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Economic Evaluation of Mechanisms to Resolve Water Conflicts

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ABSTRACT *Conflicts involving water resources are pervasive and the costs of the conflicts themselves and attempts to resolve them represent a substantial social investment. Several mechanisms are used to resolve water disputes: litigation, market transactions, political deal-making, and alternative dispute resolution techniques. This article examines the types of costs and benefits associated with resolving water disputes and proposes several criteria to be used in evaluating the economic aspects of dispute resolution mechanisms.*

Introduction

Conflicts over preserving endangered species, maintaining water quality, restoring natural areas damaged by human activity and allocating scarce water supplies are pervasive. Water conflicts and attempts to prevent and resolve them represent a substantial social investment. However, there has been little effort devoted to systematically identifying the types of costs involved in water conflicts or to measuring costs for actual conflicts. Instead, the existing literature largely contains anecdotal material on costs. Moreover, while there is widespread discontent with litigation and behind-closed-doors political deals as a means to resolve conflicts, there has been no systematic analysis of the costs and benefits of alternative approaches. Alternative dispute resolution (ADR) processes include mediation, consensus building and other forms of assisted negotiation, arbitration, early neutral evaluation, negotiated rule making and various hybrids thereof.

Examples of ADR applications to environmental issues in the USA include the Environmental Protection Agency's (EPA) negotiated rule-making process and federal agency involvement in watershed coalitions and other local problem-solving forums. Most of the 50 US states now have some programmes to encourage use of ADR in conflicts involving state agencies (Policy Consensus Initiative, 1997). In 1998, the US President specifically directed each federal agency to take steps to promote greater use of ADR techniques and established an interagency ADR working group to encourage and facilitate agency use of ADR (Clinton, 1998). Public sector enthusiasm for, and financial support of, ADR raises the question of what positive outcomes ADR produces that may not be achievable otherwise.

This article examines the costs and benefits of different strategies to resolve conflicts, focusing on western US water conflicts. The paper draws on researchers' interviews with representatives for environmental groups, Native American tribes, cities, and irrigation districts and with attorneys and mediators who work with water conflicts. Economic constructs for analysing environmental conflicts and evaluating different conflict resolution processes are introduced, referring to a stylized water dispute typical of the US West. In this hypothetical dispute, one or more parties (environmental organization, tribal government or federal wildlife agency) want water reallocated from current agricultural uses and hydropower production in order to protect or restore environmental and recreational amenities (e.g. streamside habitat, seasonal flows for fish, whitewater recreation). Stakeholders who benefit from the current water allocations oppose the proposed reallocations, arguing that their rights would be violated and that unfair economic losses would be imposed (Colby, 1998).

Characteristics of Western US Water Conflicts

Water conflicts are ongoing, with multiple and successive rounds. This occurs because water cycles are dynamic, subject to drought and flooding. The parties must also grapple with changing technical knowledge, and with new social values and concerns regarding water and the environment. The ongoing nature of water conflicts implies that parties have different behaviour than in a one-time dispute, knowing they will meet again. They have the opportunity to learn cumulatively over time as they respond to changing conditions. Their reputation for credibility and sticking to agreements matters and they have an incentive to build better working relationships and institutions to address water problems, so that the next round of conflicts can be solved more readily.

Environmental conflicts are multicultural in the broadest sense, involving urban and rural ways of life, and ethnically and culturally diverse populations. Cultural differences affect how water conflicts are addressed. For instance, in traditional Hispanic communities shortages are shared proportionally, not by the prior appropriation principle that the most senior rights get their water first.

The parties involved in water conflicts each have diverse values and stakes in the outcome, differing legal rights and diverse financial capabilities that affect sharing the costs of a conflict resolution process and of solving technical problems. Their financial status also affects their 'staying power' in the conflict resolution process, lending credence to the adage 'the one with the deepest pockets wins'. Money is a central issue, as complex water conflicts can involve hundreds of millions of dollars in land, water, lost income, technical studies and legal fees (Colby & Bingham, 1997).

Legal, economic and technical information is central in water conflicts. The role of information is complex because parties inevitably have differing perceptions regarding the technical nature of the problem; who has what legal rights; the likely outcome of litigation; costs to solve technical problems; and how the costs should be divided up among the stakeholders. The widespread use of 'duelling' experts adds to the complex and confusing role of technical information. In such 'battles of the experts', true differences over policy are confounded with differences in models and theoretical assumptions. Rather than utilizing experts to problem-solve and generate new options, expertise is used to justify previously held competing positions.

Conflict Resolution Mechanisms

Resolution of water conflicts can be pursued through many different processes and combinations of processes: litigation, voluntary bargaining (with or without a mediator), political manoeuvring to change the rules (e.g. to change the operating criteria for a dam or to alter state policies to protect streamflows) and market transactions. Market transactions involve no dispute over property rights, unlike the other processes. Market transfers focus on leasing or buying water, rather than on questioning current uses and rights to use water. Litigating and bargaining over access to water often involve questioning the legal status of current uses in order to stimulate changes in water use and ownership patterns.

Litigation

Litigation may be pursued because one or more parties genuinely desire a court ruling that will set a precedent or clarify a specific issue. In conflicts that are expected to have multiple rounds, a party may want a court ruling that benefits them in future rounds *more than* they want to resolve the current issues being disputed. They believe a favourable ruling will give them a stronger position for bargaining in the future. Litigation is used to enhance bargaining power, to provide a credible threat at the negotiating table. Litigation may be attractive to wealthier parties who have superior 'staying power' in an expensive process. Water conflicts are costly when channelled through the traditional adversarial system. It is not unusual for lawsuits and rounds of appeals to continue for 10–15 years, with corresponding expenditures on discovery and expert consultants.

Many aspects of litigation contribute to inefficient problem solving (Horowitz, 1977). First, adjudication is focused on rights and addressing 'wrongs', deferring discussion of alternatives and costs. "If a person possesses a right, he possesses it whatever the cost ..." (Horowitz, 1977, p. 34). The judiciary has little flexibility to experiment or adjust its techniques to the problems it confronts. Adjudication is also 'the supreme example of incremental decision making', able to focus on problems only piecemeal. The judge can rule only on those specific issues before him or her. This results in separation of interrelated policy questions, with unfortunate consequences.

Because courts respond only when litigants come to them, litigants may be unrepresentative of the affected parties and may not represent broader public preferences. Water conflicts affect local economies and quality of life and so citizens' groups are usually concerned, in addition to government agencies and water users. The involvement of many parties implies the interaction of many agendas and alternative framings of the conflict. These are difficult to accommodate within a litigation context. Finally, as a result of the focus on rights and duties rather than on problems, judges focus their decision on 'antecedent fact', behaviour in the past, rather than on 'consequential facts', the impact of the court's decision on behaviour in the future. Once a court ruling is issued, the conflictual and adversarial nature of litigation stimulates the 'losers' to appeal the decision or to work to erode implementation of the decision. Many court-ordered solutions prove to be short term in nature and plant seeds for related future conflicts.

Litigation has its advantages in specific cases. Litigation and political power contests serve an important purpose in giving the parties a more realistic picture of what outcomes are achievable. The clarification provided by a court ruling can be cycled back into more productive negotiations. If an environmental organization has a strong legal case, then litigation can be more cost effective for it than mediation/consensus building. Consensus-building processes are labour intensive, involving committees, subcommittees and study groups. In such processes, it is difficult for environmental groups to send staff to each and every meeting and their representatives are outnumbered by corporations and agencies. Most litigation initiated by environmental and consumer groups is filed against federal agencies in federal courts. This type of litigation has a high payoff when it forces agencies to enforce their environmental protection mandates.

Market Transactions

The conflict-resolution mechanism economists most commonly advocate is the market: voluntary exchanges between those who have water rights and those who want access to water. Market transactions, while typically not framed as a conflict resolution process, are used in the US West to settle disputes over obtaining water for environmental needs. The Nature Conservancy often takes this approach: leasing water for instream purposes, buying private land that contains critical habitat, negotiating conservation easements to constrain future development. A market transaction is not workable if the disputants are in direct conflict over who actually holds rights to the disputed water supply. A market transfer implies that the parties to the transaction agree that the seller has a valid right to the assets being transferred.

If an environmental group wants to obtain public project water that currently is used by an irrigation district, they have two broad strategies to consider: buy or lease the rights to use project water, or challenge the irrigators' rights through litigation or political action to change the rules under which water is allocated. Organizations that do not want to exacerbate conflict by challenging status quo water allocations may prefer a strategy of market acquisitions, though these are *not* always free of controversy. The water history of the US West is replete with vehement objections to water transfers by nearby communities, even though the buyer and seller had negotiated a transaction that satisfied their own interests.

Litigation involves high uncertainty and may have higher up-front costs than simply buying water rights. However, a precedent-setting ruling to reallocate project water for endangered species can give environmental advocates more bargaining power in future disputes. If recreational and environmental interests obtain a court ruling favouring the principle of keeping water instream, they have won a more valuable prize than if they negotiate with farmers to obtain a little more water in one particular creek. The long-run payoff from litigation may be higher than the payoff from a market solution.

Alternative Dispute Resolution Processes

Alternative dispute resolution (ADR) processes include mediation, consensus building and other forms of assisted negotiations, arbitration and various hybrids thereof. ADR is characterized by a process that tries to separate value

differences from technical issues, and one that builds consensus and investment in a negotiated solution. Proponents of ADR believe the results are more durable, efficient and mutually acceptable. For the purposes of comparing ADR with market transactions and litigation, we primarily use ADR here to refer to professionally assisted mediation. ADR processes are more far ranging and diverse than discussed here. See Bingham (1986) for further discussion.

Parties may choose to retain the services of a mediator as an alternative to, or in addition to, litigation. A mediator attempts to guide the parties toward an acceptable outcome, by being innovative in the search for areas of agreement and compromise and by utilizing external resources to expand options. The mediator may have influence through “general reputation, familiarity with negotiation practices, technical knowledge, and control of communication” (Bacow & Wheeler, 1984, p. 158). The role of the mediator is one of convening the forum, inviting relevant parties, engaging in problem solving, caucusing with the parties individually, directing the process, and offering suggestions toward solutions. In mediation, the role of technical experts can shift to problem solving and generating options.

The role of ADR to date has been limited in western US water conflicts. Most water conflicts are still addressed by litigation or by bargaining among the disputants without a professional facilitator or mediator. Typically, attorneys for one or more parties will take on coordination and leadership tasks necessary to keep a negotiation process moving.

The routes by which ADR has occurred in US water conflicts include:

- pre-litigation: parties agree to try mediation hoping to avoid litigation;
- court orders a pre-trial settlement conference, assigns a mediator to preside;
- parties agree to put litigation in progress on hold, while they try mediation;
- public agency provides a staff member or funding to mediate a conflict;
- legislature creates working group and funds facilitator to resolve specific issue.

Numerous roadblocks exist to more and better use of ADR in water conflicts. First, there is a widespread perception that water problems can be solved by technical experts and by spending money on a technical fix (especially taxpayers’ money). Human dimensions of water conflict are often ignored, being outside the expertise of economists, engineers and attorneys. Classic ‘solutions’ in the West include pressuring the federal government to build a dam or buy out disgruntled water-right owners. The stakeholders may lack prior experience with, or knowledge about, ADR. In addition, there may be reluctance among disputants, their attorneys and their experts to admit that they need help from outside. The process of choosing a facilitator and splitting costs of ADR can raise control and power issues among the disputants. There also may be a lack of confidence that a facilitator can understand technical and legal complexities sufficiently to help the parties.

Cost savings may not provide an inducement for ADR. ADR is not necessarily less expensive in terms of up-front costs. This is so because often the parties simultaneously prepare for litigation, or litigation is ongoing—concurrent with alternative dispute resolution. To cease to prepare to litigate can be seen as a weakness and thus be a disadvantage in negotiations.

The rising popularity of ADR is reflected by state and federal agencies sponsoring and participating in ADR processes. ADR (consensus problem solv-

ing among parties to a dispute facilitated by a professional with expertise in group processes such as a mediator, judge or trained agency staff) is proffered as a new and superior way to address water disputes. To evaluate and compare litigation, informal bargaining, political power contests and ADR, objective criteria are needed.

Economic Evaluation of Dispute-resolution Processes

Policy makers and the public require accountability for the manner in which water conflicts are resolved. Public agencies are often 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 projects—are frequently the subject of the disputes. Public officials want to know how much money, time and other resources were expended, whether the costs incurred were justified by the positive outcomes of the dispute-resolution process and whether the process used represented the best possible process.

To address these questions fully, it would be necessary to document the costs incurred by all parties to the conflict, the costs imposed on taxpayers and other groups who were not direct parties and the costs yet to be borne in implementing the outcome being analysed. Moreover, in order to determine whether the process used and the outcome achieved were worthwhile, it would be necessary to identify all the current and future benefits, to express 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 was expended in costs. If one wishes to document rigorously that the process used was the best possible process for the case, it is 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 (litigation compared with a negotiated agreement, for instance). This sort of hypothetical comparison may be possible in some cases, but is fraught with difficulties. Another strategy to compare different dispute-resolution mechanisms 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 achievable given limited data, the absence of comparable data across similar cases resolved using different mechanisms and the limited resources to study the matter. *d'Estree & Colby (2000a)* recommend a strategy of collecting available data on costs and characterizing benefits largely in descriptive terms, except where monetary measures of benefits can be obtained from other studies. 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, mediation, administrative actions, legislative remedies and other means to resolve water disputes.

Dispute-related Costs and Benefits

The literature on environmental conflict resolution and on water resource economics does not provide a systematic discussion of costs associated with conflicts and their resolution. However, there are examples of anecdotal cost data for several different types of conflicts.

Anecdotal Cost Information

The US EPA negotiated rule-making process was developed as an alternative to conventional promulgation of environmental regulations. In this alternative process, a professional facilitator convenes representatives from the affected industry and other parties, such as environmental groups and consumers. Examples of negotiated rule-making processes include regulation of wood-stove design to reduce emissions and development of small-engine emissions standards for such items as lawnmowers, weed eaters and snow blowers. In a study of 18 cases in the 1980s, the mean expenses of a private business participant in a negotiated rule-making process included 11 000 hours of professional staff time plus legal counsel, consultants and information-gathering expenses of US\$700 000 (Bingham, 1997).

Water-rights adjudications and associated negotiations to achieve tribal water settlements are ongoing around the western USA. Their purpose is to clarify the quantity and priority of rights to use water. Affected parties and observers frequently decry the expense of the adjudication process. In some regions, costs have been tracked for some of the participants. Some irrigation districts in Arizona have imposed additional assessments on member irrigators of over \$1000/acre/year to cover attorneys' fees, a notable expense for farmers. The six main parties and the state agency in Arizona have expended over \$75 million since 1974. In Wyoming's Big Horn (Wind River) proceedings, the state engineers and the state courts have expended \$35 million over a 20-year period. In Idaho, the state has spent \$20 million in 11 years. In Montana, the state agency and state courts have spent \$22 million in 15 years (Thorson, 1996). Other costs include decades of uncertainty and inability to plan for future water supplies by cities, irrigation districts, tribes and wildlife agencies. One of the New Mexico adjudications (1956 Aamodt) is the oldest active case before a federal court in the USA. The adjudications in Arizona, Montana, Washington and Wyoming all started in the 1970s and completion does not appear imminent.

Systematic Examination of Benefits and Costs

Systematic categories to guide economic assessment of water disputes can be organized according to the stage of the dispute in which costs and benefits occur. An instrument for collecting detailed data on costs and benefits (and on many other aspects of a specific environmental conflict and its resolution) is provided in d'Estree & Colby (2000a). Experience in applying this instrument to over a dozen case-study conflicts suggests that while some economic data can readily be obtained from secondary sources, such as public documents and analyses conducted by government agencies, much information is difficult to obtain without interviewing the direct parties to the conflict.

Direct costs of resolving disputes through litigation, mediation, negotiation or other processes include fees for attorneys and mediators, staff hours, consultant fees, travel costs, costs of obtaining technical information and court costs. These direct costs also represent *opportunity costs*. They are resources expended on the conflict that could otherwise have been used to buy water rights, implement water conservation measures, build infrastructure or staff other valuable efforts.

Costs of a dispute continuing unresolved (benefits of resolution) include lost economic output and productivity—crops not planted, fish not caught and

subdivisions not built. Uncertainty and inability to plan for the future is another cost, such as failure to plan for urban growth or for endangered species recovery. Environmental damages can accumulate as disputes continue, including losses of habitat and recreation quality. Working relationships decline with reduced cooperation between states, tribes, cities and irrigation districts and impaired ability to respond to other shared problems. Political and organizational costs may include bad press, loss of morale, loss of credibility and declining public confidence in the political and legal system's ability to solve problems and to sustain the quality of community life.

The costs of a dispute continuing unresolved become the benefits of achieving resolution, *if* they are costs that the parties no longer have to continue incurring once an outcome has been achieved. Costs of the dispute continuing also are important because they affect the stakeholders' incentives to resolve the dispute. In particular, the distribution of the costs affects incentives to settle. If the costs of the dispute continuing are high and affect all parties, then all have an incentive to settle. Usually, however, costs are unevenly distributed. That is, some parties benefit from the status quo and face relatively low costs of the dispute continuing. They prefer to delay reaching a settlement and to wear other parties out by imposing high costs on them. Examples include irrigation districts that benefit from current water allocations and which can impose high costs on environmental interests by impeding settlement as a species declines. Likewise, non-Indian water users may delay settlement to put off the day when water they have been using is allocated to a tribe.

Examples of the types of benefits that may be generated by resolving a dispute include:

- improved economic output, productivity:
 - additional crops planted;
 - increased fish harvests;
 - new subdivisions built;
- enhanced certainty and ability to plan:
 - planning for urban growth;
 - endangered species recovery planning;
- environmental improvements:
 - habitat restoration;
 - better recreation quality;
 - increased population of endangered species;
- political/organizational benefits:
 - better cooperation between states, tribes, cities, irrigation districts;
 - good press for stakeholders involved in settling the dispute;
 - improved organizational morale and credibility;
 - increased confidence in the system to solve problems;
 - enhanced quality of community life;
 - decreased anxiety and tension.

Social benefits can include improved water-resource data and technical knowledge and new policies and institutions such as forums, watershed councils and interagency teams. There may be increased certainty as rights are quantified and stakeholders can plan for future water needs. Problem-solving capacities may be enhanced through better working relationships and through new perceptions of how to approach complex water problems. Proponents of mediation argue that

participants in mediated agreements, in particular, gain a better understanding of other parties and enhanced ability to address future problems together.

Implementation costs are incurred following some form of resolution such as a court ruling, legislation or negotiated agreement. These costs include infrastructure costs (building dams and aqueducts), costs of achieving water-conservation standards and costs of restoring habitats. Monitoring and compliance costs include meters and gauging stations to measure water use, flow levels and water quality. Enforcement costs may include levying fines and penalties through courts or other forums. In addition, the parties may incur costs in responding to new conditions such as severe drought, a new administrative policy or a species not recovering as anticipated.

Research Questions Related to Costs and Benefits

There are a number of critical research questions that could be addressed if cost data were collected and organized in a consistent manner across a body of case-study conflicts. One such question is whether spending more money and time up-front reduces conflict recurrence? Does a more thorough and inclusive conflict resolution effort 'pay off' in reduced costs of recurrence and in improved capacity to address related problems? It would be useful to be able to compare costs across different conflict-resolution processes. Do negotiated agreements cost less to achieve than litigating to obtain a court ruling? Are implementation costs lower or higher for court rulings than for negotiated agreements? Is the resulting 'resolution' of the conflict more enduring under one type of process than another? Does one process lead to more cost-effective problem solving of future conflicts? Such questions require a long-term examination of conflicts over a complete conflict 'cycle', so that costs of the conflict itself, and of achieving and implementing some form of resolution, can be observed.

Economic Criteria for Evaluating Dispute-resolution Processes

A few criteria are discussed here at the conceptual level to illustrate how economic constructs can be useful in evaluating dispute-resolution processes. For a detailed discussion of evaluation criteria and the data needed to evaluate specific cases, see d'Estree & Colby (2000b).

Costs Proportional to Values at Stake

Ideally, costs incurred in a dispute-resolution process and in implementing a solution are related to the value of what is at stake in the dispute. If the conflict involves several million dollars' worth of water rights and the parties spend a few hundred thousand dollars to achieve an enduring and implementable resolution, then this is a reasonable investment. On the other hand, in some disputes the resources expended attempting to address the conflict seem to exceed the value of the resources being disputed. Litigation, in particular, seems to encourage excessive expenditures by stakeholders who wish to avoid becoming a 'loser' in a visible, public and adversarial process.

The magnitude of the costs of a dispute-resolution process sends incentive signals to the parties involved. If entering and participating in the process involves only negligible costs, then stakeholders may engage in the process to

settle minor and frivolous matters or to take advantage of other parties. For instance, in the western US, parties are allowed to object to a proposed transfer of a water right to a new place or purpose of use. Some neighbouring water users may have legitimate concerns and so file an objection to the proposed transfer. However, if the costs of objecting are 'too low' to the objector *and* objections create genuine costs and delays for the party proposing the transfer, then an incentive problem exists. Water-right holders who are unlikely to be affected by the proposed transfer have an inducement to file objections simply to extract something of value from transfer proponents who want them to withdraw their objection. There are highly disputed rivers in Colorado on which numerous parties automatically file objections for any proposed change, just to preserve their option to show up at hearings to comment on the proposed action. These are examples of places where the costs of filing an objection is probably 'too low' relative to the costs that objections impose on the parties seeking the transfer.

On the other hand, the costs of participating in a conflict-resolution process can also be inefficiently high. This occurs where affected parties continue to bear significant costs of an ongoing conflict because the costs and difficulties of getting the relevant stakeholders together to address the problem are prohibitive. Often the costs of the water problem are spread across large numbers of people, none of whom has enough individual incentive to tackle the problem alone. An example is that of instream flow demands for water in the western US. Water instream provides recreation and aesthetic benefits to large numbers of individuals, but the complexities of organizing diffuse beneficiaries discourages collective action. Two decades ago, most states did not recognize maintenance of instream flows as a beneficial use of water and, consequently, one could not apply for a water right for this purpose, nor could one acquire and convert an existing water right to maintain streamflows. These legal barriers prevented groups that would have liked to assure flows for fish, wildlife and recreation from doing so. Eventually, a few groups became motivated enough to undertake the costs of litigation and won court rulings allowing water rights to be used to maintain flows. Other states enacted new policies to protect streamflows after political pressure from environmental advocates and river recreation interests became significant. Policy barriers to protecting instream flows have dissipated, but costs were high for the early cases that paved the way for new policies.

Financial Feasibility

Financial feasibility examines parties' actual ability to pay for costs associated with the outcome of a dispute-resolution process. For example, many negotiated agreements to resolve disputes over tribal water claims in the US require tribes to pay for on-reservation water delivery and management costs, while capital costs to deliver water to the reservation boundaries are covered by the federal government and other parties. Financial feasibility evaluation involves identifying financial mechanisms to be used by the different parties to cover their financial obligations. In the case of a new tribal farm authorized in a negotiated settlement, water-use fees for reservation farmers might be the mechanism and financial feasibility would involve assessing farmers' ability to pay those fees.

A court ruling to resolve an interstate water dispute might require one state to make monetary payments to another in compensation for water used in

excess of an interstate water compact. For instance, the state of New Mexico was found by the courts to have violated the Pecos River Compact with Texas and, to settle the case, New Mexico agreed to pay Texas \$14 million in damages. New Mexico chose to raise the money through general state revenue sources rather than to assess charges on New Mexico water users located in the Pecos Basin. To prevent future compact violations, the state has spent about \$25 million to lease and purchase water rights in the Pecos Basin from the New Mexico irrigators whose use contributed to the interstate compact violation. The funds for water leases and purchases come from state severance tax bond funds, authorized for this purpose by the state legislature (New Mexico State Engineers Office, 1998).

Two other issues are relevant to financial feasibility. In attempts to negotiate agreements, there is a tendency to defer costs into the future through delayed capital repayment that may later prove unrealistic given the parties' actual financial resources. Another common tactic which can lead to agreements that later prove financially unworkable is to negotiate provisions which shift costs onto those who are not at the negotiating table, such as public agencies or water and power ratepayers.

Monitoring and Enforcement Provisions

Self-reinforcing incentives assist in implementation of a dispute-resolution outcome. Examples include strategically phased timing of the parties' receiving benefits in order to keep them committed to the implementation process. If one party's needs are satisfied up front, it has little incentive to comply with the long-term provisions of an agreement or court ruling that may be important to other parties. Self-reinforcing incentives reduce monitoring and enforcement costs. Court rulings are noted for lacking such incentives, as prospective violators of the ruling know that injured parties will have to reopen the case at considerable expense in order to force them to comply. Negotiated agreements and legislation can include specific fines and penalties for failure to comply. For instance, settlements of tribal water claims often include a penalty for failure to deliver the specified quantity of water to the tribe (Checchio & Colby, 1992).

'Fair' Cost Sharing

Participants' views on the fairness of proposed cost-sharing arrangements depend on each party's 'baseline'. The baseline is an internal standard, an expectation of what each party believes it should obtain as an outcome in a conflict-resolution process. Parties form baselines based on their history, values and legal perspectives, not necessarily on objective facts. Disagreements over baseline entitlements occur for various reasons. Some stakeholders may not accept status quo water allocations. For instance, environmentalists may believe farmers never should have been given such generous water rights in the first place, given that they perceive farmers' irrigation practices as wasteful. Those with historic favoured access to the resource counter that their ancestors settled the region based on promises of low-cost water and power, and built communities and made investments. Such disputants have difficulty reconciling their different baselines and arriving at water reallocations and financial terms that seem fair to both sides.

Different legal constructs lead to disparate starting points in bargaining and

difficulty in achieving 'fair' outcomes. For instance, in the western US several legal doctrines have developed that have led to different perspectives on the priority and quantity of tribal water rights. Tribes base their arguments on the reserved rights doctrine, which awards them large and senior rights. Non-Indian irrigators argue that state water laws protect their non-Indian rights against tribal claims. There are court rulings supporting a range of possible outcomes and the legal ambiguities make it difficult for the parties to achieve more clarity, sometimes motivating them to negotiate a solution tailored to their own region, bypassing the courts.

In conflicts over providing water to restore damaged ecosystems, environmental interests may argue that those who have used large quantities of water in the past (farmers, industry and cities) are the cause of stream and wetland dewatering and so ought to bear the costs of a solution through financial contributions and reduced water use. Historical water users, on the other hand, will argue that they were using water in a manner legitimized and encouraged by past policies and ought not to be penalized retroactively, even though their water uses caused damage when examined in retrospect. They will argue for a 'beneficiaries pay' principle of cost sharing under which environmental interests and public agencies bear the cost.

These diverse views are being cogently articulated in the ongoing California Bay-Delta deliberations. In that setting, environmental advocates argue that the 'beneficiary pays' principle ignores the critical issue of 'how we got here in the first place' and criticize a proposed cost-sharing plan that "ignores more than 100 years of environmentally damaging water development activities—much of it taxpayer funded... requiring the public to pay for any and all ecosystem benefits—including repairs of damage already done ..." (*Water Strategist*, 1998). In the past, federal money helped ease water conflicts by developing new supplies at little cost to local water users. Now, much of the cost burden falls on state and local governments and water users, making disputes over cost sharing more intractable.

Another aspect of fairness is reciprocity, 'give and take', implying that a fair outcome is one in which all parties compromise. However, a particular stakeholder's assessment of reciprocity still depends on his/her internal baselines. For instance, an irrigation district may believe it has made great progress in improved water conservation practices but get no 'credit' from environmentalists because 'they should have been doing it all along'. Farmers are comparing their new practices with their former levels of water use, while environmentalists are using a higher standard of water conservation as their baseline.

Conclusions

Water conflicts and attempts to address them represent a substantial social investment. They can consume vast amounts of money and management attention that could be used for other purposes. This paper examines litigation, market transactions and professionally facilitated negotiations as mechanisms to resolve water disputes, and explores criteria for evaluating and comparing the effectiveness of these mechanisms. However, meaningful comparisons require compiling detailed information on process costs, implementation, costs, financial feasibility, cost-sharing arrangements, and monitoring and enforcement provisions for a body of cases that were resolved using diverse approaches. Over the

next decade, as such case analyses accumulate, it will be possible to say much more about the costs and benefits of different strategies to resolve complex water disputes.

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