

RESOLVING INTERJURISDICTIONAL DISPUTES OVER WATER AND ENVIRONMENTAL QUALITY

Bonnie G. Colby

Department of Agricultural and Resource Economics

University of Arizona

Tucson, Arizona 85721

Phone: 520-621-4775, FAX: 621 6250

email: bcolby@ag.arizona.edu

ABSTRACT

Intergovernmental disputes involving water allocation and the environment are widespread and impose costs and uncertainties on water users, communities, and governments. This article presents criteria for evaluating different types of efforts to resolve disputes. The criteria were developed after extensive analysis of several dozen interjurisdictional disputes involving water allocation and environmental quality. These criteria are used to examine the strengths and weaknesses of litigation, negotiated agreements, and market transactions as tools for effecting changes in water allocation and management needed to resolve transboundary disputes.

INTRODUCTION

Interjurisdictional water disputes frequently involve environmental issues, and are costly and widespread in the western United States (the location for the cases on which this research is based). In the American West, state and local governments, irrigation districts, Native American tribes, and federal agencies are embroiled in intergovernmental disagreements involving water and the environment. Some widely publicized examples include the Mono Lake conflict in California which involves the City of Los Angeles, the State of California, several federal agencies, local irrigators, and environmental organizations in a complex dispute over maintaining stream flows and lake levels (Dunning 1994). The Wind River conflict in Wyoming has been ongoing for decades and involves the State of Wyoming, the Wind River Arapaho and Shoshone Tribes, several irrigation districts, and multiple federal agencies in a conflict over jurisdictional authority and over managing the river to enhance instream flows (Checchio and Colby 1992). Ongoing conflicts over endangered species and

management of the Edwards Underground Aquifer in Texas, the Carson-Truckee River Basins in Nevada, the Colorado River Basin, and the Columbia River provide other examples of interjurisdictional disputes over water and the environment (National Research Council 1992).

These conflicts impose numerous costs on disputants, on the communities in the affected regions, and on taxpayers. These costs include the direct expenses of litigation and negotiation to resolve the conflicts; ongoing uncertainties for water users and other economic actors in the regions; loss of morale and organizational credibility as conflicts continue unresolved; poor intergovernmental relationships; and lack of coordination on other regional problems. In addition, there generally are environmental costs as species and habitats deteriorate while the dispute continues.

This article focuses on only one of many components necessary for resolving these types of disputes – changes in water management and water allocation. Typically, environmental water disputes in the western United States are stimulated by a need for additional water to support endangered fish, riparian habitat, lake levels, or wetlands. Rarely is surplus water available and consumptive water users resist efforts to reallocate some of their water to accommodate environmental demands. Two broad categories of mechanisms are available to alter water allocation and management: voluntary agreements negotiated among the disputants and compulsory changes in water use and management mandated by courts, administrative agencies, and legislatures. A purely voluntary approach could include purchasing water rights from willing sellers to improve stream flow levels or providing technical and financial assistance to promote water conservation. A purely compulsory approach could involve litigation and administrative actions to alter water diversions, change upstream dam releases, and to

mandate improved irrigation practices. Under the broad category of voluntary reallocation mechanisms, there are several types of tools: market transactions, negotiated agreements, incentive pricing to spur conservation, and cost sharing of technical assistance to induce desired changes in water management. Compulsory mechanisms follow the three branches of the United States government: court orders, administrative actions, and legislative mandates. While there are important distinctions between voluntary and compulsory approaches, they often work in a complementary manner to resolve interjurisdictional disputes.

Voluntary and compulsory reallocation mechanisms have different strengths and weaknesses as tools to resolve transboundary disputes. This article evaluates these mechanisms using criteria developed for comparative analysis of western United States water disputes. The paper concludes with suggestions for more effective use of these mechanisms and for strengthening the efficacy of voluntary strategies to accomplish changes in water management necessary to resolve transboundary conflicts.

THE ROLE OF VOLUNTARY AND COMPULSORY MECHANISMS

In the western United States, voluntary and compulsory water reallocation mechanisms have frequently been used to assist resolution of transboundary environmental water conflicts. While the boundaries in the cases discussed in this paper are interstate, state-tribal, and local jurisdictional boundaries, the cases may provide some insights useful for international water disputes.

As an example of voluntary approaches, negotiated agreements have proved central to resolving disputes over water between Native American tribes and non-Indian water users. For instance, the Salt River Pima Maricopa Water Rights Settlement in Arizona relies upon complex multiparty exchanges of water, modified operation of public water projects, water leasing, and financial transactions in order to satisfy the needs of the different stakeholders. After years of negotiations within Arizona, an agreement was reached and was ratified by Congress in 1988 (Checchio and Colby 1992). Other negotiated agreements that involve tribal water disputes and voluntary water sales, exchanges, and leases include the Carson-Truckee Pyramid Lake Water Rights Settlement (ratified by Congress in 1990), and the Fort Hall Indian Water Rights Settlement in Idaho (also ratified in 1990). The Carson-Truckee Settlement uses economic incentives to further urban water conservation. The agreement requires urban water providers to install water meters and charge their customers based on the volume of water used (Checchio and Colby 1992).

Turning to examples of compulsory mechanisms, a 1989 Ninth Circuit Court ruling reallocated Stampede Reservoir on the Truckee River system from urban supply to fishery restoration. This involuntary water reallocation motivated the urban interests that had relied upon Stampede Reservoir to negotiate in earnest with the Pyramid Lake Paiute Tribe and other fishery advocates. The resulting 1990 settlement addresses many aspects (though not all) of long-standing conflicts over regional water use (Checchio and Colby 1992).

Administrative actions also have forced changes to assist in resolving interjurisdictional water disputes. The new operating rules for Glen Canyon Dam on the Colorado River promulgated by the United States Department of Interior in 1987, for instance, addressed a dispute among states, tribes, federal agencies, and hydropower users over managing the dam to accommodate environmental and recreational needs along with hydropower production (National Research Council 1996).

Legislative bodies also take actions to resolve intergovernmental disputes. For instance, the Texas legislature acted in 1993 to create a regulatory framework for managing groundwater pumping in response to ongoing litigation over endangered species dependent on the waters of the Edwards Aquifer. That legislation has encountered numerous impediments to implementation as irrigators resist regulation of their pumping. The legislation does provide for voluntary acquisitions of water from willing sellers to ease the burden of accommodating endangered species, urban growth, and agricultural water needs (Edwards Aquifer Act 1993).

In summary, both compulsory and voluntary mechanisms have proved valuable in implementing changes in water allocation to assist resolution of water-related environmental disputes. In the next section, the strengths and weaknesses of compulsory and voluntary mechanisms are compared.

COMPARING THE EFFECTIVENESS OF VOLUNTARY AND COMPULSORY STRATEGIES

Comparative evaluation of reallocation mechanisms requires criteria. The eight criteria presented here were developed after examining dozens of complex interjurisdictional water conflicts in the western United States, many of which have extended over several decades (d'Estrée and Colby 2000b; Checchio and Colby 1992; National Research Council 1992). The criteria were developed as part of a framework for evaluating "success" in resolving environmental disputes, including comparison of litigation, administrative remedies,

legislation, and negotiated agreements as dispute resolution mechanisms.¹

There are several reasons to evaluate strategies that can assist dispute resolution by altering water allocation and management. Policymakers and the public require accountability for the manner in which water conflicts are resolved. Public agencies often are stakeholders in conflicts. Public resources are expended in grappling with conflicts and issues of public interest – such as water quality, endangered species, and management of public water projects – frequently are the subject of the disputes. Public officials want to know how much money, time, and other resources were expended, and whether the costs incurred were justified by the positive outcomes of the dispute resolution process. In addition to providing accountability to elected officials and the public, evaluation also assists in learning which strategies most effectively resolve disputes.

The first four criteria involve economic considerations. Research on case study disputes indicates that these economic criteria are difficult to apply to actual cases because case-specific record keeping by disputants on costs and benefits is not yet common and some financial information is confidential. Nevertheless, these criteria are presented here in the hope that systematic documentation of disputes (as developed and applied in d'Estrée and Colby 2000b) will make it possible to apply these criteria more rigorously to cases in the future.

Different levels of conceptual and empirical rigor can be invoked to economically evaluate a particular dispute resolution process. In order to determine whether a particular dispute resolution process and the outcome achieved is “worthwhile,” it would be necessary to identify all current and future benefits, to quantify them in dollars, and then to weigh the benefits against the costs. If the benefits were found to outweigh the costs, then the process and outcome could be characterized as worthwhile in the sense that they returned more in benefits than were expended in costs. If one wishes to document that the process used was the best possible process for the case, it would be necessary to estimate what the costs and benefits would have been if an alternative process had been used, and the likely outcomes of alternative processes. This could involve comparing actual litigation to a hypothetical negotiated agreement, for instance. This sort of counterfactual comparison may be possible in some cases, but construction of a hypothetical process and outcome is fraught with difficulties. Another approach is to examine actual costs and benefits in parallel sets of similar cases that were resolved using different processes. Such rigorous inquiry is not currently possible given the

absence of comparable data across similar cases resolved using different mechanisms. Over time, with a sufficiently large number of carefully documented cases, it will be possible to say more about the costs and benefits of litigation, negotiated transactions, administrative actions, and other means to resolve environmental disputes.

The criteria discussed here focus on costs, although the criteria *perceived economic efficiency* considers stakeholders views on whether benefits outweighed costs. Analysis of cases indicates that quantification of dispute resolution benefits (such as improved working relationships and reduced hostility) is very difficult. D'Estrée and Colby (2000a) take the approach of characterizing benefits in descriptive terms rather than quantitatively. Costs are a key concern in resolving interjurisdictional water disputes and three criteria related to costs are discussed here: costs of the process used to achieve some form of resolution (a court ruling, market transaction, legislative mandate, or negotiated agreement), cost effectiveness in implementing the outcome, and the distribution of process and implementation costs among the stakeholders.

The first criterion discussed here is “*reasonable*” *process costs*. Process costs include money, staff time, and other resources expended to achieve resolution of a dispute through a voluntary agreement, litigation, or other means. Costs are reasonable if they are in proportion to the magnitude of the problem that is the subject of the dispute and the values at stake. While litigation has the reputation of being expensive relative to other strategies, preliminary cost data from water conflicts in the western United States are inconclusive due to incomplete data on costs incurred by public agencies and stakeholders. Process costs may be similar in litigation and negotiation processes because pursuit of a voluntary agreement often is accompanied by preparations to litigate in the event that negotiations break down, and to provide a credible threat of legal action in order to further negotiations. Data sometimes is available with which to evaluate the reasonableness of process costs. For instance, the most recent phase of a fourteen year dispute between Kansas and Colorado involves awarding damages to Kansas for Colorado's overuse of an interstate river. The economic value associated with the overuse by Colorado is estimated at \$60-80 million. The Colorado legislature has authorized expenditure of \$11 million to defend Colorado's position in the case (Water Strategist 1999, p.12). Colorado can benefit from this expenditure in several ways. Legal and economic expertise retained with these funds may succeed in minimizing the compensatory payments required to be paid to Kansas, protecting Colorado water users access to interstate waters, and

setting precedents beneficial to Colorado in future disputes. It is too early to ascertain whether benefits will outweigh Colorado's expenditures.

Any outcome that is achieved, whether through litigation or negotiations, must be implemented in order to address the environmental issues in dispute. Cost effectiveness examines whether implementation is accomplished in a least-cost manner, given alternative methods available to make more water available for environmental needs and to accomplish other implementation goals. With respect to *cost-effective implementation*, implementation costs may be higher under court rulings because courts are not required to consider costs as an element in crafting their ruling. Rather, courts are focused on rights and on consistency with the existing body of law (Horowitz 1977). In contrast, legislative mandates, administrative actions, and agreements negotiated among stakeholders are likely to carefully weigh costs for several reasons: because of a political desire to limit financial burdens on taxpayers, firms, and property owners, and because those parties negotiating the agreement will be bearing some or all of the costs themselves.

Only anecdotal and incomplete data is available on process and implementation costs for a cross section of cases, so hypotheses about the relative costs of litigation and negotiated agreements cannot be verified empirically. Cost comparisons are further confounded by the fact that stakeholders receive different outputs for the money they invest in different processes. In litigation, the most desirable payoff for those seeking to resolve a dispute is a ruling that favors their position in the particular case at hand and that also has strong precedential value enhancing their position in future disputes. In market transactions, the payoff is acquisition of the water needed to resolve a specific dispute. Different strategies buy different goods and so it is difficult to meaningfully compare the magnitude of process and implementation costs across cases resolved in different ways.

In light of difficulties with documenting and quantifying costs and benefits, *perceived economic efficiency* is used as a criteria to assess whether stakeholders believe that the benefits they experience outweigh the costs for a particular dispute resolution process and outcome. This criterion also relies upon independent economic analyses of the case to indicate how social benefits compare to social costs. Independent analyses for specific cases sometimes are conducted by academic researchers or by a federal agency with watchdog responsibilities – such as the United States General Accounting Office, the Congressional Budget Office, or the Office of Management and Budget. Preliminary data suggest that litigation is rarely perceived as economically efficient, except from the winner's perspective, and that negotiated

agreements are perceived as worthwhile by the signatories.

Financial Feasibility considers the mechanisms used to provide money for implementation and different parties' ability to pay their share of the financial costs incurred to implement a solution. In general, litigation determines costs that must be paid by specific litigants, who then must decide how to raise the money. The courts do not concern themselves with financial mechanisms because such issues fall outside the legal matters that are their focus. Negotiated agreements, in principle, could identify the most advantageous financial mechanisms collectively available to cover implementation costs. Some stakeholders (municipalities for instance) can issue bonds; others (tribes, irrigation districts) may be eligible for low cost federal loans. To date, however, negotiated agreements generally have not dealt with financing issues and more attention to this matter would be beneficial.

Voluntary and compulsory approaches do appear to differ significantly with respect to *fair distribution of costs* among parties. In a voluntary process, the initial costs of getting the process started fall on those parties seeking to resolve the conflict. They must call the relevant stakeholders together, initiate a bargaining process, and offer financial (or other) inducements to persuade right holders to sell or lease their water, or to consent to changes in dam operations and water management. In a litigation framework, the burden of initiating litigation also falls on those who most urgently seek to resolve the conflict. However, once the legal process is set in motion and begins to be taken seriously by affected parties, they too must spend money on attorneys, experts, and court costs. The cost burden is spread among the stakeholders, providing impetus to settle the problem. Perceptions of fairness regarding cost distribution vary among stakeholders.

Flexibility is another criterion for evaluating water reallocation strategies used to settle disputes. Ideally, any water management regime (new operating criteria for a dam, for example) that results from a dispute resolution process will be responsive to changing conditions, unexpected events, and to the changing needs of stakeholders, the site, and the species that are the subject of the dispute. For instance, some disputes involve restoration of riverine ecosystems and fish species. This may require flows that vary seasonally and flood flows every few years to mimic the natural hydrograph. Negotiated agreements, legislative solutions, and agency actions are likely to consider such specific environmental needs, if necessary to resolve the dispute. Negotiated solutions typically consider drought in regions that have experienced drought previously. Court rulings, on the

other hand, are unlikely to mandate responsiveness to changing resource needs over time. Further litigation may ensue if the actions the court orders prove inflexible over time. While market transactions introduce a desirable element of flexibility, traditional market purchases of water rights may not be sufficiently flexible to address disputants' environmental concerns beyond improved baseline stream flows. For disputes in which restoring a wetland or a species is a key issue, complex agreements with upstream dam operators and irrigation districts may be needed to manage rivers in ways that mimic natural conditions in terms of flow levels, water temperature, and flood magnitude and frequency.

Incentive compatibility in the signals created by a dispute resolution process and its outcome also is a criterion to evaluate changes in water management and allocation. Incentive compatibility means that the negotiated agreement, court ruling, or legislation generates signals that promote, rather than obstruct, water use patterns that are consistent with resolving the conflict. For instance, water prices set by an administrative agency can be compatible with resolving a conflict over regional water scarcity if prices are structured to encourage water conservation. Subsidized water prices, or failure to link water costs to volume of water used, would not be incentive compatible with resolving a dispute in a water-scarce region. Market transactions create incentives in the form of a known market price for water rights. The market price signals water users that water has value beyond their own immediate use of it. Irrigators, for example, will realize that on-farm water conservation may enable them to sell or lease the water no longer needed for irrigation – providing an incentive for more efficient water use. Judicial processes send a different type of incentive signal – deterring violation of established environmental policies that would land the violator in court, with its attendant costs and uncertainties.

Another important criterion for comparing different mechanisms to resolve a conflict is their ability to stimulate a *paradigm shift*. A paradigm shift implies a change in the way stakeholders approach water management and problem solving. Such shifts are desirable to the extent that they help break up outmoded policies and institutions that no longer are consistent with

modern demands for water to support recreation and restore endangered species. Court rulings, which are used as a basis for interpreting the law in future cases, clearly can precipitate a paradigm shift. However, administrative actions can also be paradigm shifters, as the 1990 EPA veto of Two Forks Dam amply illustrates (U.S. EPA 1990). Market transactions can be path breaking when the transaction is the first of its kind in a region – the first purchase and transfer of a water right to instream flow maintenance, for instance (MacDonnell, 1989). Innovative transactions can pave the way for more widespread use of the market to resolve conflicts by forcing policy makers to clarify how water rights can be applied to a new purpose – such as restoring a wetland. One of the essential elements in a paradigm-shifting event is a shift in bargaining power among stakeholders. A court ruling favoring environmental uses of water puts environmental advocates in a stronger bargaining position for future negotiations. An administrative decision protecting stream flows gives river advocates a stronger voice in subsequent disputes over water management. A multiparty agreement to alter dam operations in order to assist fish recovery sends the signal that such a change can be accomplished in other river basins.

Improved ability to solve subsequent problems is another criterion with important economic ramifications in regions where stakeholders confront a series of water management problems over time. Negotiated agreements provide clear advantages over compulsory processes because they engage stakeholders in identifying strategies to resolve the conflict, debating their merits, allocating the cost burden, and building consensus for a particular approach. The process gives the stakeholders experience in working together and this can make it easier to solve the next problem that faces the group (the next drought, the next species listing . . .). In contrast, litigation encourages an adversarial approach among the parties rather than a problem-solving stance, and does not help lay the groundwork for future cooperative efforts.

To summarize, eight criteria for comparing voluntary and compulsory mechanisms have been introduced. Figure 1 summarizes the criteria and contrasts litigation and negotiated transactions for each criterion.

Figure 1: Criteria for Comparing Voluntary and Compulsory Mechanisms

	Voluntary	Compulsory
<i>Criteria</i>	<i>Negotiated Transaction</i>	<i>Litigation/Court Ruling</i>
“Reasonable” Process Costs	controlled by participants	courts not required to consider costs
Cost-effective Implementation	costs considered by participants	courts not required to consider costs
Perceived Economic Efficiency	perceived efficient by signatories	perceived efficient by “winner,” if anyone
Financial Feasibility	may specify financing	financial mechanisms ignored
Fair Distribution of Costs	restoration advocates	distributed across litigants
Flexibility	can be tailored to case needs	court may not recognize disputants’ needs
Incentive Compatibility	price ⇒ value of resource	costs and uncertainties deter recurrence
Paradigm Shift	innovative transaction may be a breakthrough	precedent set for future cases
Improved Ability to Solve Subsequent Problems	builds working relationships	discourages cooperation, information sharing

EFFECTIVE USE OF VOLUNTARY AND COMPULSORY MECHANISMS

Compulsory and voluntary mechanisms each have advantages and limitations. In the United States, both are available, and in fact complement one another. One of the key observations from tracking several dozen cases involving water and environmental conflict is the interplay between compulsory and voluntary strategies to resolve disputes over water use and further environmental protection.

On the surface a market transaction and litigation may appear to be opposite strategies. The market approach unquestioningly accepts existing property rights and fully compensates owners who sell their land or water. Litigation invokes the law to force changes in water management, and may constrain the exercise of water rights or redefine them altogether. However, on closer inspection, the distinctions begin to blur. Like court rulings, market transactions can generate heated reactions. This occurs when the transaction negatively affects third parties even though the buyer and seller have reached a mutually acceptable arrangement (National Research Council 1992). Transactions frequently are

tinged with the compulsion of looming financial crisis, litigation, or regulatory change, and so may not be purely voluntary. Just as market purchases are not always free of hostility, litigation is not always hostile. “Friendly litigation,” in which an environmental organization sues a federal agency to compel it to perform its role (to designate critical habitat for a listed species, for instance) has played a crucial role in many water disputes. In such cases, the agency may have been prevented from actively pursuing species or wetland protection due to political pressures from water users or due to lack of staff and funds. A lawsuit initiated by environmental advocates gives impetus for agency action to address the environmental problem and this may help resolve the water dispute. Such litigation is an indispensable tool for creating momentum to resolve environmental conflicts over water (National Research Council 1992; Western Water Policy Review Advisory Committee 1998).

In many dispute resolution efforts, two or more mechanisms are used to accomplish changes in water use and management. The interactions between market transactions, litigation, and regulatory change often proceed as follows in western United States water conflicts (d’Estrée and Colby 2000b; Checchio and Colby

1992; and National Research Council 1992). An environmental group or a tribal government becomes concerned with the decline in a specific resource; a freshwater fish species, for example, and starts to investigate the issue and to talk with water users whose activities are affecting the fishery. The environmental advocates find that nearby water users are content with the status quo and have little reason to alter their water use. The environmental or tribal advocates identify legal grounds to litigate in order to protect the resource – such as the Public Trust Doctrine in the 1983 Mono Lake case; the Endangered Species Act in the Pyramid Lake case (National Audubon 1983; Pyramid Lake Tribe v. Hodel 1989). Litigation commences. As the discovery period proceeds, other parties become convinced that the environmental or tribal advocates will follow through on gaining protection for the fish and have the legal expertise and resources to do so. The stakeholders begin talking; some changes in water use and upstream dam operations are proposed. Water users argue that they must be compensated for using less water in order to benefit the fishery. A partial agreement is worked out that depends on public funds for water purchases, for water conservation assistance, and to support fishery restoration projects. The stakeholders work to achieve enabling legislation and appropriations. Implementation of water purchases, new water management practices, and fish recovery projects begin. This mix of threats to compel changes in water management through litigation, negotiations among stakeholders, market transactions, and legislation is quite typical of dispute resolution efforts involving water in the western United States.

Compulsory mechanisms provide impetus for negotiated agreements and for market transactions. Without the threat of litigation, there is little motivation for irrigation districts and cities to willingly alter their customary uses of water. Both voluntary and compulsory approaches are available in the United States. That is not the case in much of the world. Either protective statutes on which litigation can be based do not exist, or such statutes exist on paper but the political will and resources to enforce them are absent and so they are not useful in compelling changes in water management. Environmental advocates in much of the world must rely on voluntary agreements and negotiated transactions to accomplish their goals. In international disputes, there also may be no effective forum to compel one nation to alter its water diversions or to take other steps to address the dispute. Consequently, voluntary mechanisms are important in resolving water disputes among nations.

In the absence of compulsory mechanisms that require water users to make changes needed to resolve the

dispute, the burden of negotiating water acquisitions and changes in management practices falls on those organizations spearheading dispute resolution efforts. These organizations may be tribal governments, environmental advocacy groups, public agencies, or downstream nations suffering from water diversions by upstream countries. Without any threat of litigation or administrative curtailment of customary water uses, money is the primary motive that can stimulate water users to make changes helpful to resolving the dispute. Costs are borne by those seeking to resolve the conflict. Customary resource users are fully compensated at fair market value and are free to accept or reject proposals to use their water. They have no compulsion to come to the negotiating table.

If voluntary transactions are to be an effective tool for resolving disputes over water use and environmental quality, action is needed at two levels. First, some organization has to take the lead in pioneering water purchases and leases that are innovative enough to meet disputants' needs. Examples include agreements that tie dam releases to seasonal fishery needs, or dry-year water contracts under which irrigation diversions can be curtailed when stream flow levels fall below habitat requirements. Second, laws and policies need to be updated to make it easier to implement voluntary agreements and transactions. For instance, in the mid-1980s most western United States did not provide mechanisms to acquire water rights and change their use to maintaining lake levels and instream flows. Environmental advocates persisted in early efforts to transfer water rights to satisfy environmental needs, inducing western states to create procedures to dedicate water for environmental purposes. Policies ripe for updating today in the United States include those governing the uses of public project water, re-licensing of dams, and operation of public water projects.

CONCLUSIONS

To summarize, compulsory and voluntary mechanisms are available to accomplish changes in water allocation and water management needed to help resolve environmental disputes. Different strategies have differing strengths and weaknesses. Market mechanisms are expensive when the lurking threat of compulsory change is absent. Market transactions require money to buy out water right holders and costs fall upon those seeking the change in water use. Litigation and the force of law are cumbersome without the flexibility of negotiated transactions and agreements tailored to the specific needs of a case. Disputes over water and the environment in the American West demonstrate the

complementary use of litigation, negotiated agreements, and market transactions to resolve disputes. This paper argues that a successful strategy to resolve disputes over water and environmental quality is one that has reasonable process costs, includes realistic financial mechanisms to cover costs, is perceived as worthwhile in terms of benefits exceeding costs, is cost effectively implemented, and is one for which costs are fairly distributed. In addition, successful mechanisms to resolve water disputes must provide the flexibility to adapt to changing resource needs, stimulate paradigm shifts in addressing future conflicts, and improve the disputants' ability to resolve subsequent problems.

AUTHOR

Dr. Bonnie G. Colby is a natural resource economist whose research and teaching focus on the economic implications of environmental policy. Her Ph.D. is from the University of Wisconsin and she has been on the faculty of the University of Arizona since 1983.

ACKNOWLEDGEMENTS

The research reported here was supported by a grant from the Udall Center for Studies in Public Policy and by a "Water and Watersheds" grant from the National Science Foundation/U. S. Environmental Protection Agency joint grant program.

REFERENCES

- Anderson, T. L., and P. Snyder. 1997. *Water Markets: Priming the Invisible Pump*. Washington D.C.: Cato Institute. p. 47-66.
- Carson-Truckee Water Conservancy District v. Clark. 1984. 741F.2d, 257.
- Carson-Truckee Water Conservancy District v. Clark. 1985. cert. denied 105 S.Ct. 1842.
- Checchio, E., and B. Colby. 1992. *Indian Water Rights: Negotiating the Future*. Tucson, Arizona: University of Arizona.
- Clinton, W. J. 1998. "Designation of Interagency Committees to Facilitate and Encourage Agency Uses of Alternate Means of Dispute Resolution and Negotiated Rule Making." Memorandum for Heads of Executive Departments and Agencies. May 1.

Washington D.C.: The White House.

- Colby, B. G. 1998. "Negotiated Transactions as a Conflict Resolution Mechanism." in M. Rosegrant, A. Dinar, and W. K. Easter eds. *Markets for Water - Potential and Performance.*, Boston: Kluwer Academic Publishers, p. 72-94.
- Congressional Budget Office – Natural Resources and Commerce Division. 1997. "Water Use Conflicts in the West: Implications of Reforming the Bureau of Reclamation's Water Supply Policies." Washington DC: United States Government Printing Office. Chapter 4.
- D'Estrée, T., and B. Colby. 2000a. *Guidebook for Evaluating Success in Environmental Conflict Resolution*. Working Paper. Fairfax, Virginia: George Mason University – Institute for Conflict Analysis and Resolution.
- D'Estrée, T., and B. Colby. 2000b. "Analyzing Successful Resolution of Environmental Disputes." Draft Book Manuscript.
- Dunning, H. 1994. "The End of the Mono Lake Basin Water War." *California Water Law and Policy Report*. November: 27-31.
- Edwards Aquifer Act. 1993. Texas legislature, enacted. May 30.
- Grand Canyon Protection Act. 1997. United States Congress.
- Horowitz, D. L. 1977. *The Courts and Social Policy*. Washington D.C.: Brookings Institution Press. p. 28-39.
- Kenney, D. and W. Lord. 1999. "Analysis of Institutional Innovation in the Natural Resources and Environmental Realm: The Emergence of Alternative Problem-Solving Strategies in the American West." *Natural Resources Law Center Research Report*. No. 12. Boulder: University of Colorado School of Law.
- MacDonnell, L., T. Rice, and S. Shupe. eds. 1989. *Instream Flow Protection in the West*. Boulder: University of Colorado Natural Resource Law Center.
- Marston, E. 1987. "Ripples Grow when a Dam Dies." *High Country News* 26(20): 1-6, Paonia, Colorado.
- National Audubon Society v. Superior Court. 1983. 33Cal.3d419, 658 P. 2d709, 731,189 Cal Rptr.

39,368, cert. denied 464, U.S. 977.

National Research Council. 1992. *Water Transfers in the West: Efficiency, Equity and the Environment*. Washington, DC: National Academy Press.

National Research Council. 1996. *River Resource Management in the Grand Canyon*. Washington, DC: National Academy Press.

Natural Resources Law Center. 1996. *The Watershed Source Book*. Boulder: University of Colorado School of Law.

Public Law. 1992. 102-575 HR 429. Title XXXIV.

Pyramid Lake Tribe of Indians v. Hodel. 1989.

Pyramid Lake Tribe of Indians v. United States Dept. of Navy. 1990. 898 F.2d. 1410. 1420. (9th Cir.).

Schiffer, L. J., and R. Juni. 1996. "Alternative Dispute Resolution in the Department of Justice." *Natural Resources and Environment* 11:11-12, 66, Chicago: American Bar Association.

Sierra Club v. Lujan. 1993. WL 151353, 3 (W. D. Texas).

Tompkins, R. E. 1996. "Mediation, the Mediator and the Environment." *Natural Resources and the Environment*: 27-30, 68; Chicago: American Bar Association.

United States Bureau of Reclamation. 1997. "Achieving

Efficient Water Management." Washington D.C.: United States Government Printing Office. p. 2-18.

United States Environmental Protection Agency. 1990. Final determination vetoing Two Forks Dam, November 23. High Country News. Paonia, Colorado. Feb. 25, 1991. p. 3. (The courts upheld the EPA veto in Alameda Water and Sanitation District v. Reilly, 930F. Supp. 486 (D. Colorado, 1996)).

Water Strategist. Claremont California: StratEcon. published quarterly.

Western Governor's Association Principles for Environmental Management in the West. 1998. Resolution 98-001, Denver Colorado, February 24.

Western Water Policy Review Advisory Commission. 1998. Final Report, "Water in the West: Challenge for the Next Century." Washington D.C., June.

ENDNOTE

¹ The full body of criteria that were developed, along with a research instrument for collecting the data needed for evaluation, are reported in d'Estrée and Colby, 2000a. Only a few of the full set of twenty-six criteria are discussed here. D'Estrée and Colby, 2000b applies the framework to case studies and compares different resolution strategies.