

WATER SHARING IN THE 21st CENTURY

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Abstract. Successful water sharing negotiations require the application of five Guiding Principles: an obligation to cooperate and negotiate in good faith; a commitment to interdisciplinary analysis; analysis conducted at the watershed and river basin scale; a commitment to adaptability; and adherence to certain standards in the negotiations.

Development of an effective water sharing agreement requires accurate and precise information that enables: determination of the geographical and political boundaries of the water sources to be shared; identification of the water policies, laws and regulations of the individual Parties that may conflict; the prediction of the future availability of water and its quality; and prediction of the future demands for water that must be met. With this information, alternative effective mechanisms or strategies for the allocation can be developed,

The final step in effective water sharing is producing a document that expresses the rights, privileges and obligations of the Parties as well as providing a mechanism to administer the water sharing. *Model Water Sharing Agreements for the 21st Century* (Draper, 2002) provides three model water sharing agreements to serve as a template for individual agreements.

INTRODUCTION

Water scarcity is evident throughout much of the United States, and the use of shared water resources is a major source of conflict. The interstate and international conflicts over the allocation of the waters of the Colorado River began early in the Twentieth Century and have yet to be totally resolved. Even when water is relatively plentiful, the increasing demand for water from shared resources is growing as the population expands, dramatically increasing the needs of public water supply. This is graphically demonstrated by the dispute between Florida, Alabama and Georgia over allocation of the shared waters. The problem is

pervasive. Few river basins in the continental United States are contained within a single state's boundaries.

The problem is magnified in the international arena. There are 268 major rivers shared between and among two or more nations. These international rivers cover almost one half of the total land surface of the globe. Fifty-three rivers are shared by three or more nations, with the Danube being shared by 17 riparian countries. International river basins sustain over 40% of the world's population. Over a third of the 200 international river basins are not covered by any international agreement, and only some 30 have truly co-operative institutional arrangements. The need for effective co-operation among riparian countries is greater now than ever before because of the growing demand for water.

OBSTACLES TO WATER SHARING

Successful water sharing must overcome a number of significant obstacles. The reluctance to give up dominion and control over the natural resources within the political boundaries of the Parties is arguably the most significant. (Draper, 2002; Puri, 2002; Wolf, 2001; World Bank, 1998; Libiszewski, 1995) Other obstacles to effective water sharing include conflicts in the internal water laws and policies of the Parties, an incomplete knowledge of both the water resource availability and demand for water within the shared basin, and conflicts between the internal economic policies of the Parties

Whether it is a nation-state or a state or tribal entity within a federal system, a government will normally claim the exclusive rights to all natural resources within its boundaries, including ownership and/or control of the water resources. (Albert, 2000; Draper, 1997) In negotiations, each Party will seek the rights and authorities critical to its political, economic or social objectives while ceding less critical rights and authorities to the other nations. Water sharing requires each Party to relinquish a part of its control and dominion. Resolution of this inherent friction underlies

the success of all negotiations. How much sovereignty is relinquished determines the scope and possibly the effectiveness of the agreement. (Eaux partagées, 2002)

In the United State, three elements of control and dominion clash under the constitutional powers of the federal, state and tribal governments. Under federalism, the states maintain control over inland waters, with some important exceptions. (Gelt, 1997; Kennedy and Lord, 1994; *Kansas v. Colorado*) These important exceptions include specific legislation, such as the Clean Water Act as well as certain doctrines established by the Supreme Court and by Congressional deference. Such doctrines include federal reserved water rights that adhere to federal lands in the west, federal control over navigability, and federal supremacy regarding federal waterpower projects.

GUIDING PRINCIPLES

The uniqueness of each basin and its riparian states indicates that a universal set of principles must be fairly general. (Wolfe, 1999) However, efficient and effective transboundary water sharing should be based on five guiding principles.

Coordination and cooperation

All Parties have a duty to cooperate and negotiate in good faith. This principle is the foundation of international law, and it applies in all relations between sovereign nations. (Draper, 1997)

Interdisciplinary Analysis

The development of effective and efficient water sharing is a multi-faceted challenge. (Draper, 2001; Kenney and Lord, 1994) Although necessarily based on water science, i.e., knowledge of the quantity, quality and timing of the available water supplies, the development of effective water sharing agreements is predicated on an adequate interdisciplinary analysis by experts in water science, engineering, technology, law, and economics. (Dellapenna and Draper, 2002)

Watershed and River Basin Management

Planning and management on a watershed or river basin basis, not solely according to artificial political boundaries should be foundation principle for both intrastate and interstate water management. (Barlow and Clarke, 2002) The reality of political boundaries and the desire for local control must be respected in the water sharing process, but effective and efficient water sharing requires analysis by watershed.

Adaptability

The water sharing agreement should be based on the best information available, but should be flexible enough for change. Natural systems are inherently variable and complex. (Sophocleous, 1998) An adaptive agreement is designed from the outset to recognize that clearly formulated predictions about the behavior of hydrologic systems may be changed by human use (Lee, 1993) as well as by the potential effects of climate change. (IPCC, 2001) For an agreement on water sharing to be effective, it must be prepared to adapt to potential changes in site-specific circumstances that may develop within time-period the agreement is in effect. (Bernauer, 2001)

Principles of Negotiation

Certain principles of negotiations are essential for the development and implementation of a viable water sharing agreement. These principles are equally necessary for the agreement's ongoing effectiveness. They include an obligation to cooperate and negotiate in good faith and an obligation to prevent unreasonable harm to other Parties. Other principles of negotiations include a commitment to the equitable utilization of the shared water, an obligation to exchange adequate data with the other Parties and a commitment to the values of water resource sustainability. (Dellapenna, 2001; Albert, 2000; Caponera, 1995; Draper, 1997; Hey, 1995)

ASSESSMENTS

An effective water sharing agreement requires precise information about the availability and quality of water and the demands that must be accommodated. An accurate accounting for existing demands and one for predicting future water demands must be made, as well as an assessment of the water quality and quantity necessary for ecological integrity. A number of other assessments should be conducted at the beginning of the formulation of the agreement. These include definition of the geographical and political boundaries of the water sources to be shared and analysis of the water policies, laws and regulations of the individual Parties that may conflict. An economic impact analysis should be made that correlates the other assessments.

From a procedural standpoint, strategies for the development of a water sharing agreement should initially proceed with the exchange of data and information between technical experts with the objective of reaching a technical consensus on both the actual and potential problems regarding water sharing.

Only then can alternative strategies to respond to the problems be developed. (Eaux partagées, 2002) The assessment process constructs a factual background that will enable the implementation of a strategy of water allocation.

Once the Parties have quantified the water sources and demands, including the environmental sustainability needs, the economic impact assessment of the various strategies can then be used to make tradeoffs according to some objective function agreed to by the Parties. Analysts should develop an allocation strategy that best fits the objectives set by the Parties.

STRATEGIES

Although the variation among allocation strategies is infinite, historical experience has demonstrated that the number of successful strategies is limited. History has also demonstrated distinct allocation strategies that apply to allocating surface water and groundwater. The allocation should apportion the water justly and fairly and should minimize the potential for conflict. (Draper, 1997) Although the specific manner of allocating water can vary according to a variety of influences, most can be classified as either flow or storage allocation. Choice of the method depends on what the Parties want to accomplish and how they want to divide the risk of shortage. (McCormick, 1994)

Historically, six strategies for surface water allocation have been used. (Draper, 1997; McCormick, 1994; Dumars, 1990) A priority of particular demand strategy sets priorities by the type of use rather than by user location and provides certain quantitative limitations on those priorities. Storage Limitations limit the amount of water that an upstream entity may impound on an annual or seasonal basis. It may be combined with some other method of allocation. Using guaranteed quantity at a point, a guaranteed quantity is to be delivered at certain points. The upstream Party guarantees that a fixed amount of water will pass a certain point every year or other time period. Using a percentage of flow strategy the Parties allocate water by either a fixed percentage or a formula based on different flow levels. Each participant is entitled to take its specified percentage of the total yield of the basin. A consumption limitation strategy allocates a particular delivery requirement between one point and another, as was done in the Rio Grande Compact.

Historically, two strategies for groundwater allocation have been used. (Cherry and Badr, 1998; Hayton and Utton, 1989) A Maximum withdrawal rate

strategy does not divide the water itself, but limits the Parties' rates of extraction. Planned Depletion is used in a case where recharge is limited or nonexistent. The Parties agree that the groundwater source is a nonrenewable resource and the aquifer is divided in terms of total withdrawal over a period of time.

There is a growing consensus that water sharing agreements should consciously allocate benefits as well as allocating water. (World Commission on Dams, 2000) Normally, however, economic benefits are not explicitly used in allocating water, although economic principles have helped guide definitions of "beneficial" uses and have suggested "baskets" of benefits, including both water and non-water resources, for positive-sum solution. (Hamner and Wolf, 1998)

MODEL WATER SHARING AGREEMENTS

The final step in effective water sharing is producing a document that expresses the rights, privileges and obligations of the Parties as well as providing a mechanism to administer the water sharing. To assist in developing such a document, model water sharing agreements have been published to serve as a template. *Model Water Sharing Agreements for the 21st Century* (Draper, 2002) provides three model water sharing agreements to serve as a framework for individual agreements. These agreements are structured according to the willingness of the Parties to accede to the principles outlined above and the degree of sovereignty over water resources the Parties are willing to renounce in order to make transboundary water use efficient.

The *Model Agreement for Coordination and Cooperation* simply facilitates the exchange of data and other information pertinent to independent water planning and development by the respective Parties. The Parties retain almost all of their sovereignty over the water within their boundaries. The *Limited Purpose Agreement* is designed for those situations in which the Parties wish to maintain control of most aspects of their internal water development but recognize either the need to resolve existing or potential conflict or the need to establish direct coordination or management over a specific water development project, a particular water source, or a particular water management function. The *Comprehensive Water Management Agreement* provides a model for comprehensive planning and management of shared water resources. This Model Agreement is based on the concept that the most

efficient and effective allocation of shared water resources can be achieved only through management on a watershed basis and that the water resources and the associated riparian lands are an integrated whole whose interrelation requires integrated management to achieve optimal use especially during periods of drought.

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