts have focused on total world value rather than the marginal value of preserving particular land or resources. A controversial 1997 effort placed a total price tag of $33 trillion (with a confidence interval from $16 to $54 trillion) on the world’s ecosystem services, 1.8 times the current annual global GNP. See Robert Costanza et al., The Value of the World’s Ecosystem Services and Natural Capital, 387 NATURE 253, 259 (1997). Unfortunately, the Costanza study is exceptionally flawed. See, e.g., David Pearce, Auditing the Earth, ENV’T, Mar. 1998, at 23 (critiquing the Costanza study, in particular its failure to value services at the margin). The Costanza study, however, is still indicative of the exceptionally high value of ecosystem services to human society and industry.
most likely setting for capitalizing on ecosystem services to promote preservation.

Preservation and protection of riparian lands promote water quality in a variety of ways. Commercial use of riparian lands present perhaps the greatest current pollution threat to the nation's waterways, primarily because of runoff from agriculture, livestock, roads, and other uses and the leaching of waste from septic tanks. Wetlands and other riparian lands also help provide natural filtration of contaminants originating in the watershed. Soils filter out some contaminants from local runoff before the runoff reaches the waterway. Vegetation both slows down runoff, permitting various forms of solid pollutants to settle out, and stabilizes soil, reducing contamination from siltation. A number of major cities in the United States, including Portland and San Francisco, have long relied on relatively pristine watersheds for drinking water quality. In the twentieth century, a growing number of water suppliers turned to technological solutions such as filtration and disinfection to address water quality problems. Technological solutions, however, are often extremely expensive. Moreover, technology alone may not provide safe drinking water, as demonstrated by outbreaks of serious illnesses like cryptosporidiosis in cities that filter and disinfect their water supplies.


127 See Protecting the Source, supra note 126, at 14-17 (concluding that wetlands are the most valuable means of naturally filtering water supplies); Katherine C. Ewel, Water Quality Improvement by Wetlands, in Nature's Services, supra note 122, at 329 (describing how wetlands filter nutrients and improve water quality).

128 An Ounce of Prevention, supra note 126, at 9; Protecting the Source, supra note 126, at 14.

129 An Ounce of Prevention, supra note 126, at 9.


131 See Watershed Management, supra note 130, at 98-101 (noting the outbreak of waterborne diseases even in water systems that use filtration and other technological approaches, and describing the outbreak of cryptosporidium in Milwaukee in 1993, affecting over 400,000 residents); Protecting the Source, supra note 126, at 7 (describing the 1993 outbreak).
also can have negative side effects in terms of both aesthetics (e.g., the taste of chlorine in drinking water) and health (e.g., the possible carcinogenicity of chlorine by-products).132 The abandonment of reservoirs because technological approaches could not keep pace with land development and thus pollution provides perhaps the most vivid illustration of the limitations of technological solutions and the critical importance of protecting watershed lands.133

In theory, water suppliers can try to protect watershed lands through either regulation or the acquisition of property interests. In practice, many water suppliers have found acquisition more effective than regulation for several reasons.134 First, regulations are often difficult to enforce effectively, particularly where the watershed is in a political jurisdiction distant from the water supplier. Second, local communities typically fight significant regulatory efforts by distant water users.135

Protection of riparian lands can also reduce the risks of flood damage. Floods cause over four billion dollars in damages on average every year and
lead to dozens of deaths. Heavily vegetated riparian lands can slow precipitation runoff into rivers or streams, enhancing groundwater recharge and reducing the chances of dangerously high flows. Wetlands also serve as natural sponges, absorbing additional water during periods of heavy precipitation or runoff and thus reducing flood potential. Naturally contoured lands, in contrast to a highly developed region with a channelized river bed, also provide a natural safety valve against floods, reducing the risk of flood damage to downstream and upstream regions. When floods do occur, moreover, undeveloped riparian lands will suffer less economic damage than land on which significant capital improvements have been made.

Land that is preserved for water-quality or flood-mitigation purposes can also provide valuable public goods for which funding might otherwise be inadequate. Preserved land, for example, might serve as valuable habitat for endangered species, provide an aesthetically enjoyable riparian corridor, or provide low-intensity recreational uses. The preservation of particular


138 See PROTECTING THE SOURCE, supra note 126, at 15 (describing one report that concluded that Wisconsin watersheds containing 15 percent wetlands had flood peaks 60 percent lower than watersheds with no wetlands); Andrew Wilcox & John Harte, Ecosystem Services in a Modern Economy: Gunnison County, Colorado, in NATURE'S SERVICES, supra note 122, at 311, 317 (noting that unimpaired flood plain systems are estimated to store two to five times as much water as man-made flood plains). According to a 1993 study by the Illinois State Water Survey, every 1 percent increase in wetlands along a stream corridor decreases peak stream flows by an average of 3.7 percent. ECONOMIC BENEFITS, supra note 136, at 34.

139 See ECONOMIC BENEFITS, supra note 136, at 34.

140 Id.

141 See, e.g., OFFICE OF GROUND WATER AND DRINKING WATER, U.S. ENVIRONMENTAL PROTECTION AGENCY, DRINKING WATER SOURCE PROTECTION: CASE STUDIES IN WATERSHED MANAGEMENT 16 (1999), at http://www.epa.gov/safewater/swpcstudy.html (last visited Oct. 27, 2000) (observing that frequently the goals of water quality preservation and habitat protection overlap); id. at 29 (describing Seattle's efforts to protect and preserve endangered and threatened species within its Cedar River Watershed); BUILDING GREEN INFRASTRUCTURE, supra note 134, at 31 (noting the multiple benefits of land preservation); ECONOMIC BENEFITS, supra note 136, at 38 (describing potential collateral benefits of
lands may also provide various non-use values, including existence value, option value, and bequest value.\textsuperscript{142} There is no guarantee that the lands with commercially valuable services will be the lands we want to preserve for their public goods: the land in a watershed that is most valuable for water quality protection, for example, may not be the same land that is critical habitat for an endangered species. And indeed goals can be inconsistent: a water supplier that chooses to preserve land for water quality protection may not want the land used for recreation. But there is a sufficient enough chance of a substantial overlap in values to believe that the commodification of ecosystem services can significantly advance a number of environmental objectives.

A. Acquisitions Motivated by Watershed Services

Investment by water suppliers, cities, and others in the ecosystem services provided by riparian land is not hypothetical. In perhaps the best known example, New York City has chosen to invest over a quarter of a billion dollars in the acquisition and preservation of up to 350,000 acres of land in the Catskill watershed.\textsuperscript{143} Regulations under the federal Safe Drinking Water Act require water suppliers to filter their water unless the supplier can demonstrate that it has taken other steps, including protection of the watershed, that will adequately protect its customers from the risks of contamination.\textsuperscript{144} As noted earlier, filtration can be very expensive and is not always effective. New York City obtained an exemption from the filtration

\textsuperscript{142} See, e.g., Lawrence H. Goulder & Donald Kennedy, Valuing Ecosystem Services: Philosophical Bases and Empirical Methods, in NATURE'S SERVICES, supra note 122, at 23, 34-35 (describing the potential existence and option values of ecosystem services); Sandra Postel & Stephen Carpenter, Freshwater Ecosystem Services, in NATURE'S SERVICES, supra note 122, at 95, 206-207 (defining these non-use values and giving examples).

\textsuperscript{143} See WATERSHED MANAGEMENT, supra note 130 (describing New York City's efforts and their efficacy); PROTECTING THE SOURCE, supra note 126, at 18-20 (describing the city's program); Scott D. Anderson, Watershed Management and Nonpoint Source Pollution: The Massachusetts Approach, 26 B.C. ENVTL. AFF. L. REV. 339, 376-77 (1999) (describing the city's efforts to avoid filtration requirements of federal law); Graciela Chichilnisky & Geoffrey Heal, Economic Returns from the Biosphere, 391 NATURE 629, 630 (praising New York City's effort to "securitize" the watershed services).

requirement by not only acquiring sensitive watershed lands, but funding watershed-based efforts to minimize pollution from farming and development, paying to improve sewage facilities in the watershed, and updating and extending its regulation of watershed activities to effectively police septic systems and other local sources of pollution. New York City estimates that the total cost of its entire watershed-protection program through 2010 will be about $1.5 billion, far less than the $4-8 billion cost of constructing a filtration plant (which would also entail annual operating costs of about $300 million).

New York City's efforts to preserve watershed land are not unique. Water companies have long acquired land in their watersheds to protect the quality of their drinking water. On average, water companies in the United States own only about two percent of the land in their watersheds. In some portions of the nation, however, water suppliers control a much higher percentage, including most of the remaining open space.

Renewed emphasis on drinking water quality, including the federal Environmental Protection Agency's filtration regulations, are today driving additional land acquisition. In the late 1990's, more than 140 cities were considering watershed conservation in an effort to ensure safe drinking water for their customers. In 1998, Seattle increased its ownership of land in the

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146 See Watershed Agreement Overview, supra note 145; Chichilnisky & Heal, supra note 143, at 630.

147 See An Ounce of Prevention, supra note 126, at 3, 6, 9 (discussing purchases by water companies since the mid-19th century, when cholera outbreaks in New York and London focused the companies on the importance of isolating water supplies from human activities).

148 See Protecting the Source, supra note 126, at 14 (citing a 1991 study by the American Water Works Association's Research Foundation).

149 See, e.g., id. at 3 (noting that Connecticut water companies own more than 130,000 acres of watershed lands, equal to more than half of the state's open space and including some of the "most pristine wildlife habitat and recreation areas in the state").

150 Protecting the Source, supra note 126, at 20; Chichilnisky & Heal, supra note 143,
South Fork Tolt River watershed from about 30 to 70 percent through a land exchange with the Weyerhaeuser Company; previously Seattle had acquired close to 100 percent land ownership in the Cedar River watershed, its other major water source, through land exchanges with the federal government. Portland, Maine is actively purchasing land within 1,000 feet of its main reservoir and tributaries. Salt Lake City assesses its water customers a small additional monthly fee to pay for land preservation in the city’s Provo River watershed. Charlotte-Mecklenburg Utilities, in North Carolina, uses a portion of its capital improvement budget each year to acquire watershed lands. In a joint interstate effort, New Jersey and New York have purchased over 17,000 acres of land in Sterling Forest, the watershed for almost a quarter of New Jersey’s population. Both Syracuse, New York and Rochester, Minnesota have embarked on programs to protect the cities’ water supplies by paying riparian farmers to establish buffer zones along key water bodies. Rather than protecting riparian land from any development, some water suppliers have used easements, leases, or other financial incentive programs to minimize the size of the footprint that local activities impose on the land.

at 630.


152 U.S. ENVIRONMENTAL PROTECTION AGENCY, supra note 141, at 31-32.

153 Id. at 34.

154 Id. at 32-33.

155 BUILDING GREEN INFRASTRUCTURE, supra note 134, at 19.


158 See, e.g., U.S. ENVIRONMENTAL PROTECTION AGENCY, supra note 141, at 18-19 (describing a lease program of the Contra Costa Water District in California designed to
Fewer examples exist of cities or others investing in watershed preservation for flood control purposes, but interest is growing in such "soft" solutions to flood damage. With funding from a voter-approved initiative, California's Napa County plans to spend $160 million to acquire 500 acres of flood plain; the county expects that the acquisition will significantly reduce flood damages, which totaled $500 million in the last four decades of the twentieth century. Local governments near Boston acquired rights to 8,000 acres of wetlands capable of holding some 50,000 acres of water during potential flood periods, rather than building a $100 million system of dams and levees or bearing continued flood damages averaging $17 million annually. Littleton, Colorado, acquired over 600 acres of land for both flood control and park purposes.

B. Potential Barriers to Capitalizing on Ecosystem Services

One should have a healthy dose of skepticism regarding how often water companies, local governments, and other entities will find it worthwhile to preserve watershed lands. A number of the situations where water suppliers have chosen to preserve watershed lands, for example, involve unique settings that are not likely to be widely duplicated. New York City, for example, was able to escape building a multi-billion dollar filtration plant not simply because it planned to acquire riparian property, but also because it promised to engage in extensive regulation, both mandatory and voluntary, of the watershed. New York City could do this because of its historic regulatory authority over activities in the watershed; many cities will lack this power and find it difficult to obtain such authority over the almost certain opposition of local governments. But the opportunity to

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159 ECONOMIC BENEFITS, supra note 136, at 35.
160 Id. at 37.
161 Id.
162 For background on the unique setting of New York City's efforts to preserve the Catskills watershed, see New York City's Water Supply: Part I (Stanford Law School Environmental & Natural Resources Law & Policy Program Case Study No. 036-99, Oct. 1999), at http://casestudies.stanford.edu. See also BUILDING GREEN INFRASTRUCTURE, supra note 134, at 4 (concluding that land acquisition programs must typically build on strong regulatory programs).
163 Even New York City encountered tremendous opposition from local watershed
enlist cities, water suppliers, and others in the preservation of watersheds is significant enough to justify examining how public policies either support or undermine incentives to invest in ecosystem services.

A number of obstacles can undercut the incentive to invest in watershed preservation for water quality or flood control purposes. First, the magnitude of the service value can be difficult to estimate, making it difficult to justify the cost of watershed preservation to customers or constituents. New York City's decision to preserve land in the Catskills was a no brainer: land acquisition, along with the city's other efforts to avoid quality-impairing land uses in the watershed, excused the city, at least for the moment, from regulatory mandates that otherwise would have required it to build a multi-billion dollar filtration facility. Not every city, however, has been successful in convincing EPA to waive the filtration requirement in return for a watershed protection program. The vast majority of major water suppliers in the United States, moreover, have already installed filtration systems. Those cities that filter their water will find it difficult to quantify the additional improvement in water quality provided by acquiring watershed land and thus to justify to consumers or constituents the increased rates or taxes needed to pay for the land. The problem can be equally severe in determining the value of acquiring land or easements to reduce flood damages.

Administrative standards or actions can play a major role in influencing the value of watershed preservation. In the case of New York City, EPA's waiver of the filtration requirement played a critical and positive role—placing an easy to determine and large price tag on the value of watershed preservation. The simplest means of putting a price tag on communities to significant exercise of its regulatory or eminent domain powers. PROTECTING THE SOURCE, supra note 126, at 18-19.

164 See, e.g., Anderson, supra note 143 (describing Boston's unsuccessful efforts to avoid filtration).

165 See id. at 829 (citing EPA statistic that 97 percent of the 235 significant water suppliers in the nation filter their drinking water).

166 See id. at 854 (citing an independent expert panel convened by Boston for the proposition that "with filtration, aggressive watershed protection could be difficult to maintain"). Even in these cases, however, water suppliers may be able to determine a value based on the avoided cost of any additional water quality measures that the supplier can avoid by protecting the watershed. See, e.g., BUILDING GREEN INFRASTRUCTURE, supra note 134, at 19 (observing that the city of Gastonia, North Carolina, calculated that it has saved $250,000 a year by diverting water from a higher quality region of Mountain Island Lake).

167 See BUILDING GREEN INFRASTRUCTURE, supra note 134, at 31 (noting that the EPA gave
ecosystems and the services they provide is through avoided cost: what costs does an entity avoid by investing in the preservation of the ecosystem.\textsuperscript{168} Federal and state environmental agencies have provided a clear "avoided cost" for watershed preservation not only by waiving filtration requirements where watershed preservation is adequate, as in the case of New York, but also by waiving various water monitoring requirements for water suppliers with significant source protection.\textsuperscript{169}

In other cases, however, regulation can undercut the value of preservation. If the government mandates filtration even where watershed preservation would provide much the same level of protection, water suppliers may find it difficult to justify a land acquisition program. In these cases, the water supplier may find it difficult to quantify the added benefits for the reasons discussed above, or watershed preservation may not bring sufficient added value to justify today's often high land prices.\textsuperscript{170} The government should mandate technological fixes where they are indispensable, but should not inflexibly require technological fixes where a combination of soft solutions is an effective substitute.

Governmental funding programs similarly may bias entities from preserving watershed lands. The federal government, for example, has long subsidized and helped fund water purification facilities and "hard" flood control measures such as dams and levees. If equivalent financial assistance

the Massachusetts Metropolitan District Commission "the option of acquiring twenty-five percent of its watershed land as an alternative to a $200-million filtration plant"). The cost of filtration and other technological approaches to water quality is exceptionally high. The federal Environmental Protection Agency forecasts that water suppliers in the United States will need to spend almost $140 billion in infrastructure by the year 2020 to bring their water systems into compliance with the Safe Drinking Water Act. PROTECTING THE SOURCE, supra note 126, at 5.

\textsuperscript{168} See Goulder & Kennedy, supra note 142, at 29-31 (discussing how to value ecosystem services through avoided cost).

\textsuperscript{169} See AN OUNCE OF PREVENTION, supra note 126, at 10 (noting that EPA and the Connecticut Department of Public Health have waived water monitoring requirements that would have cost almost $20 million). The Safe Drinking Water Act also helps indirectly to encourage water suppliers to preserve watershed lands by requiring states to assess watershed threats to drinking water. See U.S. ENVIRONMENTAL PROTECTION AGENCY, supra note 141, at v (describing requirements added by the Safe Drinking Water Act Amendments of 1996).

\textsuperscript{170} Some cities nonetheless may still find watershed preservation worthwhile. Atlanta, for example, filters its water but is still taking major efforts to protect its watershed. See Stapleton, supra note 156, at 5 (noting Atlanta's efforts and concluding that "filtered as well as unfiltered systems must protect their watersheds").
is not provided for land acquisition, entities trying to decide whether to take natural or engineering approaches will have an added incentive to adopt the engineering solution. The federal Environmental Protection Agency has begun to address this bias in the context of drinking water quality by extending its revolving loan program to land acquisition (although the federal government limits to just ten percent the share of each state’s loan money that can be used to acquire land or conservation easements).\(^\text{171}\) North Carolina has tried to correct for the traditional bias in favor of engineering solutions by creating a multi-million dollar grant program for the preservation of riparian buffer zones in watersheds furnishing urban drinking water.\(^\text{172}\) The federal Department of Agriculture also has begun working with cities to provide funding for agricultural buffer zones in riparian zones.\(^\text{173}\)

Deficiencies in the political process or in a state’s regulation of utilities can also undercut incentives to invest in watershed preservation. Where a city is currently cash strapped, for example, the short-term interests of politicians may lead them to defer watershed purchases (or even to sell watershed land that the city already owns) despite a significant long-term risk of drinking water-related illnesses. An investor-owned water company is unlikely to acquire watershed lands unless the state public utility commission permits the company to put the full cost of the land in its rate base and thus recover a fair rate of return on the land. But public utility commissioners, responsive to the public’s demand for low rates but not responsible for environmental protection, may prove reticent to approve such a request, particularly if the health value of watershed preservation is uncertain. Even if the water company is permitted to put the full cost of the land in its rate base, the water company may later be tempted to sell the land if the land appreciates in value. Public utility commissions generally value assets for rate base purposes at historic cost, so companies receive no rate increase when their properties appreciate; if they sell assets, however, investor-owned utilities may be able to pass the proceeds on to their shareholders (depending on the rules of the particular state).

\(^\text{171}\) **BUILDING GREEN INFRASTRUCTURE**, supra note 134, at 34; **PROTECTING THE SOURCE**, supra note 126, at 25.


\(^\text{173}\) See Association of Metropolitan Water Agencies, supra note 157 (describing the program and cooperative programs between various cities and agricultural communities).
A number of these factors have led both private and public water companies in Connecticut to sell off watershed property. Connecticut water companies sold off some 2,000 acres of watershed lands from 1991 through mid-1997 and, in the late 1990s, had plans to sell off another 2,000 acres.\footnote{AN OUNCE OF PREVENTION, supra note 126, at 3, 13. Over 21,000 acres of land were classified as so-called “Class III” lands and thus alienable with little regulatory oversight. Id. at 3, 7.} The pace of land sales, moreover, appeared to be quickening.\footnote{Id. at 3, 7.} In some cases, water companies have stopped using a watershed as a supply source because of reduced demand and new water quality standards that would require expensive new filtration facilities; because the watersheds are no longer used for domestic water supply, the companies can no longer economically justify holding onto the open space.\footnote{Id. at 13.} Much of the land that is held by the water companies, moreover, has appreciated dramatically since the land’s original purchase; this increase in value is not reflected in water rates, but the companies can realize the gain in value by selling the land.\footnote{Id. at 14.} The companies can then pass the gain through to ratepayers or, in the case of private companies, to shareholders;\footnote{Id.} alternatively, the companies can use the proceeds to pay for new facilities (which may be required under the Safe Drinking Water Act or other environmental laws, but difficult to finance without selling land).\footnote{Id. at 14.} The Connecticut Department of Public Utility Control at times even encourages water companies to sell land in order to reduce water rates, which is one of the department’s central missions.\footnote{Id. at 12, 17. The department has increased the percentage of the gain from land sales that companies can pass on to shareholders in part to encourage companies to sell the land. Id. at 19.}

Collective action problems may become a problem where no single entity values watershed services sufficiently to acquire land by itself, but where the value of the services to multiple entities does exceed the land cost. Preservation of watershed lands, for example, may simultaneously enhance water quality, reduce flood damages, increase the beauty of the region, protect local wildlife, and provide recreational opportunities for local residents. None of these benefits by itself may be worth the cost of the land

\footnote{Id. The Connecticut Department of Public Utility Control decides on a case by case basis how private water companies should allocate the proceeds from land sales between customers and shareholders. AN OUNCE OF PREVENTION, supra note 126, at 18-19.}
to be preserved, but combined may far exceed it.\textsuperscript{181} In an ideal world, the water companies drawing from the watershed, downstream cities interested in flood protection, local governments or developers wishing to enhance local beauty and recreational opportunities, and state and federal wildlife agencies would come together and jointly agree to purchase the land. In reality, however, some or all of the involved entities may try to free ride on the contributions of the others. A water company, for example, may wait for governmental agencies to invest in the land.

Collective action obstacles may require novel solutions. One approach, which I have discussed elsewhere, would be the creation of a special watershed district empowered to tax individuals or entities benefitting from the watershed services and to use the revenues to acquire watershed lands or take other protective actions.\textsuperscript{182} Local communities have long used special districts as a means to overcome collective action problems in the provision of services with public good qualities. Farmers, for example, have formed irrigation districts to import and distribute water supplies and pest control districts to exterminate crop-threatening insects.\textsuperscript{183} Residents of flood-prone areas have formed flood control districts to finance dams and other engineering control measures. Local communities have formed school districts to provide public education.\textsuperscript{184} Each of these various districts is governed by a board of directors, generally elected by the affected population, which decides which measures to take and how to apportion the total cost among the local population, and then implements the measures and collects the necessary funds. The concept of a watershed services district would simply take this tried-and-true approach, which has been used to date

\textsuperscript{181} Cf. BUILDING GREEN INFRASTRUCTURE, supra note 134, at 4 (noting that watershed preservation efforts are usually driven by multiple goals and must look to multiple funding sources).

\textsuperscript{182} See Barton H. Thompson, Jr., People or Prairie Chickens: The Uncertain Search for Optimal Biodiversity, 51 STAN. L. REV. 1127, 1177-78 (1999).


\textsuperscript{184} These examples are not exhaustive. Urban regions, for example, have also formed business improvement districts to help finance urban renewal programs. See Mark S. Davies, Business Improvement Districts, 52 WASH. U. J. URB. & CONTEMP. L. 187, 201-04 (1997) (discussing how business improvement districts help solve collective action problems).
primarily to finance engineering solutions to problems, and use it to ensure adequate provision of natural services.

A final political obstacle that sometimes has arisen is the perceived hegemonic relationship between the beneficiaries of the ecosystem services and the watershed communities. Where land is purchased and preserved by a distant city or company, the local watershed community can lose tax revenue, employment opportunities, and a sense of local control. Watershed communities, moreover, are often rural and can resent the perception that their future economic development is being sacrificed for the benefit of urban areas. Watershed communities therefore may vigorously oppose even willing-seller land acquisitions and may need separate compensation and a role in the process by which land is selected for preservation. Before acquiring watershed land, both New York City and Portland, Maine had to negotiate exactly such partnerships with local governments in the watersheds.

IV. MAKING ENVIRONMENTAL REGULATORS INTO ENVIRONMENTAL BROKERS

Most policy observers view markets either as an appendage or alternative to regulation. Traditional water markets, for example, are supplementary to traditional state regulation of water use. The state regulates how much water can be withdrawn from a river or aquifer, but then permits the market to allocate that limited quantity of water among competing users in what policymakers hope is an economically efficient fashion. In a similar non-water context, environmental agencies decide how much pollution factories can emit, but then establish regulatory markets to help allocate the right to pollute as efficiently as possible. Both public goods markets and ecosystem service markets can be either substitutes for or supplements to regulation. The government, for example, can choose to purchase instream flow rather than mandate reduced diversion or to mandate a minimum level of instream flow and then supplement that flow with additional acquisitions. Where ecosystem services are sufficiently valuable, private or public entities may find it advantageous to pay for ecosystem preservation, reducing or eliminating the need for regulation.

By contrast, a largely unexplored option would integrate markets into

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185 See, e.g., U.S. ENVIRONMENTAL PROTECTION AGENCY, supra note 141, at 31, 34 (describing the concerns of Standish, Maine, regarding Portland’s land acquisition program).
186 PROTECTING THE SOURCE, supra note 126, at 18-19.
the regulatory process itself, converting regulators into environmental brokers. Consider again regulation of water diversions. The government under an "environmental broker" approach would create a set of instream flow rights and award them to a governmental entity for management and enforcement. The government could acquire these rights initially through the market. Or it could create the rights directly through regulation—establishing a set quantity of instream flow rights and, if necessary, reducing diversionary rights accordingly. Market factors need not dictate the initial level of water rights dedicated to instream flow; the government could determine the initial quantity of rights through political deliberation. The critical element of an "environmental broker" approach would not be how or what quantity of instream rights are created, but the freedom given the governmental entity holding the rights—the environmental broker—to use the marketplace to maximize the value of those rights to the environment. If the environmental broker decided that it had more water than it needed to satisfy environmental demands at any point in time, for example, it could sell the excess water to consumptive water users and use the proceeds to purchase more water at a later point when the additional water is needed. The environmental broker, in short, would be expected to use the market like any market participant to maximize the value of its holdings—except that the environmental broker would measure value in terms of environmental benefits rather than profits.

In California, the "CALFED" process, designed to address the environmental needs of the delta formed east of San Francisco Bay by the confluence of the Sacramento and San Joaquin rivers, has proposed a constrained version of an environmental brokerage approach, dubbed an Environmental Water Account or EWA. Growing diversions from the Sacramento and San Joaquin rivers, as well as from the delta itself, have caused a variety of serious environmental problems, including reduced fish runs and lower water quality. In a framework for action issued in June 2000, federal and state agencies with responsibility for the delta proposed to continue to use regulatory instream flow requirements, set under the Endangered Species Act and other environmental laws, as the principal delta protection. But the EWA would form a second tier of protection. The

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187 The concept of the EWA grew in part out of a report by the Natural Heritage Institute in 1998 proposing a Delta Ecosystem Restoration Authority. See Natural Heritage Institute, An Environmentally Optimal Alternative for the Bay-Delta: A Response to the CALFED Program 32-35 (1998).
188 CALFED Bay-Delta Program, California's Water Future: A Framework for
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EWA would start with a set quantity of water rights and then be free to manage those rights to optimize environmental protection. The EWA could require more water to flow through the delta, thus effectively “borrowing” instream flow, in return for providing EWA water later in the year to consumptive users. Or the EWA could allow more water to be pumped out of the delta for consumptive use in return for more EWA rights that it could exercise at a later point when fish were more at risk. The EWA could also invest in storage capacity if the EWA believed that the storage would be valuable in increasing the environmental value of its water rights. The EWA, however, could not modify the basic regulatory standards; it would manage and try to optimize only the second tier of instream flow protection. As CALFED’s revised Phase II report describes the EWA’s role, the EWA would be “used to ‘fine-tune’ ecological protection, reallocating EWA assets to provide additional protection to targeted species as indicated by real-time events.”

A. The Potential Advantages of Environmental Brokerage

An environmental brokerage approach enjoys several overlapping advantages over the traditional regulatory approach. First and foremost, an environmental brokerage approach both permits and forces governmental regulators to trade off among environmental options over time in response to changing conditions and knowledge. Environmental regulations historically have been quite static. In the instream context, mandated streamflows do not

ACTION 22 (2000) [hereinafter FRAMEWORK FOR ACTION].

189 Id.


191 See REVISED PHASE II REPORT, supra note 190, at 96-98; EWA CASE STUDY, supra note 190, at 8-11.

192 REVISED PHASE II REPORT, supra note 190, at 96-98; EWA CASE STUDY, supra note 190, at 8-11.

193 REVISED PHASE II REPORT, supra note 190, at 97, 99; EWA CASE STUDY, supra note 190, at 10.

194 FRAMEWORK FOR ACTION, supra note 188, at 22; REVISED PHASE II REPORT, supra note 190, at 96.

195 REVISED PHASE II REPORT, supra note 190, at 96.
tend to change, and when they do change, they change slowly. If regulated flows turn out to be unnecessarily high at any time because of changes in scientific knowledge or natural conditions, regulators have little incentive to relax the mandate; the regulators get nothing in return for relaxing the mandate and may find it difficult to later restore the mandate. If regulated flows turn out to be insufficient to meet environmental objectives, by contrast, regulators typically find it difficult to increase flow requirements over the political opposition of existing water users. An environmental brokerage approach both permits and rewards value-creating tradeoffs. When flows are unnecessarily high, the broker benefits from selling water; when flows are insufficient, the broker can buy the needed flow with proceeds acquired from selling water at other times. The traditional regulatory process typically deals with tradeoffs only in the initial setting of regulations: with a limited quantum of political will power, the government must decide when and where to demand instream flows. But once the initial instream flows are set, tradeoffs are seldom revisited.

For similar reasons, an environmental brokerage approach would provide a more effective institutional framework for adaptive management. Scientists are near universal in their call for adaptive management, in which regulatory schemes would incorporate a feedback loop to evaluate the efficacy of current regulations and modify them in light of that evaluation. Adaptive management, however, has been institutionally hobbled by the problems just identified; regulatory rules prove hopelessly sticky. An environmental broker, however, would have both the flexibility and the incentives needed to engage in adaptive management. As the CALFED process concluded in evaluating the merits of an EWA, an environmental brokerage approach “allows for more creative, flexible and adaptive responses to real-time developments in the environment.”

In some cases, an environmental brokerage approach might partially align the interests of the environment and the regulated community, reducing future conflict. Environmental interests, for example, have historically opposed the development of new water infrastructure that would permit the diversion of more water; although regulations might limit the environmental harm, the infrastructure has historically promised no benefits to the

196 See id. at 96 (describing prescriptive regulatory standards as “rigid and inefficient”).

197 See NATURAL HERITAGE INSTITUTE, supra note 187, at 32 (concluding, in the context of the CALFED process, that “existing institutions generally cannot shift directions quickly in response to new scientific information”).

198 REVISED PHASE II REPORT, supra note 190, at 96.
environment. Under the proposed EWA, however, new infrastructure could also benefit the environment. Both environmental interests and water consumers thus would share a common goal in effective water management.

Finally, and perhaps more controversially, an environmental brokerage approach would bring useful discipline to the regulatory process. Markets serve a disciplining function: market participants must think carefully about their choices, and they are rewarded if they calculate correctly, and suffer losses if they make poor decisions. The traditional regulatory process often distributes and cabins decision-making in a way that undercuts responsibility and thus discipline. Regulators are seldom rewarded for identifying needed changes in current regulations. Indeed, the safest course for a regulator is often to stick with the status quo. An environmental broker, by contrast, would not only enjoy the authority to make changes based on the new information, but would be subject to intense criticism for failing to pursue valuable change.

B. The Potential Pitfalls of Environmental Brokerage

Despite its potential attractions, an environmental brokerage approach faces a number of potential practical problems. One major concern is how errors by the environmental broker would be handled. As just explained, markets impose discipline by rewarding wise choices and ruthlessly punishing bad choices. Companies make the wrong decisions and consequently fail every day in the private marketplace, and we generally do not care (except to minimize the costs of paying off creditors and moving resources into new uses). That is exactly how the market is supposed to work. Although few people would object to providing governmental agencies with incentives to make good decisions, most people would not want instream flows to suffer because of the poor choices of an environmental broker. If as the result of a poor decision or physical or biological events that could not have been predicted, an environmental broker ends up effectively bankrupt, with no water rights but a significant need for additional instream flow, the government would be confronted by a problematic choice. The government could let the environment suffer. Or the government could bail the broker out and provide additional instream flows through regulation or purchase. Although the latter option would

199 See NATURAL HERITAGE INSTITUTE, supra note 187, at 32 (concluding that, because responsibility for the Sacramento-San Joaquin Delta is split among multiple agencies, none is accountable for the success or failure of protection measures).
protect the environment, it would undermine the disciplinary benefits of a brokerage approach and encourage the broker to make riskier decisions.

A related concern is whether current science and institutions are up to the job of engaging in the types of tradeoffs that a brokerage approach encourages. In many situations, for example, scientists may not be able to determine whether fish need current levels of instream flow. The government must set regulatory standards even in the face of such uncertainty, but trying to fine tune instream flows on an active adaptive basis may not be worth the costs and risk. There is also reason to question whether we can design an entity to serve as environmental broker that is both sufficiently fast acting and sufficiently trustworthy. An environmental broker, like governmental agencies generally, would be a monopolist. Because people fear that agencies may exercise bad judgment or be corrupted or captured, laws tightly constrain agency discretion and generally require lengthy and public decision-making processes. To be effective at rapid adaptation, an environmental brokerage approach could not incorporate the same degree of protection. Although the legislature or voters could discipline the broker after the fact for misjudgment or corruption, damage would already have taken place.

The EWA responds to these concerns by incorporating a brokerage approach only into the second tier of instream protection. As a CALFED report noted, prescriptive standards "generally provide a greater assurance of the intended protection, in that they do not rely on real-time decisions by asset managers." The CALFED approach tries to achieve both a high level of assurance and regulatory flexibility by mandating a first tier of protection, while using a brokerage approach to provide a second level of security:

The prescriptive standards would be used to provide the broad baseline level of ecosystem protection, and to address specific species needs that are well established and predictable. The EWA can then be used to "fine tune" ecological protection, reallocating EWA assets to provide additional protection to targeted species as indicated by real-time events.

Concerns that the environmental broker might make management mistakes could be addressed similarly by restricting the flexibility permitted the broker. In the instream flow context, for example, the broker might be

200 REVISED PHASE II REPORT, supra note 190, at 96.
201 Id. at 96.
permitted to vary initial instream flow rights by only 20 percent, ensuring that flows would never fall below 80 percent of the original regulatory level. Both of these approaches—multi-tier protections and constrained flexibility—would permit the environmental broker to engage in quick adaptations through the market without as great a risk to environmental assurance.

An environmental brokerage approach also raises a myriad of structural issues, many paralleling the concerns just discussed. Of these issues, the most important is governance: who should serve as the environmental broker? From an adaptive management perspective, the ideal broker would be a single entity, but political concerns are likely to drive the government to create a hybrid entity responsive to multiple constituencies. This raises broader questions about the ability of our current environmental institutions to engage in adaptive management. As noted already, the United States has responded to fears of capture and corruption by confining governmental agencies in layers of procedures and rules; responsibility is often split among multiple agencies. Workable in a largely static world, these safeguards cannot survive a new emphasis on speed and flexibility and are inherently incompatible with an environmental brokerage approach.

An environmental brokerage approach is likely to face considerable political opposition except where proposed as part of a broader set of reform efforts. Despite the opportunity that an environmental brokerage approach presents for true adaptive management, many environmental interests will be suspicious of a brokerage approach for the reasons just outlined. Resource users, on the other hand, may worry about the potential competition posed by an environmental broker. An environmental broker, as a governmental entrant into the water marketplace, may bid up the price of resources for

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202 Among the principal issues are (1) the type and quantity of assets with which the broker should initially be endowed, (2) whether the broker should receive additional funding in the future, (3) the type of investments and transactions that the broker should be permitted to pursue, (4) what changes need to be made in existing markets to permit the broker to effectively participate, and (5) the governance structure of the broker. See REVISED PHASE II REPORT, supra note 190, at 100-01 (listing major issues needing to be resolved in creating an EWA); EWA CASE STUDY, supra note 190, at 11-13 (same).

203 In the case of the EWA, for example, the CALFED process proposes to manage the water account through three federal and state agencies—the U.S. Fish & Wildlife Service (based in the Department of the Interior), the National Marine Fisheries Service (based in the Department of Commerce), and the California Department of Fish & Game—“in coordination with project operators and stakeholders, through the CALFED Operations Group.” FRAMEWORK FOR ACTION, supra note 188, at 22.
private market participants. In gaming exercises run to determine the impact of an EWA, for example, the EWA increased competition not only for water but also for conveyance and storage facilities. The EWA, moreover, used up a substantial portion of the operational flexibility that exists in the system that moves water through the Sacramento-San Joaquin water system. The EWA nonetheless may prove acceptable because it has become an essential linchpin in a complex set of tradeoffs. Under the current CALFED solution, the delta will receive greater environmental attention, but farmers and other water users will be protected against unpredictable future restrictions on water diversions by the EWA and a “no surprises” policy.

V. CONCLUSION

Policy interest in markets has historically focused on regulatory markets. Although such markets can help improve the environment, primarily by reducing the cost of and political opposition to additional environmental restrictions, they aid efforts to restore and protect the environment only indirectly. Markets can more directly benefit the environment through three other approaches discussed in this article: public good markets in which governmental agencies or non-profit organizations acquire environmental rights, ecosystem service markets in which entities that benefit from ecosystem services directly invest in their preservation, and the merger of markets and regulation in the shape of environmental brokers.

Public good markets are a simple extension of regulatory markets, permitting the government or non-profits to buy back resource rights that the government now or in the past chose to allow private users. Some people may object to the government buying back rights that it created. But public good markets may prove to be politically more effective than traditional regulation as a way of obtaining some environmental benefits; as discussed in Part I, instream flow markets have proven more effective to date in restoring balance to our nation’s waterways than governmental mandates. But for some of the same reasons that mandatory regulation is politically difficult, public good markets are likely to be underfunded.

Where environmental restoration and protection produce ecosystem services, the commercial value of such services presents another potential

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204 REVISED PHASE II REPORT, supra note 190, at 100.
205 Id.
206 See FRAMEWORK FOR ACTION, supra note 188 (detailing the full set of CALFED proposals).
source of funding. Ecosystem service markets present a particular opportunity for the preservation of wetlands and other riparian lands. As elaborated in Part II, such lands often provide commercially valuable services in water purification and flood control. The government can play a major role in helping to promote such markets by ensuring that its regulations and funding programs do not mandate or reward technological substitutes and by finding solutions to collective action problems.

An environmental brokerage approach presents the opportunity to import the flexibility, speed, and discipline of markets into the regulatory process. Effective adaptive management is inconsistent with the traditional regulatory approach, which, partly by design, is beset by a high degree of inertia. The market offers a very different institutional model that focuses on speed and disciplined tradeoffs among options and that is thus more compatible with the essence of adaptive management. But an environmental brokerage approach also provides less environmental assurance than traditional regulation. As a result, an environmental brokerage approach for the moment should play a role only at the margins of traditional regulatory systems, providing a means of fine tuning regulation without risking fundamental levels of protection.
Figure 1
Instream Flow Acquisitions (1990-1999)