MECHANISMS FOR TRANSBOUNDARY DISPUTE RESOLUTION: A LEGAL-GEOGRAPHICAL ANALYSIS OF THE PLAINS RIVERS

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CHAPTER 1: INTRODUCTION

Societies throughout history have had the common problem of allocating limited resources to competing interests. No matter what political or economic form societies take, dividing limited resources among and between interested parties causes contention. Even when the resource is plentiful enough to satisfy all users, problems and politics arise concerning distribution; of course when competing users attempt to allocate more of a resource than can satisfy all needs, tensions are elevated. Add to this situation the complexity of resources that flow across political boundaries and more immediate problems arise like who owns the resource? If ownership is shared then how much does each party own? What about allocation and distribution? Who resolves disputes over these questions when the parties cannot agree? What if the parties do not share the same legal system? The picture gets very complicated very quickly when transboundary resources are involved. Wars have been fought over conflicting claims on the same resource.

Restricting the discussion to the resource of water, there is no shortage of areas for investigation or topics to research. In the case of rivers that flow across political boundaries, the geographical distribution of the resource has great bearing on allocation conflicts and

resolution options for those conflicts. The Colorado River, for example, directly involves the interests of more than half a dozen states, each with unique interests and often conflicting ideas about allocation and management of the water running through their state. Sorting out the geographic, economic, political, and legal implications reveals that water disputes grow in many dimensions simultaneously.

Unfortunately, our legal system does not possess consistently reliable results of conflict resolution (or for that matter, conflict prevention) concerning transboundary resources when individual states disagree on allocation; as resource consumption increases, this has become more problematic. One of the major problems facing the western United States in the last fifty years has been allocation of the limited amount of water within that region. There is not nearly enough water to accommodate the competing interests of a growing population, the increasing agricultural production, and the increasing industrial exploitation. In the face of this unpleasant reality, many legal battles have been fought over seemingly simple dilemmas such as who really owns water in a given river. Overlapping authority of different governmental agencies that control the same water but desire different allocations only adds to the confusion.

Conflicts that occur at the interstate level pose interesting legal problems since our founding fathers meticulously designed a political system of checks and balances, giving each state equal power over events within its respective boundaries. If a dispute concerning a transboundary river occurs, few options exist for the states involved. They can work out a compromise among themselves; this requires a solution that all parties agree to along with a legal compact detailing the agreement. Another possibility is legislation by Congress. If the states are unable to work out a compromise, they can sue one another which shifts the decision-making process to the Supreme Court. At present, about two dozen interstate compacts exist among the Western states, while there have been numerous court cases concerning interstate rivers and the allocation thereof. Kansas and Colorado, for example, have been suing each other since 1907 over whether Colorado uses more than its fair share of the Arkansas River; this battle is still not totally resolved. It should be noted that each of these three mechanisms for conflict resolution has both political and legal limitations which make them problematic at times. In order to affect Congressional legislation as a solution for conflict between states over water management or allocation, the respective states involved would have to develop enough interest within the Congressional bodies to bring the issue up for

consideration, then lobby various members to vote on either side of the proposal. Since these disputes tend to involve only isolated regions of the country, rallying the unaffected majority to even look into such disputes is difficult and politically costly; most politicians have neither the time nor the inclination to concern themselves with regional squabbles that do not bear directly on their political futures.

Devising a compact between the parties seems sensible and oft-times works well. However, compacts are very specific legal documents which do not have the flexibility to withstand shifts in management policies, regional population growth, or new political, economic, or environmental issues as time passes. Once a compact is created, this does not always solve all major problems between the states in question and modification of compacts can be an unwieldy and tedious process; similarly, interpretation can be tedious and usually falls under the domain of the Supreme Court. The Court has looked upon interstate compacts with differing viewpoints, alternately considering them as contracts and statutes which leads to ambiguities about federalism. Federalism is discussed in greater detail in chapter two.

If all legislation or compact agreements fail, states can sue each other, but this too has its risks. The Court has evolved a history of equitably apportioning waters in

cases of transboundary rivers, but Supreme Court decisions are based on principles of equity that often change with different justices or Courts and have a wide range of interpretation--which can leave the door open for unexpected Court decisions and less than complete solutions to problems.

While water has always been a sought after resource, the simple fact that there is more water in the eastern half of the U.S. than the western half has lead to more serious disputes over water in the west and a richer history of disputes--for better or worse. For this reason, the scope of this study is restricted to transboundary rivers within the west and midwest. More specifically, three rivers that flow from the Rocky Mountains where there is a surplus of water, to the plains states where there are seasonal shortages of water--the Platte, Arkansas, and Canadian River systems. These rivers were chosen due to the similarity in their geographic circumstance and the parallel development of water disputes along these rivers which lends them to a natural classification as a group.

A notable exception to this grouping is the Missouri River. It seems that the Missouri, whose basin covers nearly one fifth of the continental U.S., and which flows from Montana through many plains states before merging with the Mississippi River near St. Louis, would be a natural addition to the Plains Rivers grouping. Similar to the

other rivers flowing across the plains, the Missouri River basin sovereigns include the governments of several states, two dozen Indian tribes, and dozens of federal agencies and bureaus.

The Missouri River is not included in this study because it differs from the other rivers in the following ways: unlike the other plains rivers, the Missouri has a history of comprehensive basin development that can be traced back to the 1800's. Then in 1944, the Pick-Sloan plan was created which developed a series of dams, levees, navigation channels and hydroelectric turbines for navigation, flood control, and river basin development. Comprehensive integrated basin management of the Missouri has alleviated (or at least postponed) many of the jurisdictional and allocation problems that plague the other major plains rivers. This management plan has not pleased all residents of the area and appears unable to keep up with the region's growth and development as time passes. In the near future, the Missouri River may develop more common attributes with its litigious counterparts than anybody expected. In his 1989 paper, "The Missouri: River of Promise or River of Peril," Thorson intimates that it is only a matter of time before the Missouri encounters many of the water allocation and management problems that other plains rivers now face. Thus, its history of basin-wide

management hinders meaningful comparison with the three rivers in the study group.

Purpose of Study

Due to a lack of formal studies that make an effort to integrate both the geographical and legal aspects of conflicts over transboundary resources, this is an area ripe for investigation. Matthews (1988) has developed a conceptual framework tying together environmental issues, legal solutions, and classification of transboundary resource problems at different geographic scales. Taken as a whole, this matrix of transboundary issues and legal solutions could serve as an analytical tool for examination of environmental problems and solutions within the legal system. Comparison of similar problems at different scales, e.g., state, federal, or international, could lead to broad- based applications of successful conflict resolution options and elimination of less useful options.

Scope and Methodology

This smaller scale study of the plains rivers and their transboundary river problems will examine just a part of Matthews' larger matrix of problems and solutions. The methodology of case study utilizing the tool of legal

research is applied to track the historical evolution of transboundary issues for the Platte, Arkansas, and Canadian River basins and solutions attempted to solve these problems. It is the goal of this study to analyze the structure and function of the legal mechanisms (or in some cases the lack thereof) for solutions to transboundary issues.

In order to do this, several aspects of water disputes should be noted. In their 1995 paper, Matthews and McCormick analyze interstate water compacts based on three main attributes: Scope of allocation, method of allocation, and lastly, management system.[1] In keeping with these aspects of water disputes, scope, method, and management will also be utilized here to analyze the mechanisms employed in transboundary water disputes. Employing these criteria to Supreme Court cases, rather than strictly to interstate water compacts, should yield different conclusions. Within this broader venue, some criteria will be more important, and some less important in ultimately dissecting the structure and function of conflict resolution.

In relation to these aspects of conflict resolution, the criteria for analysis will revolve around the following questions. First, the scope of the attempted allocations of each of these rivers to date; how have the waters within each river been used to date? What parties were included in

the allocation decisions? What parties were affected by said allocations? Which if any parties were left out of the decision-making process? What waters were actually allocated? This latter question needs to be addressed due to the common policy of allocation of disputed waters only. This may be a problematic management strategy if surface and or groundwater sources which are intimately tied to the allocated water, and obviously affected by any allocation, are not considered in the original plan. A more complete discussion of water rights with respect to allocation appears in chapter 2.

Also to be considered is the method of allocation. Water along rivers can be allocated voluntarily through negotiations of the parties involved resulting in an interstate compact. In this process, the upstream states generally have an advantage over downstream states due to the luck of sequential control. Since water passes through upstream states first, they have the option to either negotiate with downstream states or not, depending on any perceived advantage for doing so. For those states that do participate in compacts to achieve allocation, McCormick's 1994 article outlines four main types of allocation: storage allocation, flow allocation, hydrologic models and percentage of flow.[2] Each kind of compact allocation has distinctive features which impact on the other established criteria of scope and management.

Another possibility for allocation comes through litigation. If two states in dispute take their case to the Supreme Court, the Court may allocate portions of the water in question to each party. Ostensibly, this is done with the principle of equity in mind which includes a balance between existing users; this is not always the case though. Litigation concerning the interpretation of compacts may also result in the Court defining allocation on a given river. When this happens, there is no guarantee that any of the parties involved will prevail, and thus, it is considered a risky proposition, especially for those states who abhor compromise.

Finally, long term management will be assessed. Given the allocation method and mechanism for solution of disputes concerning such allocation for each respective river, has it been an effective tool for long term management? Is there potential for longterm management if none exists in the present circumstances? The criteria for success being the absence of protracted disputes and the relative ease with which new problems can be addressed. By itself, an analysis of similarities and differences in legal issues for similar geographic situations may lead to a pattern of legal options that can be utilized regionally for future water disputes of a similar nature. For instance, individual states within the U.S. may arrive at a solution to transboundary river disputes that may also be

applicable to river disputes between two countries. Integrated with other information, conclusions derived from this case study will be of value as part of the larger picture of transboundary resource issues and their possible solutions on various other scales as a cohesive scheme of resource management. This is not to say that geographers have never considered the legal/geographic connection. Certain related aspects have been studied such as boundaries, or aspects of political geography, but few have cultivated the richness of both geographic and legal implications for resource studies. What follows is the context within which geographers have explored the components of this connection, as well as a brief grounding in the pertinent legal issues applicable to this study.

Given the intertwined relationship of resources with different political units of all scales, the only practical means of resource management in the future must be an integrated approach. If there is any potential of forming a long term policy for future resource allocation, or developing a framework within which conflicts can be resolved in a consistent manner, one must look simultaneously at the geographical distribution and legal options of the conflicts. These problems are not going to go away, and one can expect that, as population grows, the increased intensity of disputes will draw more attention to the lack of underlying cohesion in policies on the subject,

or mechanisms for resolution. As technology advances and the world shrinks, we cannot ignore the reality that our resource management is inextricably linked to the access of resources for those around us.

CHAPTER NOTES

1. Matthews, Olen Paul and Z. McCormick, Integrated Water Resource Planning for the 21st Century, Proceedings, A.S.C.E. Water Resources Planning and Management Division conference, Cambridge, Mass., 1995.

2. McCormick, Z., "Interstate Water Allocation Compacts in the Western United States--Some Suggestions," Water Resources Bulletin, June 1994, Vol.30, No.3, pp.385-395.

	International				National				State				Local				Individual			
	Judicial	Legislative	Administrative	Negotiation	Judicial	Legislative	Administrative	Negotiation	Judicial	Legislative	Administrative	Negotiation	Judicial	Legislative	Administrative	Negotiation	Judicial	Legislative	Administrative	Negotiation
Natural Movement (mobile surface water)	⊗		⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	×	×	⊗	⊗	⊗		⊗	⊗
Overlapping Authority (simultaneous jurisdiction over water)					⊗	⊗	⊗	⊗	⊗	⊗	×	×	×	⊗	×	⊗	×		×	×
Unstable Boundary (naturally shifting river)	⊗		⊗	⊗	⊗	×	×	⊗	⊗	⊗	×	×	×	×	×	⊗	×		×	×
Right of Access or Use (ban on water imports and exports)	×		S	⊗	⊗	×	S	⊗	⊗	⊗	S	×	×	×	S	⊗	×		S	×

× Possible Solution

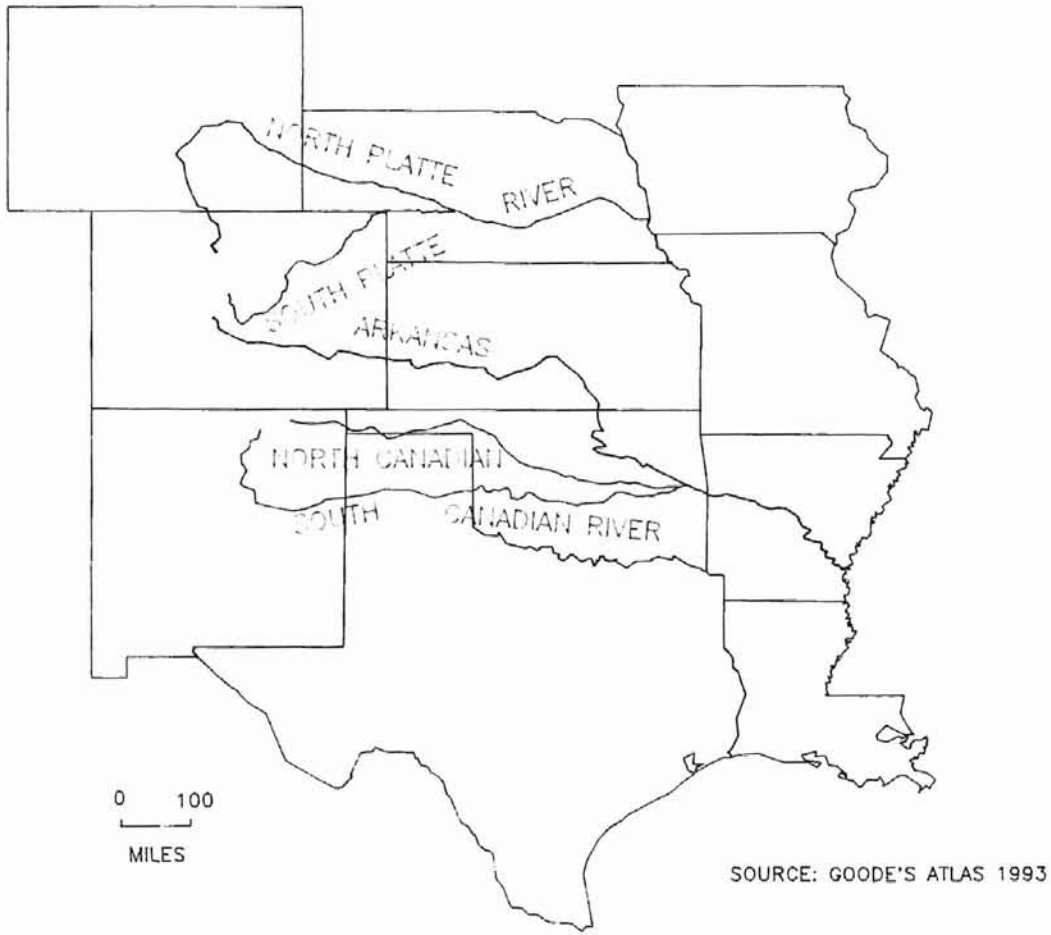
○ Solution Attempted

S Solution Same as Another Category

Figure 1 : Transboundary Water Issues and Solutions

source: Paul Matthews

FIGURE 2: RIVERS IN STUDY AREA



SOURCE: GOODE'S ATLAS 1993

CHAPTER 2: LEGAL AND GEOGRAPHIC SETTING

Any thorough discussion of the problems concerning allocation in transboundary waters in the western United States must acknowledge the laws within which decisions concerning allocations are made. In western water law, the bulk of the laws revolve around three concepts: the doctrine of prior appropriation, the doctrine of equitable apportionment, and the extent to which the Federal government controls state water.

Here is a brief historical overview of the development of those ideas and a review of the recent literature concerning interstate allocation of water. Following the legal background is a brief discussion of compacts as a legal means of solving disputes relating to transboundary resources. Since interstate compacts are involved with so many western states and may shed light on the role of the Supreme Court with respect to solutions to transboundary water disputes, they must be addressed. Ultimately, one must utilize both geographic and legal aspects of transboundary resource issues in order to fully understand and analyze the problems. In the introductory chapters though, the two subjects remain separated for clarity of content.

PRIOR APPROPRIATIONS

Laws concerning water developed along two different paths in the United states. Water law in the eastern states evolved from the English tradition of riparian rights; this allowed water rights only to those parties who owned land adjacent to a watercourse. Riparian rights also restricted rights to water usage strictly within the basin containing the watershed from which the water originated.[1] This works fairly well if water supplies are numerous and plentiful, as was the case for the English and the residents of the eastern U.S., but is totally incompatible with the geographic realities that western states face where water is not evenly distributed and there exist vast amounts of arid land.

In order to adapt to the reality of sporadic water distribution in the western U.S., a more utilitarian kind of water law developed, called the doctrine of "prior appropriation". This deviated from riparian rights in that it assured water rights for anybody who diverted water and applied it to a beneficial use.[2] Consequently, water movement out of the basin of origin not only took place but was encouraged. This pragmatic concept of water rights can be better appreciated given the historical context of explosive population growth and development, minimal

hydrological understanding, and the fever of manifest destiny.

Usually, prior appropriation includes the elements of "intent to apply water to a beneficial use; an actual diversion of water from a natural source; and application of the water to a beneficial use within a reasonable amount of time."[3] The philosophy behind prior appropriation, "first in time, first in right," evolved out of local mining statutes which prioritized mining claims chronologically; the earlier claim had the most unassailable rights and any overlap or ambiguity in rights always favored the party that made the first claim. Applied to water rights instead of mining claims, the logic of first in time, first in right is apparent.

The 1870 Amendment to the Mining Act of 1866, stipulated that "anyone who acquired title to public lands took title subject to any water rights, easements for water rights, or rights-of-way acquired by others while lands were in public ownership."[4] As well as intimating a severance of water from federal land, this cleared up any ambiguity as to whether riparian or prior appropriation rights would win out if a situation of conflict cropped up--prior appropriation would be favored in the West.[5] Adding to the impact of this, the Desert Land Act of 1877 provided for irrigation and mining appropriations of water from non-navigable sources on public lands subject to

existing rights.[6] It was unclear whether this appropriation concept applied only to desert lands or all public domain within the states covered in the Desert Land Act until the Supreme Court decision in California Oregon Power Co. v. Beaver Portland Cement Co. in 1935.[7]

The Court deferred to states' interests by determining that each state could decide individually to what extent either prior appropriation or riparian rights would prevail. As a result there are eight pure appropriation states that use prior appropriation as the only sanctioned method of acquiring water rights, eleven diluted states that recognize some mixture of both riparian rights and prior appropriation, while the rest of the states use riparian based water law.

FEDERAL CONTROL OF STATE WATERS

Against this backdrop of individual states developing their own water allocation systems to fit their own needs, there has been an interesting interplay between the federal government and individual state governments concerning power to regulate waters. Many prior appropriation states have statutes declaring state ownership of the waters within their boundaries (or that the waters belong to the public) and thus the states control the allocation of said waters. These claims convey an assertion of sovereign

interest in the allocation of these waters; states argue that they can regulate water appropriation under state ownership.[8] During the development of the western states' water allocation systems and statutes, the federal government played only a minor role, even though authority over all navigable waters granted in the commerce clause of the constitution technically gave the federal government ultimate authority.

At first, this was a seemingly symbiotic relationship whereby the states had control over the waters within their boundaries and made statutes accordingly, essentially exercising total ownership; meanwhile the federal government, released from the burden of daily management, concentrated more on national policies such as plans for land reclamation in the West. As the federal government became more committed to reclamation, more federal involvement in the policies concerning western waters followed.[9] The western states had been left to their own devices concerning the policies of water allocation for so long, their combined political influence was enough to fend off the first federal assertions of power with respect to water policies. Western states probably expected to retain perpetual control over their waters; they relied on the California Oregon Power decision as a foundation of argument for states' rights to exert sole control over water allocation.[10]

Despite the appearance of non-interference, the federal government took an interest in water allocation fairly early. In the 1824 Supreme Court case Gibbons v. Ogden, the court determined that the power over interstate commerce, stated as belonging to the federal government in Article 1, Section 8 of the Constitution, included control over all waters that were considered navigable.[11] At this point the primary interest was most likely limited to improving navigation on these public lanes of commerce.[12] In 1870, the Court defined navigable waters as those that "are used or susceptible of being used in their ordinary condition as highways of commerce."[13] By 1899, in U.S. v. Rio Grande Dam & Irrigation Co.[14], navigability came up again, and the Court decided that the Act of Congress of 1890 which prohibited any obstruction to the navigable capacity of water bodies also included not only the navigable part, but also any tributary waters.

It does not take much imagination to interpret this as pertaining to practically all waters in the U.S. since most every minor tributary flows into a bigger body of water. In the event that any water did not fall under this umbrella, by 1940, the definition of "navigable" had been broadened to include water that could be made navigable if "reasonable improvements" were made.[15] If there remained any doubt about federal supremacy over state control of water after the 1940 case, Sporhase v. Nebraska in 1982

certainly dismissed the plausibility of state ownership of water. In this case, the Court clearly limited state sovereignty, at least with respect to water allocation, when it declared water as a commodity, subject to the commerce clause.[16] Because water is an article of commerce, it can be regulated as a commodity under federal jurisdiction.

EQUITABLE APPORTIONMENT

The last far reaching doctrine to be examined is that of equitable apportionment. This sprang out of the lack of legal mechanisms to deal with interstate conflicts over water allocation. Since the western states do not all conform to the same philosophy of water allocation, disputes have arisen over interstate water allocations. Most western states adopted the prior appropriation doctrine with respect to water issues, however, some states evolved a combination of prior appropriation and riparian rights. Given the convoluted history of federal-state relations with respect to water allocations, the added dimension of collisions between sovereign states might have been expected; this especially applies to the western states that have continually over-allocated their water supplies. When such disputes occurred, as a final option, the states turned to the Supreme Court for relief.

"Equitable apportionment" is a term used by the Supreme Court to identify the federal common law that determines the extent and the limitations of states' rights to benefit from and to use interstate waters.[17] The Court adopted the doctrine to settle existing controversies over how interstate water should be apportioned among states.

The first case articulating the Court's definition of equitable apportionment arose in 1907 with Kansas v. Colorado in which Kansas claimed that Colorado used so much of the Arkansas River that its natural flow through Kansas was diminished to the point of causing economic harm to Kansas residents.[18] Since Kansas relied on riparian law while Colorado had developed prior appropriation law concerning water rights, the Court concluded that equity should be the factor in balancing the interests of the two states.[19] An underlying principle in equitable apportionment must be that each state has the right to use interstate waters, but not in a way that excludes the other state from doing the same.[20] There is also the principle of balance of harm. In Kansas v. Colorado, the issue was "whether the Court should overlook slight injury in Kansas in order to preserve the existing economy in Colorado as well as the economy in Kansas;"[21] the Court denied relief to Kansas on the ground that the economic benefits to Colorado outweighed any detriment to Kansas.[22]

Fifteen years later in Wyoming v. Colorado, Wyoming attempted to prevent Colorado from diverting waters in the Laramie River, the main tributary of the Platte. Although the Court refused to apply a strict doctrine of appropriation, it recognized the importance of senior water rights in both states.[23] It then proceeded to allocate specific amounts of the river to each state. This was the first time that the Court's use of equitable apportionment resulted in actual division of water in an interstate river between two arguing states.[24] After balancing the impact to existing economies in the respective states, the court concluded that other factors should also be considered in the search for an equitable remedy.

"Priority of appropriation is the guiding principle. But physical and climatic conditions, the consumptive use of the water, the extent of established uses, the availability of storage water..."[25] and other uses were examined in the final analysis of an equitable apportionment. This may have been the most complex equitable apportionment case since it involved three states with unevenly developed economies, each of which was dependent on the river. In the end, the Court divided the river into six naturally defined regions; each region was apportioned water needed to preserve development. In essence, the Courts used existing priorities to establish the rights.

One of the most controversial equitable apportionment cases involved a suit brought by Colorado to allow diversion of water from the Vermejo River, a small nonnavigable river that originates in the mountains of southern Colorado but flows most of its length in New Mexico. The river in question was already totally allocated by four users in New Mexico, but Colorado claimed the New Mexican users were utilizing the water inefficiently and thus should not be allowed to continue wasting water that had better potential uses in Colorado. The dispute turned into two Supreme Court cases, called here Vermejo I and Vermejo II.[26]

In Vermejo I, a special master who had been appointed by the Court to look into the case, recommended that Colorado be allowed to divert a portion of water from the Vermejo. When a water dispute is exceedingly complicated, the Court will occasionally appoint a special master who is then charged with gathering information. He serves as an impartial fact finder who sifts through all the information the Court may not have the time or expertise to contemplate, then makes recommendations to the Court. It should be noted that the special master serves in a strictly advisory capacity; the Court is in no way obligated to follow a special master's recommendations, and oft-times does not. The process is slow and can take years in the more intricate cases. Here the master's

recommendation rested on two findings (1) New Mexico could compensate for some or all of Colorado's planned diversion through reasonable conservation measures, and (2) Colorado's benefit would outweigh New Mexico's injury. While the Court did not specifically approve of Colorado's diversion project, it did agree that an equitable apportionment was in order.

For the first time, the Court focused on waste and inefficiency when it said "we have invoked equitable apportionment not only to require the reasonable efficient use of water, but also to impose on states an affirmative duty to take reasonable steps to conserve and augment the water supply of an interstate stream." The Court remanded the case to the special master to make further findings of fact, thus delaying an actual apportioning of the Vermejo. While the Court did not grant Colorado the right to divert water, it did recognize that "the principle of balancing benefits against harms between two existing users also applied to balancing the benefits of a diversion for proposed uses against the possible harms to existing uses."[27]

Thus, there appears the new concept that interstate priorities may be vulnerable to "adjustment" when a more pressing case of need for the water can be shown. Basically it implies that an upstream state could negate a senior but inefficient downstream use in favor of a more

efficient future use. "It is the first time that the Court imposed a duty to conserve on water users as a condition to a successful claim to a fair share of an interstate river."[28]

In Vermejo II, the Court required more than just an argument on the part of Colorado to divert the river. Colorado had to show clear and convincing evidence that its planned future use was the better use of the Vermejo; the focus of the Court decision centered on "the standard by which we judge proof in actions for equitable apportionment."[29] Colorado never managed to show "clear and convincing evidence" that its proposed use would in fact be the best choice of allocation and was denied any of the Vermejo's water. With its second denial to Colorado, the Court clearly holds both parties responsible for showing that water is being or will be put to the maximum efficient use.

COMPACTS

Within the range of possible solutions of disputes between two states within the U.S. is the interstate compact. In Matthews' matrix of transboundary problems and solutions, the interstate compact falls into the category of natural moving resources and negotiated solutions--in this case between the individual states of the United States. Since surface waters follow geographic rather than

political boundaries, a strict adaptation of law does not cover all conceivable problems with surface waters.

Looking at rivers flowing across state boundaries, the problem of jurisdiction arises between the states through which the river flows. Of course, each state will attempt to exploit the water in her respective domain, but as the water flows across political boundaries other states will attempt to do the same, often at cross purposes. A finite supply of water practically ensures that not all parties will be satisfied in their use of the resource in question. When conflicts arise, a negotiated solution in the form of an interstate compact can sometimes resolve the situation.

If the states can voluntarily come to an agreement such as a compact, this is seen as the best option for resolution. As mentioned before, there are limitations to the effectiveness of this approach but many interstate compacts have been successful. Of the nearly two dozen compacts now in existence among the western states, many have had no significant problems although others have been problematic.

One way of evaluating compact allocations is by determining who bears the risk in time of shortage. As McCormick points out in his 1994 article, "Interstate Water Allocation Compacts in the Western United States--Some Suggestions," different kinds of water allocation result in different parties assuming the risk.[30] Because surface

water flow can vary dramatically from year to year, especially in the West, shortages are inevitable. Without an agreement specifying which party has the risk, it will be the downstream states which shoulder the burden of risk in times of shortage, by virtue of their geographic location.[31] Even when the assignment of risk seams clear, problems can still arise related to compact interpretation.

Another point of consideration is the view of the Supreme Court concerning interstate compacts. The Court, when faced with interpretation of these compacts has held differing views. At times, the Court looks upon them as contracts which the Court can change, or invalidate as it sees fit without concern for any issues of congressional authority or state sovereignty. At other times, the Court has viewed compacts as statutes which cannot be changed by the Supreme Court, thus allowing the Court a path of non-decision on whatever problem arises concerning a compact.[32] If the validity of interstate compacts varies with time, and the philosophy of the Court as generations pass, what does this indicate about the certainty of the terms of the agreement?

In the following chapter, a brief section concerning any compacts and their problems or lack thereof will be added to the discussion of each of the three rivers in the study. This is needed to flesh out an understanding of the level of tension and conflict on each river, as well as

acknowledge any attempt other than litigation to solve problems on an interstate level. It should be noted however, that a thorough examination of interstate compacts and their implication with respect to conflict resolution in matters of transboundary resources is beyond the scope of this paper. Such an undertaking has already been explored by McCormick in his dissertation, "The Use of Interstate Compacts to Resolve Trandboundary Water Allocation Issues," in 1993, which provides a wealth of detailed information on this subject.[33]

GEOGRAPHIC LITERATURE REVIEW

When approaching the multilayered issues of transboundary resource disputes, the most obvious and perhaps overlooked physical constraint is the geography of the situation. No matter what the resource, or whose boundaries are involved, the problem cannot be fully comprehended and resolved without recognition of the geography. This has been painfully clear when short sighted solutions to problems such as oil spills or waste disposal come back to haunt future generations because of a lack of poor geographic understanding.

Many geographers study boundary disputes. In fact, the study of boundaries is one area of study that traditionally resides almost exclusively within the realm

of political geography. Boundary studies crop up frequently and the literature is replete with articles from Hartshorne's 1936 elucidation on boundary terminology to Ritter and Hadju's recent look at the East-West German boundary (Ritter, 1989) and Swearingen's 1988 examination of geopolitical causes of the Iran-Iraq war. Also, boundary studies involving maritime boundaries have appeared (Smith, 1981; Ricketts, 1986) in the literature. Of course, boundary disputes and their complexities lie at the heart of transboundary resource issues--if one looks beyond the resource in dispute.

A few geographers have reached beyond traditional political geography to the point of legal systems analysis. In his 1971 article, Dikshit added the previously overlooked geographic dimension to the study of federalism as it relates to political systems. His article delineates how geographic attributes must be considered when studying the complex interrelations of the forces of regionalism which group people together, in contrast to the forces of homogeneity that centralized governing create. The study of federalism usually remains in the realm of legal academics.

Law is not an area that has numerous links to the geographic community. A few articles appear now and again such as an examination of global patterns of legal systems (Easterly, 1977). In 1978, there was an exploration of

geographic perspectives on environmental litigation (Mitchell, 1978). Changes in legal institutions were examined by Emel and Brooks in their 1988 article concerning property rights. Sauder explored use and abuse of land laws in California's Owens Valley in 1989. As geographers take up the study of environmental problems, one cannot avoid the legal issues within which many problems are mired. Many other disciplines have taken the lead in interdisciplinary environmental dilemmas however, so legal-resource articles can be found in a diverse range of disciplines.

Resource management certainly overlaps into the domain of geographic interest. Ley and Mercer put an economic slant on the politics of resource consumption in 1980, and Wescoat delineated long-term trends for resource consumption in his 1991 article. Water management and its geographic implications were outlined in Shrubsole's 1992 study of the Grand River Conservation Commission. This area provides great potential for future studies given the strong grounding in resources that geographers command.

CONCLUSION

When one realizes all the elements that affect law and the implications of laws on our policies, procedures, and mechanisms for solving problems, it can seem overwhelming.

But these same elements are key to understanding the scope and flexibility of possible solutions to very complex problems. Especially when dealing with resource related issues, one must be aware of the interconnected web of forces that control and define the problem at hand. This necessarily requires a legal framework; it also requires a geographic framework because of the intrinsic properties of resources, which tend to move, like air and water for example.

The geographic literature is rather sparse when searching for legal issues as related to resources and resource management. This should not mislead anyone into thinking that every stone has already been overturned in this academic pursuit. Quite to the contrary, there exist many opportunities for exploration of interconnecting legal and geographic studies. As environmental problems increase and management of the planet's finite resources becomes more intensely scrutinized, scholars will be pressed in many fields to expand the scope of study where resources are concerned. Full understanding of large scale resource problems and policies will require an integrated approach incorporating many fields of knowledge--a pursuit geographers are well equipped to handle.

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CHAPTER 3: THE PLATTE RIVER

THE HIGH PLAINS

In order to discuss the rivers of the study area in any meaningful way, the boundaries of the study area must be drawn. In simple terms, the study area is that region of the United States across which the Platte, Arkansas and Canadian rivers flow. All three river systems begin in the Rocky Mountains and extend eastward across and beyond the High Plains. From time to time, the High Plains has been defined as various sizes and shapes within this general region. For the purposes of this study, the High Plains will cut a swath across the eastern edge of New Mexico, Colorado and Wyoming, the panhandles of Texas and Oklahoma, and the western portions of Kansas and Nebraska.

The geography and climate of the High Plains give the rivers which run across this area special importance. In his book Cadillac Desert: The American West and its Disappearing Water, Reisner wrote, "the landscape is relentlessly the same: the same flatness, the same treelessness, the same curveless thirty-mile stretches of road." Any change in elevation goes practically unnoticed due to the great distance required to achieve such changes.[1] Even though the topography can appear quite featureless and bland, erratic climatic conditions provide

interesting contrast to this vision of seamless, barren tranquility.

Serving as a transition zone between the mountainous region to the west and a more humid grassland area to the east which eventually gives way to forested hilly terrain, the High Plains have traditionally experienced exceedingly variable climate. Annual precipitation averages range from approximately ten inches a year in the West to as much as 30 inches in the eastern portions.

The study area in this case, stretches eastward beyond the High Plains to confluence of these rivers with the Mississippi. However, the dramatic climate of the High Plains should be understood since it plays an important role in the availability and importance of water within the study area. Common occurrences include tornadic activity, violent and scattered thunderstorms, sudden hail storms, and seasonal droughts. This dramatic climate results in areas which appear parched quite regularly during the year then become sporadically drenched by sudden cloud bursts. With such uneven and unpredictable rainfall, the permanent flow of river water becomes very crucial to life and growth in this semi-arid region. Consequently, people take rivers very seriously. Not surprisingly, the history of the High Plains is replete with conflicts about how to best use those rivers.

In light of the precarious nature of the surface water flow, people in this region began exploiting groundwater early and in massive amounts. This complicates matters when one considers that all the rivers in the study area are underlain by the same massive aquifer, the Oglalla. Until recently, the connection between ground and surface water posed little interest to water managers. However, technological advances in the last few decades, as well as the complete allocation of the surface waters, have encouraged groundwater exploitation at a frightening rate. In terms of legal implications, groundwater and surface water have traditionally been two completely separate entities. Hydrologic reality conflicts with this legal tradition and will certainly cause much confusion until this is rectified.

THE PLATTE RIVER

Geographic and Economic Description

The territory drained by the Platte River and its tributaries spans the principal areas of development of Colorado, Wyoming and Nebraska, and includes their major centers of population. Covering nearly 700 miles from west to east, the Platte River begins high in the Rocky Mountains in Colorado and Wyoming, then flows eastward

across the High Plains and through the state of Nebraska until it converges with the Missouri River on the eastern border of Nebraska.[2] Consisting of two branches, the North Platte and South Platte which converge in western Nebraska, the basin width varies from roughly 300 miles at the divergent western end of the river where each branch begins, to a minimum width of just 90 miles in the vicinity of Julesburg, Colorado.[3]

The North Platte River originates in the northern part of Colorado and runs northerly through Wyoming to the vicinity of Casper. Beyond Casper, the river flows eastward for a short distance then turns southeasterly, flowing out of Wyoming and joining the South Platte River at North Platte, Nebraska to form the main stem of the Platte River. The South Platte River has its headwaters in the Continental Divide region west of Denver, Colorado, from which point the main stream flows north towards Greeley, then veers to the east to its junction with the North Platte River for a total length of 450 miles from headwaters to the junction with the North Platte.[4]

The basin drains 90,200 square miles, of which approximately 38,000 square miles are drained by the North Platte and 25,000 square miles are drained by the South Platte.[5] Looking below the junction of the North and South Plattes, the river drains about 29,000 square miles and its basin lies completely within the state of Nebraska.[6]

Nearly all of the sustained flow of the Platte River and its tributaries begins in the Rocky Mountains of Colorado and Wyoming. The associated snow melt in the spring combined with the fact that 75 to 80% of the precipitation along the Platte occurs as rain during the growing season, maintains a steady flow in the river from about April to late July.[7] The period of minimum flow of the Platte River in Nebraska is in late summer, when evaporation and seepage are greatest, while the Colorado and Wyoming ends run lowest during the winter months due to thick ice build-up.[8]

Aside from seasonal variation, the semi-arid plains region must also contend with larger cycles of water flow. Long term records for the area indicate that normal characteristics of the basin include dry seasons about every third year with occasional periods of several dry years in succession.[9] As a consequence, farming is possible, but irrigated farming is much more reliable, hence much more profitable to the region.

General Economics

For the basin as a whole, agriculture, including grain, hay, sugarbeets, and ranching is the most valuable industry, with tourism, manufacturing and mineral production not far behind.[10] Taken together, the Wyoming, Colorado, and Nebraska regions of the Platte River basin

cover a wide range of agricultural, manufacturing and mineral exploitation; but individually, each region is characterized by differing dominant types of development. Nebraska, for instance, is devoted almost exclusively to farming and livestock, especially in the western part of the state. Although they are neighbors, Wyoming is predominately a mineral producing state; while livestock and agriculture play a role in the state's economy, the value of coal and other mineral products puts mineral exploitation ahead of all other endeavors. The South Platte valley in Colorado shows the most varied development in the basin with agriculture, manufacturing, and mineral development alternating as leading economic influences in different time periods.

Rather than remaining within the confines of artificially produced, political boundaries, a better understanding of the situation is revealed by utilizing the inherent geographic divisions of the Platte. From this point forward, the North Platte and the South Platte basins will be the primary frames of reference rather than individual states.

THE SOUTH PLATTE

Competing interests representing population centers and irrigated agriculture have vied for use of the South Platte waters since the earliest settlers attempted to tame the area. To this day, that dilemma remains unresolved for the people of this region, consequently, the South Platte and its tributaries drain the most populated region of Colorado as well as one of its most productive agricultural areas. Total surface water supplies in the basin average about 1.8 million acre-feet per year, with about 450,000 acre-feet coming from interbasin transfers.[11] The biggest population centers along the South Platte include the Denver-Boulder area with a population of 1,848,319 in 1990, Greeley, Colorado with 131,821 and North Platte, Nebraska, with 22,605 people.[12]

Consumptive Uses

Irrigation began as early as 1859 along the river with the simple flooding of lowland hay fields and expanded rapidly in both quantity and complexity in the following decades.[13] Predictably, reliable surface flows were fully appropriated in the South Platte basin by the 1890's.[14] Water availability was increased first by storage projects. This did not satiate the farmers or the cities so transbasin diversions evolved, some even from one side of the Continental Divide to the other, then finally

groundwater development occurred. Clearly, competition was fierce between potential users of the South Platte; when tallying the final results, one has to admit that irrigators came out with the most lucrative water rights in the basin.

Estimated consumptive water uses within the basin now total about 1.5 million acre-feet per year with irrigation accounting for 82.5% of the consumption, while municipal and industrial uses represent about 15% of the total.[15] As noted by McCormick, "Despite the demands placed on it by the irrigation districts and urban areas upstream, the river still maintains some flow at the Colorado border, averaging 392,000 acre-feet per year at Julesburg."[16] Even with an average of 392,000 acre-feet, the year-to-year variation is quite extreme. For instance, in 1973 the outflow was over 1 million acre-feet, while the river had effectively no outflow at all in 1978.[17] This unpredictable flow did not bode well for Nebraska farmers who were simultaneously developing irrigation farming.

By the 1920's, Colorado users had no existing water left to allocate in the South Platte basin, but were faced with growing demand for water and no end in sight for potential consumptive uses. Some clever entrepreneurs even attempted to divert water from the Laramie River, a tributary of the North Platte, into the South Platte basin. This resulted in a Supreme Court case with Colorado as the

defendant being sued by the state of Wyoming.[18] This case will be discussed in more detail later. A positive aspect of this legal entanglement revealed itself in the 1923 compact between Colorado and Nebraska which allocated the waters of the South Platte River among existing users and made provisions for division of any additional water which might become available in the future.[19]

The South Platte Compact

As previously mentioned, an interstate compact is a contract between two or more states delineating mutually agreeable allocation of a river which flows across the borders of each state involved. In the case of the South Platte compact, the river was divided into an upper and a lower section, with the midpoint dividing the sections located between Sterling and Ft. Morgan, Colorado, at the western border of Washington County, near the Colorado-Nebraska border.[20] The compact designers made every effort to protect existing uses already established in both states. On the Colorado side, Colorado district No. 64 was an established user, while on the Nebraska side, the Western Irrigation District had water rights with a June 1897 priority.[21]

In keeping with preservation of the oldest existing uses, the terms of the compact state that Colorado must

administer the lower section of the river to assure that no withdrawals for priority dates after June 1897 reduce the flow at the Julesburg gauging station below an established flow rate of 120 cfs between 1 April and 15 October of each year.[22] There is also a clause stating that any shortage created due to negligent operations on the part of Colorado must be made up within 72 hours.[23] The only major tributary, Lodgepole Creek, was also divided just west of the Colorado-Nebraska state line. Above the dividing line, Colorado enjoys full use of the river, while below that point Nebraska is entitled to full use.[24] For any future developments, Colorado can store up to 35,000 acre-feet during the time period of 15 October to 1 April, and Nebraska can divert as much as 500 cfs if it so desires.[25]

Unlike many other interstate compacts among western states, this one appears to please all parties involved--or at least not hurt them. There have been no challenges to its credibility, and no petitions by either state to rework the agreement. As unlikely as it seems, even with more population, more pressure to develop and expand and only a finite amount of water to use, the agreement has withstood nearly 75 years of changes. One possibility which may explain its survival rests in the fortunate circumstance that nobody who had water rights lost them when the compact was established.[26] Turning an existing

situation into a formal agreement would naturally cause the least amount of disruption for all stakeholders involved.

Endangered Species Act

Even with a compact in existence for so many decades, potential problems could be on the horizon. Continually searching for new ways to expand the development along the Platte, many water storage projects have been proposed, some of which are quite controversial. One source of controversy is the Endangered Species Act of 1973. This far reaching piece of legislation compels both citizens and governmental agencies to protect both the actual life and the critical habitat of any endangered species of plant or animal. The objective of the Endangered Species Act is the "conservation" of threatened and endangered species and their critical habitats. Conservation is defined in the Act to mean "the use of all methods and procedures which are necessary to bring any endangered species to the point at which the measures provided pursuant to the Act are no longer necessary."[27] All federal agencies and departments must "cooperate in the implementation of the goals of this Act" and each agency is to "take steps" to insure that its actions do not jeopardize endangered species or result in destruction of their habitat.[28]

Needless to say, this seriously jeopardizes the prospect for any funding from either state or federal agencies in the construction of water diversion projects if those projects in any way impinge on the life or habitat of an endangered species. As it happens, the designated critical habitat for the whooping crane, an endangered species of bird, covers a 53 mile stretch of the Platte River between Lexington and Shelton, Nebraska.[29] The wide sandy flood plain of the river provides seasonal wetlands which serve as breeding ground for the birds in their yearly migratory travels between Texas and Canada.[30] While the habitat as a whole covers a large area, stretching as far west as New Mexico, the breeding grounds encompass a narrow swath of shallow marshland sensitive to changes in water flow. In the face of ever increasing demand for water in the South Platte basin, many water diversion projects continue to be proposed even though they are clearly in conflict with the endangered species act since they would dramatically decrease water flow in the breeding habitat for whooping cranes; therein lies the controversy.

Two new proposed water storage projects in Colorado have been delayed due to expected impacts along the critical habitat zone for the whooping crane in central Nebraska. Riverside Irrigation District and Public Service Company of Colorado planned to build a reservoir with a

capacity of 60,000 acre-feet on Wildcat creek, a tributary of the Platte, near Brush Creek, Colorado. The U.S. Fish and Wildlife Service has determined that the 11,000 acre-feet per year depletion of flows along the Platte that would result from this project is likely to jeopardize the endangered whooping crane.

Similarly, a second project, The Narrows, has been proposed to be built by the U.S. Bureau of Reclamation, primarily to provide more water for irrigation. The project site is on the South Platte River about seven miles northwest of Ft. Morgan, Colorado. A reservoir with the capacity to store 1.6 million acre-feet of water would most assuredly damage the habitat of the whooping crane due to a depletion of stream flows projected to be 91,000 acre-feet per year.[31] Aside from the dubious legality of these proposed water diversions on a federal level, the irrigators in Nebraska must be considered too. Having little or no control over the success or failure of water diversion projects in the upstream state of Colorado, the Nebraska residents will certainly feel the effects of water diversions. Even if the amount of water specified in the compact are flowing in the river, any newly diverted water upstream which lessens the flow of the Platte is perceived by Nebraska farmers as water that they have been denied.

According to the Fish and Wildlife Service (FWS), the suitability of the Platte River along the mid-Nebraska

stretch as a habitat for whooping cranes has been deteriorating over time due to a decrease in streamflows, and this deterioration has caused a 62% decrease in the amount of open water habitat in mid-Nebraska just in the last 50 years.[32] To preserve and restore the quality of the habitat the FWS has estimated the amount of streamflow required. Based on estimated streamflow requirements, FWS presently opposes any additional depletions from the Platte River.[33] Proponents of water development projects point out that the effect of this position is to preempt state water law by demanding a federal instream flow right to these amounts of water. They contend that such an action constitutes a taking of established water rights, and that neither Congress nor the Endangered Species Act ever intended to interfere with state water rights to this degree.[34] The result of this has been that the proponents of water diversion projects and governmental agencies who are compelled to impede them have all been mired in a sea of law suits and counter suits, the likes of which will likely tie up these projects for years--if they ever come to fruition.

Many aspects of the problems of interstate management of a mobile resource such as the South Platte River can now be seen. While some of the difficulties of allocation have been worked out with the South Platte River compact, many problems still remain. Because they are dealing with a

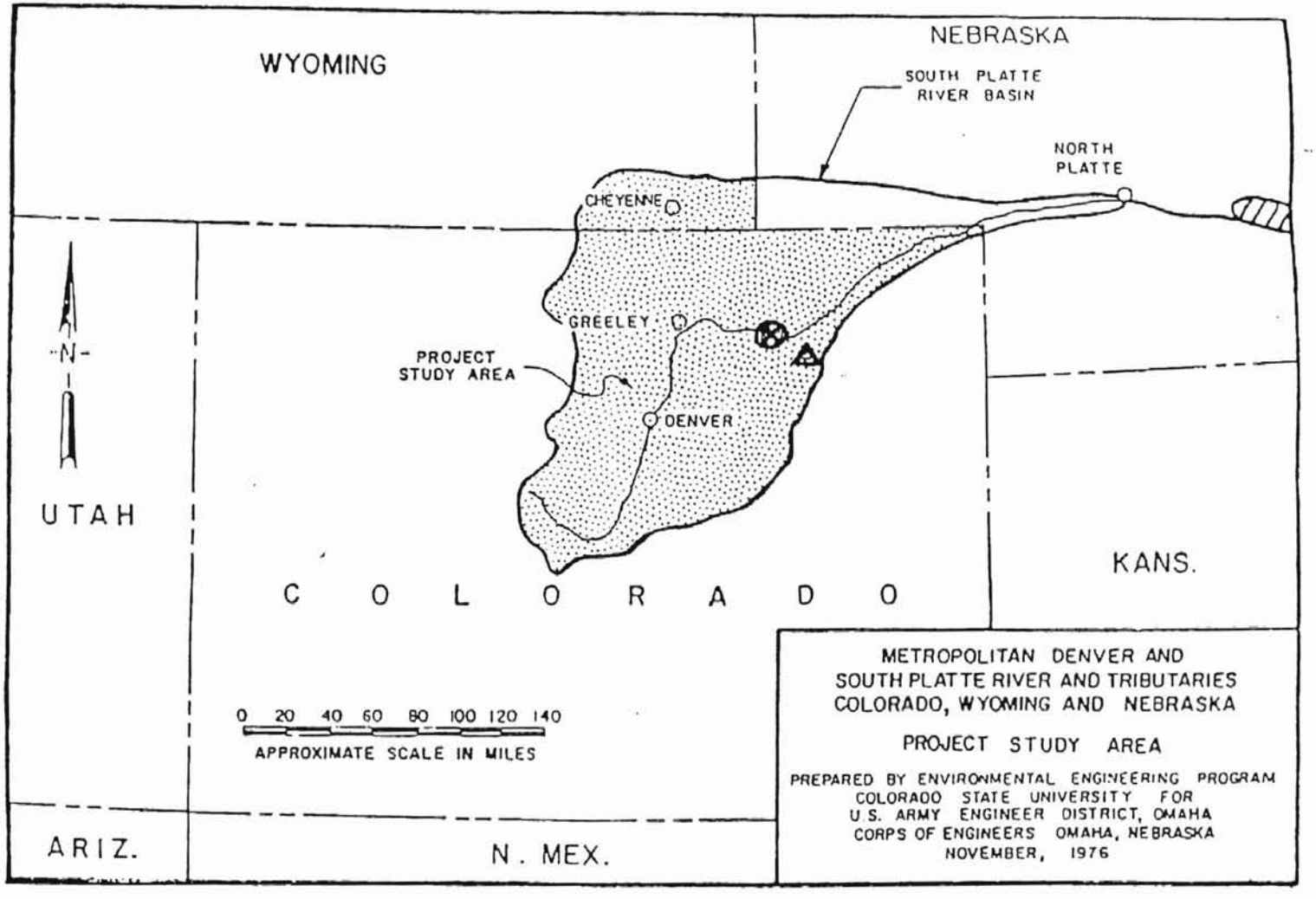

Figure 3. Location Map

⊗ Narrows Project

△ Riverside

▨ Crane Habitat area, Nebraska

shared resource, each state has been inextricably intertwined with the fate of the other state along the South Platte, for better or worse. Any diversions of water in Colorado will necessarily create an impact on the residents of Nebraska. Nebraska, being the downstream state, is left at the mercy of Colorado to hold up its end of the allocation agreement already in place. Previous to the passage of the Endangered Species Act, Colorado could conceivably plan and build reservoirs with no end in sight; no provision existed to prevent such actions if they caused harm on the downstream states' wildlife habitat. In short, there was no impetus other than courtesy to encourage responsible management on the part of the upstream state.

As it stands now, the residents of neither state have come to terms with the finiteness of the resource. Irrigators in Nebraska and Colorado are both desperately looking for ways to continue to divert more water rather than address the efficiency or necessity of the present uses of water. The mechanism of the interstate compact has been successful for the two states to date, at least in so far as the water it allocates is concerned. But possibilities for newly diverted water have revealed incongruous philosophies pertaining to the management of the South Platte River. Colorado citizens appear unconcerned about any harm caused to Nebraska citizens with future diversions; similarly, Nebraska residents have

deluded themselves into thinking that all water that flows across their state now ought to remain in their care. Conflicting goals at different levels and agencies of government offices have spawned water management practices in conflict with federal laws. These are not promising views on water management.

NORTH PLATTE BASIN

The North branch of the Platte River provides one of the only reliable sources of water for the states of Wyoming and Nebraska. Because this River retains such a valuable position in the economy and welfare of the two states, it frequently becomes the center of debate, especially on the subject of irrigation. Having a history fraught with competition, contention and litigation, the North Platte's prominence in the affairs of this region was established long ago.

Irrigation in the river basin began as early as 1865 with Colorado and Wyoming developing more rapidly than Nebraska.[35] However, from 1910 to 1940, circumstances allowed for Nebraska to vastly increase its irrigation systems; during this time period, the acreage under irrigation in Colorado increased 14%, that of Wyoming increased 31%, and that of Nebraska 100%.[36] Most of this increase can be attributed to one of the earliest

reclamation projects, the North Platte Project. This project included several reservoirs, the Pathfinder Reservoir (in Wyoming) completed in 1909 with a capacity of 1,000,000 acre-feet, the Guernsey Reservoir (also in Wyoming) completed in 1927 which total 45,600 acre-feet of water, and the Inland Lakes Reservoir (in Nebraska) completed in 1913 which holds a total of 76,000 acre-feet of water.[37] From this historic project, nearly 225,000 acres of farmland are irrigated, most of which is in Nebraska.[38]

Although the net result of the North Platte Project has been an increase in water available for irrigation, the project complicated problems regarding administration of the water between the states of Nebraska and Wyoming.[39] Most of the land to be irrigated lies within Nebraska while the storage and diversion works are in Wyoming. Consequently, users in Nebraska are dependent on infrastructure in place in Wyoming to control and regulate the water Nebraskans so desperately need. This precarious balance of appropriations across state lines held up fairly well until the 1920's because the supply of water adequately satiated all appropriators. North Platte users still had to fend off advances by potential users in the South Platte basin though.

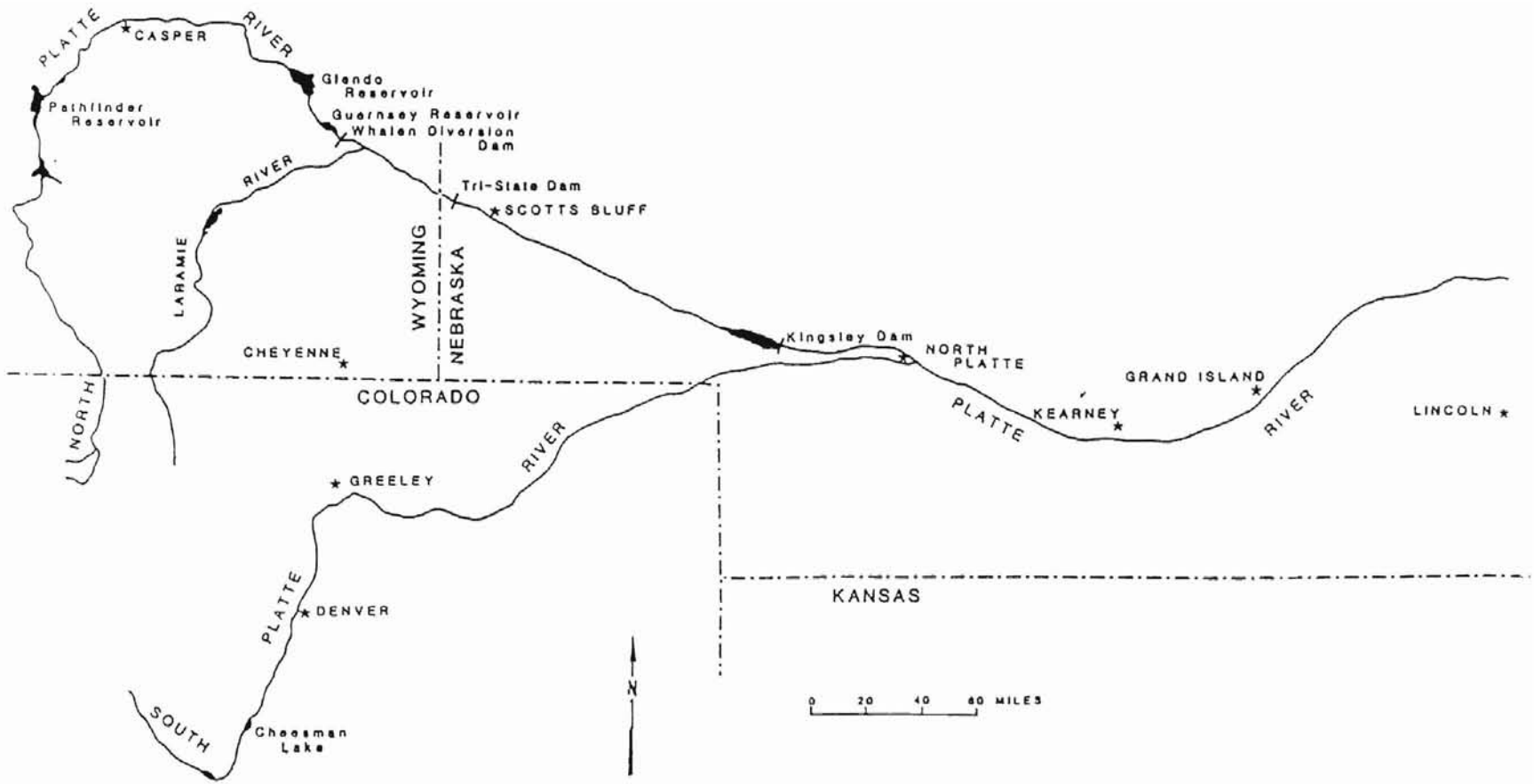

Fig 4. Platte River in Colorado, Wyoming, and Nebraska.

Wyoming v. Colorado (1922)

Wyoming and Nebraska had already found uses for every drop of the North Platte, so tempers flared when two Colorado diversion companies proposed diverting a portion of the Laramie River at Poudre Valley and sending that water down into the South Platte Basin.[40] Since the Laramie is the major tributary feeding into the North Platte River, all appropriators downstream would have less water if such a diversion occurred. The possibility of such a diversion so enraged the established appropriators along the North Platte that the state of Wyoming brought suit against the state of Colorado to prevent the Poudre Valley diversion project from taking place. The scramble for new sources of water in the South Platte basin, as described earlier, created project sponsors who would not easily be dissuaded. And so the Supreme Court was called on to settle the dispute.

The Court apportioned the Laramie in a manner that upheld Wyoming's priority. Wyoming retained 270,000 of the 290,000 acre-feet of water flowing on the Laramie River.[41] Colorado's argument that the proposed site of diversion in the Poudre Valley, which was more developed, was a more useful application of water did not sway the Court. An equitable apportionment in this case meant an application of prior appropriation across state lines.[42] Consequently,

established economies already in place were given preferential treatment. Since both states relied on prior appropriation within their respective states, this seemed to be a logical argument given by the Court. An unexpected addition to the Court's opinion entailed the first recognition of conservation in promoting water's paramount use. The Court imposed on each state "a duty to exercise its resources in a manner reasonably calculated to conserve the common supply."[43]

What many people term the Dust Bowl years began in 1931 and the North Platte River, like most of the West and Midwest, lived through several unusually dry years.[44] During this time, a second major federal irrigation project commenced in Wyoming known as the Kendrick Project.

This project, and its associated dams, intended to supply Wyoming with 66,000 acres of irrigated land.[45] Both Nebraska and Wyoming adhere to prior appropriation water law, and the Kendrick dams would be junior to nearly every other appropriator along the North Platte. Despite this, Nebraska felt the presence of the Kendrick dams would threaten the future water supply to western Nebraska.[46] Nebraska's fears were well founded since Wyoming did not recognize any extension of priority of water rights across state boundaries.[47] This dispute arising out of the Kendrick Project (and a protracted drought) became the basis of the 1945 Supreme Court case Nebraska v. Wyoming.[48]

Nebraska sued Wyoming to enjoin junior diversions for the Kendrick Project in 1934. A special master was appointed by the Court to gather facts pertaining to this situation and, in 1940 he filed his report. The original Court decree was entered in 1945 and modified in 1953 for construction of the Glendo reservoir.[49]

Nebraska v. Wyoming (1945)

In the previous Wyoming v. Colorado dispute, the court relied on established water rights and the tradition of prior appropriation to give a mass allocation of water to each state along the Laramie. In Nebraska v. Wyoming, Nebraska argued that a similar application of the prior appropriations rule should be used by the Court to resolve the current dispute.[50] This, of course, implied that junior appropriators in Colorado and Wyoming should be deprived of water for the benefit of senior Nebraskan users.[51] Wyoming, on the other hand, urged the Court to make a mass allocation of water between the states without the Court determining the priorities interstate of the appropriators in each state; this proposal included a distribution of both natural flow and storage waters as a common fund to all users.[52]

In the end, the Court rejected both states' suggestions and made its own allocation which deviated from

strict application of prior appropriation and did not give a simple mass allocation.[53] The most difficult part of the case concerned the division of supply between Wyoming and Nebraska in connection with diversions made between Whalen, Wyoming, which is 40 miles west of the Nebraska border, and Tri-State Dam in Nebraska, which is one mile east of the border.[54] In making an allocation between Nebraska and Wyoming, the Court had to cope with an extremely complicated situation due to the interrelated problems of priorities in one state and reservoirs in the other.

Because of these intricacies, this case is probably the most complicated equitable apportionment case in the history of the Supreme Court. Also taking into account that the established economies of the states were uneven and that some of those economies already in place were dependent on junior appropriations, aside from the interstate interdependency problem, the Court organized the river into six sections corresponding to six natural divisions of the river basin.[55] This was supposed to allocate specific amounts of water to each section so as to preserve the economies of each region along the river. Ultimately, the Court apportioned the natural flow (storage water being omitted entirely) of the North Platte such that Nebraska received 75% of the water during irrigation season, while Colorado and Wyoming split the remaining 25% of the flow.[56] The decree also provided that gauging

stations and measuring devices be installed so that the natural flow could be determined and regulated on a daily basis.

It should be noted that the issues of allocation of storage water and off-season flows were not addressed in Nebraska v. Wyoming. Another problem left unresolved lies in the fact that the Laramie had not been specifically apportioned between Nebraska and either Colorado or Wyoming.[57] The effect of the decree was basically to freeze Colorado and Wyoming uses at their levels at the time of the suit since apportionment of natural flow was required only between Whalen and Tri-State Dam.

Because the Court did not strictly apply prior appropriation in this case, the question arose as to exactly what factors did apply to an equitable apportionment. Although priority of appropriation was the guiding principle, the Court defined the following as other relevant factors to consider: physical and climatic conditions; consumptive use of water in the various sections of the river; the character and rate of return flows; availability of storage water; the extent of established uses; the damage to upstream areas as compared to the benefits to downstream areas if a limitation is imposed on the former; and the practical effect of wasteful uses on downstream areas.[58]

Even with the clarity of factors involved in equitable apportionments that was established with this case, some of the unresolved issues concerning non-natural flow of the Platte came back to haunt the court when, in 1986, Nebraska petitioned the Court for an enforcement order and injunctive relief under the decree's reopener provision.[59]

Nebraska v. Wyoming an d Colorado (1993)

Initiating this suit in 1986, Nebraska alleged that Wyoming and Colorado were violating or threatening to violate the previous decree of 1945 by virtue of developments on two North Platte tributaries, Deer Creek and the Laramie River. Wyoming counterclaimed that Nebraska was circumventing the decree by demanding and diverting water from above the Tri-State Dam for uses below the Tri-State which are not recognized in the decree.[60] Basically, Nebraska challenged two new developments on the Laramie near the North Platte confluence. The first, Grayrocks Project, was completed in 1980 and consists of Grayrocks reservoir and an electric power generating plant.[61] The second, Corn Creek Project, is a proposed irrigation system for Wyoming farmland.[62]

Nebraska claimed that the equitable apportionment of the water on the Platte includes Laramie flows that historically have reached the North Platte, while Wyoming

contended that the waters of the Laramie are completely apportioned between Colorado and Wyoming by virtue of this Court's 1922 Laramie River decree.[63] The Court granted Nebraska's motion for injunctive relief concerning Grayrocks and Corn Creek diversions, but it also granted Wyoming rights involving canal diversion limitations.[64]

Examining the long litigious history of affairs concerning the North Platte, it becomes immediately clear that the problems with water allocation will likely not go away. Reviewing the cases on the Platte River, one can see that using the Supreme Court as the overriding authority in decisions of allocation has failed to establish a workable solution to interstate water problems between the states of Colorado, Wyoming and Nebraska. Each case brings to light yet another aspect of water management that either was not considered before or had not been addressed thoroughly and clearly enough to satisfy all users involved.

This can perhaps be seen as a symptom of the evolving development within these states and their subsequent changes in priorities as regards water and its usage. Or it may be a symptom of the inappropriateness of the venue by which these disputes are solved. One thing is certain, the process by which arguments are settled before the Court now necessitates that each case be addressed as a unique and individual circumstance, thus encouraging piecemeal management. As time goes by and more users desire the

finite supplies of the Platte River basin, it appears inevitable that there will be more chapters to follow in the saga of interstate river management between these feuding states.

CONCLUSION

Both the North and South Platte Rivers have been completely allocated for some time. With extreme variation in yearly discharge, this leaves some parties always wanting for water, especially in dry years. To augment the available resources for agriculture, massive irrigation projects rely on Platte river water and extensive groundwater exploitation, which also depletes the rivers. While none of the groundwater has been allocated or even considered in association with Platte surface water, separate consideration of the surface and groundwater supplies cannot continue for much longer at the present rate of groundwater consumption.

To date, the main use of North Platte water revolves around irrigation and grazing, with mining interests taking a close third; the South Platte supports a considerable population as well as the aforementioned uses. Allocation has happened as a consequence of voluntary interstate compacts in the case of the South Platte compact between Colorado and Nebraska. However, enough tension exists

between Colorado, Wyoming, and Nebraska that water has also been allocated by the Court both along the Platte and on main Platte tributaries.

Court induced allocation affected all users and most of the surface water sources for the three states. Many current users are not completely satisfied with the allocations but find themselves with few alternatives. By using litigation as a mechanism for interstate water disputes, each of the states involved surrendered control over the decision making process in allocation of the Platte to the Court and must abide by its decision. This can be seen as positive or negative water management depending on the perspective of the user. While the Court made every effort to divide up the water in a fair manner, the end result tended to preserve existing water rights before consideration of anything else. Thus if the waters were not being utilized well at the time of allocation, a Court remedy allocation plan would only perpetuate those same ill-conceived uses.

The North Platte created an especially convoluted Court apportionment plan with six separate sections and allocations for each. This kind of allocation sheds some light on the complexity of the situation. It may also suggest a problematic future with respect to management in light of any new problems. The allocation was put in place fifty years ago and has no flexibility to accommodate

decades of growth and change. Needless to say, long term management will entail much effort.

Because the situation appeared so irreconcilable to the states involved that they resorted to Supreme Court allocations on more than one occasion begs the question of exactly who will manage the waters in the long term future. Clearly, the Court imposed allocation has not been without its problems. Each of the three states has, at some time in recent decades, brought suit against the other states because of impending or proposed water diversion projects and their implications on the present allocation situation. This is one aspect of future problems the Court did not address; certainly there will be others. Unfortunately, the parties are so vehement and egocentric in their philosophies on equitable distribution that the Court will likely be involved again.

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CHAPTER 4: THE ARKANSAS RIVER

Geographic and Economic Description

Beginning in the Rocky Mountains near Leadville, Colorado, at an elevation of about 11,000 feet, the Arkansas River flows eastward across Colorado, Kansas, Oklahoma and Arkansas until it merges with the Mississippi River at the eastern border of Arkansas. Similar in length to the Colorado River, the Arkansas is the fifth largest river in North America with a length of 1,450 miles.[1] The Arkansas and its tributaries drain an area of 160,500 square miles which includes parts of seven states.[2]

A number of large population centers are located in the Arkansas Basin. Pueblo and Colorado Springs, Colorado combine to make a population of 500,000. Wichita, Kansas metropolitan area has a population close to 500,000; further downstream, the Tulsa, Oklahoma, metropolitan area contains over 1,000,000 residents and the Little Rock, Arkansas, urban area houses roughly 300,000 people.[3] Moreso in the west than the east basin, increasing population continually places demands on the Arkansas as a source of municipal and industrial water.[4]

One of the most striking features of this river is the dual nature of its personality. In the west, the Arkansas descends rapidly through the mountains running in a narrow, deep valley. Coming out of the foothills of the Rockies at Pueblo, Colorado, the valley widens into an immense agricultural and grazing area along the High Plains across western Kansas. Between the Kansas-Colorado border and Hutchinson, Kansas, the river often disappears having very low sporadic flow and a broad, sandy bed with low banks and minimal tributary inflow. From this point eastward, the channel deepens and tributary flow increase, fed by the more abundant rainfall of the eastern plains. From Wichita, Kansas, to Little Rock, Arkansas, about 600 river miles, parts of the drainage area consist of rolling prairies but most of it is broken and hilly, merging with the Ozark Mountains in Arkansas.[5] Below Little Rock is a broad valley which blends into that of the Mississippi River.

Not surprisingly, climate and precipitation vary greatly along the Arkansas Basin. Total precipitation in the Upper Basin ranges from forty inches annually in the mountains to less than twelve inches around Pueblo. East of Pueblo, precipitation averages twenty inches at Dodge City, Kansas, thirty at Wichita, forty at Muskogee, Oklahoma, and fifty two inches annually at the mouth of the river.[6]

In the west, extreme precipitation events are common, with some areas of the watershed receiving less than ten

inches annually while rains producing as much as eighteen inches of moisture in central Oklahoma in one thirty-six-hour period have been recorded.[7] In the west, melting snows in the spring create the largest flows in the mountains and flood flows account for a large percentage of the annual discharge; consequently, much of the year is characterized by long periods of low flow. In the east, it's an entirely different story. Floods originate from precipitation falling in the eastern part of the basin and a seasonally steady high flow characterizes most of the Lower Basin.

Agriculture is the principal industry throughout the watershed. Even though the watershed covers only a narrow latitude, there are wide ranges in altitude and rainfall yielding climatic conditions suited to almost all farm crops grown in the temperate zone.[8] Heavy irrigation is practiced in the west; with 412,000 acres of irrigated farmland downstream of Pueblo, the principal crops have been sugar beets, alfalfa, melons, corn, grains, and fruit.[9] Eastward into Oklahoma wheat, sorghum, and other forage crops predominate; stretching into Arkansas, rice fields irrigated by wells occur in the extreme east end of that state. Raising and feeding livestock is widely practiced along the entire basin either as a separate industry or in conjunction with farming.

Industrial growth throughout the basin developed principally along the lines of naturally occurring resources.

The mountains near the headwaters of the Arkansas are highly mineralized yielding significant amounts of gold, silver and other metals. Extensive deposits of coal are worked in portions of Colorado, Oklahoma and Arkansas, with oil and natural gas entering the picture in central Oklahoma and ranging eastward through western Arkansas.[10] The salt and gypsum industry is important in Kansas due to its underlying geologic deposits. Brick, tile and cement plants appear where sand, clay, and shale deposits are easily accessible. Such is the diversity of industry, crops, and climate that the river will be analyzed according to the upper and lower basins. The upper basin stretches from the headwaters to the semi-arid portions of western Kansas, while the lower basin consumes everything from Wichita on down to the juncture with the Mississippi River.

Irrigation History Along The Upper Basin

In order to fully understand the nature of the problems along the Arkansas River, one must understand how the situation developed, especially as regards the development of irrigation along the Colorado-Kansas border region. The problems faced in this region can serve as a prime example of the kinds of disputes over interstate water which occur in other areas of the West and the solutions employed to resolve those problems. For that reason, a historical background and

detailed explanation of the Court cases which resulted are necessary.

Because the western end of the upper basin experienced such sporadic and unpredictable weather, crops could not be reliably grown without irrigation. This combined with periods of explosive population growth in the eastern portion of Colorado created immense and desperate water shortages, and people were always looking for ways to procure more of the precious liquid.

To that end, local farmers organized themselves into mutual stockholding irrigation companies, or more commonly referred to as ditch companies, which served the purpose of acquiring more water for the stockholders. Each stockholder had a voice in the company's affairs in proportion to the amount of stock he owned. The ditch companies would then pool their financial capital and build irrigation canals for their respective crops.[11] Between 1870 and 1900, an immense web of irrigation canals spread throughout the Arkansas valley in eastern Colorado. The idea originated in Colorado and gradually spread further downstream and into western Kansas, and by the turn of the century, literally hundreds of ditch companies sprang up ranging in size from the very small to the very large.

There existed only modest amounts of water to be claimed in this area of the Arkansas river to begin with, and within thirty years of the first ditch company's inception, the flow

of the river itself began to decline due to overappropriation.[12] Many of the ditch companies went bankrupt for various reasons ranging from consolidation to fraud and trickery or bad management. However, the ones that survived thrived and brought an economic boom to the area.

Simultaneous to the development of ditch companies, the towns of Pueblo and Colorado Springs were growing rapidly and soon these young cities had expanded beyond the capacities of their water systems. As early as 1872, the city of Colorado Springs created an eleven mile canal north of Pike's Peak to ensure water supplies and, by 1910 Colorado Springs had captured all of the water on the south slope of Pike's Peak with reservoirs, tunnels and ditches.[13] Pueblo, meanwhile, was sucking up water everywhere it could find it. In the 1920's, the river flowed through the city of Pueblo at a rate of 1,700 cfs; this was reduced to 81 cfs in 1934 and finally in 1935, the river was dry.[14]

By 1900, all water rights were claimed in the valley, forcing cities and industry to purchase developed agricultural rights, which in turn curtailed farming.[15] To avoid this, city planners sought to transport water from the wetter western side of the continental divide to the drier Arkansas River valley. Sustaining urban water supplies turned out to be a complex matter but the economic resources of the city made it possible to raise enormous sums of money to

implement water plans and to win costly legal battles with small towns and irrigators.[16]

With urban areas swallowing up small towns, buying out irrigators, even diverting water from the other side of the continental divide, the severity of water problems in the area cannot be understated. If it seemed dry up in Pueblo and Colorado Springs, it was even drier downstream across the Colorado-Kansas border. The scramble to establish water rights was not restricted to the Colorado portion of the Arkansas.

Although no Kansas cities became major players in the water rights game, there were ditch companies along the southwestern edge of Kansas who also established water rights.[17] Of course, being geographically situated downstream of the fracas on the front range, the Kansas farmers were at the mercy of the upstream users to ensure the flow of the river; this was not an enviable position to be in.

While Colorado users had little regard for other Colorado water interests, they had even less regard for those downstream. In fact, the local governments made a concerted effort to use every drop of water along the Arkansas, considering any drop of water that crossed the Colorado-Kansas border to be wasted water. This attitude combined with a lack of any real interstate authority in these matters lead to generations of spite and malice between

Kansas and Colorado farmers that has not dissipated to this day.

KANSAS V. COLORADO (1907)

The ditch companies in Kansas began suing the ditch companies in Colorado for infringement of water rights as early as the 1890's. Eventually under pressure from influential stakeholders within each state, the states themselves got involved and by 1901, a case had come before the Supreme Court.[18] This first case was such a landmark case in deciding the fate of interstate water allocation that it deserves a detailed explanation.

Kansas alleged that the state of Colorado was diverting so much of the Arkansas River that Kansas economies were stifled, and that Kansas citizens had a right to an unimpeded flow of the river through their state without unreasonable depletions by upstream users. It was claimed that Colorado unfairly depleted the entire flow of the river before Kansas could use it. Colorado countered that there were in fact two rivers, the Arkansas River which dried up shortly after crossing the Colorado-Kansas line, and the Kansas Arkansas River which sprung up in Kansas and had no bearing on the Arkansas.[19] As ludicrous as the argument sounds today, it does shed light on the utter lack of hydrologic knowledge with which the citizens of a hundred years ago were equipped.

The Supreme Court had never dealt with anything of this nature before, so before considering any information about the Colorado-Kansas situation, the Court had to consider whether it was even qualified to judge a case involving two semi-sovereigns such as states within the United States. The Court decided that, since no other venue existed and, if the states were completely sovereign, a range war would likely ensue, it did have ultimate power to decide such things as interstate water allocation.

After assessing the facts in the case, the Court decided that massive irrigation by Colorado users had caused some detriment to the southwestern region of Kansas. But it also found that when harm to Kansas was compared to the great benefit to Colorado, it seemed that "equality of right and equity between the two states forbids any interference with the present withdrawal of water in Colorado for purposes of irrigation."[20] However, the Court also agreed that "... if the depletion of the Colorado continues to increase there will come a time when Kansas may justly say that there is no longer an equitable division of benefits and may rightfully recall for relief against the actions of Colorado."[21]

The Court had set the tone for all similar interstate water disputes which came before it. An equitable balance between harms and benefits of users was to be established when determining a fair allocation of interstate rivers. This ruling, while it did not satisfy Kansas, did leave the

door open for Kansas to file suit again at a later date, which it did.

COLORADO V. KANSAS (1943)

While Kansas did not get satisfaction from the 1907 case, its citizens and ditch companies continued to sue ditch companies in Colorado, much to the aggravation of Colorado ditch company executives. This protracted war of litigation finally cost so much time and money to defend against that it was Colorado who brought suit in this second round of Supreme Court battles.[22]

Colorado filed suit in 1928 to enjoin any further prosecution from ditch companies in Kansas (who had been suing Colorado ditch companies since 1909). The Court appointed a special master to find facts pertinent to the situation. Even though there was an allocation of the river in the master's recommendations, in 1943 the Court handed down a decision which did not allocate the river. It did however enjoin Kansas ditch companies from suing Colorado ditch companies.

One reason that Kansas may have fared so poorly in the 1943 decision could be its inability to show that Colorado's irrigation caused substantial harm to Kansas farmers. Even though Colorado irrigation projects increased during the time between the two rounds in Court, so did irrigation projects

in Kansas. Because there were in fact more acres irrigated in Kansas at the time of the 1943 decision than there had been in the 1907 decision, the Court was reluctant to upset whatever precarious balance existed at the time.

As citizens in eastern Colorado and western Kansas pursued their conflicting goals, they engaged in interstate litigation, which proved both expensive and unproductive. Gradually, the participants turned toward cooperation (loosely defined) to achieve greater water supplies. In 1949, Kansas and Colorado agreed to a compact concerning the John Martin Reservoir.[23] While considered the Arkansas River Compact, the agreement actually apportions the water in the John Martin Reservoir, sixty miles upstream from the border. It would stretch the limits of credulity to assume these long term litigious enemies had suddenly made peace. However, the funding required for the reservoir became threatened when Colorado and Kansas could not agree on the plans for the reservoir, which was a condition to obtain federal financial assistance.

The two states finally agreed on an allocation in which Kansas received forty percent of the releases from the reservoir while Colorado received sixty percent.[24] It should be noted that Colorado's allocation is measured from the dam while Kansas' is measured from the state line. Despite hopes of a final settlement between Kansas and Colorado, more litigation was to follow. Kansas petitioned the Court for a

ruling on the compact in 1986 because it claimed that Colorado was unfairly depleting the river before it reached the reservoir.[25] In 1989, Kansas amended its complaint to assert a claim for damages and to claim that two new diversion projects in Colorado further deplete the river before it reaches the reservoir.[26]

Obviously, some issues of contention are not being addressed if the two states have a history of litigation which extends nearly one hundred years without finding some solution both parties can accept. Even with an attempted compromise with the compact of 1949, the citizens of the states involved remain doggedly determined not to be cheated out of what they perceive as their fair share of the Arkansas River. Ironically, after 1950, the pace of city growth along the Front Range intensified and irrigated agriculture came under more pressing economic assaults. By 1950, irrigation had reached its peak along the Arkansas.[27] Hopefully, irrigators in both states can finally face the most difficult issue they have tried to ignore for one hundred years. There is a limit to the amount of growth in this region that the water supplies can withstand. No amount of squabbling and litigation will alter that simple fact.

Until such time as this becomes widely acknowledged, people will continue to heedlessly exploit both surface and groundwater supplies. The latest round in the Kansas v. Colorado war of litigation involves for the first time, a

claim that Colorado taps so far into the groundwater supplies of the Ogalalla as to diminish supplies in the hydrologically connected Arkansas River. Kansas filed suit in 1985, and in July of 1994 the special master's report came down. In the report, the special master, for the first time, recommended to the Supreme Court in favor of Kansas. Although two other complaints were not settled in favor of Kansas, the master did agree that Colorado, pumping as much as 15,000 acre-feet of groundwater annually, did indeed appear to be depleting the usable and available stateline flows of the Arkansas River.[28]

LOWER BASIN

In a complete turn around of the events just discussed, the lower basin of the Arkansas River appears to have more than enough water to satisfy its users. It is precisely because of this that many problems plaguing the upper basin simply do not exist along the lower basin. Along the Arkansas' lower basin, rather than a dearth of reliable water sources, there is more than enough water to meet the needs of all the users. Two compacts on the lower basin have come about, one between Oklahoma and Kansas (1965)[29], the other between Oklahoma and Arkansas (1970).[30] These compacts simply and clearly allocate the water of the Arkansas between the parties of each respective compact, and to date, there have been no real problems with the compacts.

In fact, these are only mentioned now to show that states can find their own solutions to allocation of interstate waters at times, and to further illustrate the dual nature of the Arkansas. Along the lower basin, the problems with river management revolve not around how to get water, but how to use it. A series of locks and dams dot the lower basin of the river, but contrary to the upper basin, this water is dammed up for flood control and navigational benefits.

If one thing becomes clear when looking at the history of the Arkansas River and the attempts at management by those states across whose soil the river flows, it is that when every user has enough water, there are virtually no problems. Only when the allocation becomes a zero sum game necessitating that, for one party to win the other must lose, do the players get desperate. We all must live within the constraints of our natural environment to some degree. Unfortunately, this will never be easy and people will not conform to the elements of nature without a fight if those elements do not support their perceived interests.

Conclusion

Because of its split personality, the semi-arid upper basin having dramatically different geologic, hydrologic, topographic and climatic attributes than the water rich lower

basin, assessments of the Arkansas River must be made as two separate cases. Turning first to the upper basin, the use of the waters to date covers a variety of human and agricultural uses; with respect to the amount of allocated waters, all water in the river has been allocated and then some. Immense irrigation projects along the front range have been an integrated part of river use since the mid-nineteenth century. As well as agricultural diversions, most of the major population centers along the Arkansas rely on river water for municipal uses. Adding to the mix are cattle grazing, industrial uses, and the ever-increasing groundwater exploitation on the High Plains, especially within the Arkansas River Valley.

While everyone along the river was affected by these uses, the only form of river management historically has been that of first in time, first in right with the first users being irrigators, followed by municipalities then industry and grazing. Water was allocated via interstate compact, as least for that water contained in the John Martin Reservoir. This has not been without contention though, and happened relatively late in the history of water use for the area. A major reason for the contention centers on the uneven distribution of risk for the states. Because the allocation method was storage limitation, the risk of shortage remains completely with the downstream state, in this case, Kansas. Colorado is limited in the amount of water it can store in

the John Martin Reservoir, thus Kansas will receive only what is in excess of the upstream storage allowance (plus any water originating between the reservoir and the state boundary).

A Court imposed allocation has not occurred yet concerning the Kansas-Colorado dispute, but the Court has intimated that such a possibility exists at some future date. A likely catalyst for this option can be seen in the habitual refusal of upstream users to consider the effects of water diversions on downstream users.

Since no basin-wide management strategy exists for the river at present, successful river management is only a distant dream. The upper basin of the Arkansas has been problematic to the residents there for most of the two centuries of permanent Anglo habitation. Seasonally consistent at best, the hydrological attributes of the Arkansas do not lend themselves to the kind of uses with which it is now burdened, yet pressures on the river continue to grow.

Given the openly hostile litigious history between Colorado and Kansas, persisting for nearly a hundred years, the suggestion of even a semblance of successful longterm management throughout the upper basin would be overly optimistic. It must also be noted that the sheer number of cases sent before the Court, and lack of subsequent resolution, leads one to conclude that either the problems

between the two states have no resolution or the venue through which the problems have been addressed is inappropriate and/or ineffective.

Another strike against the potential for integrated or longterm management lies in the inability of the current system to adjust to new problems. When the first boom in users fully allocated the regular flow of the Arkansas by the turn of the century, new potential users insufficiently addressed this problem. Overallocation and vast shuffling of existing water rights simply delayed any realistic attempt to manage the river's resources.

Later, as more users came to rely on an already overtaxed water supply, the prevailing philosophy of management centered on the hope of technologically diverting or extracting more water than previously possible instead of more prudently managing the existing water supplies. Again this puts off the realization that there is a limited amount of water to be exploited.

The implications of this philosophy which ignores the limitations and interworking of the natural system does not bode well for the potential of future basin management. If the upstream users refuse to acknowledge the needs of downstream users and all users refuse to acknowledge the reality of a limited resource, a rational or flexible plan for management of said resource appears unlikely.

As for the lower basin, many of the allocation problems plaguing the upper basin do not exist. To date, the waters of the lower basin remain plentiful and uncontroversial. The major users of lower basin waters include two cities and various commercial interests interested mostly in navigation. A series of diversion projects controlling the flow of water through most of the river's path across Oklahoma and Arkansas has been in place for two decades now and has met with few problems. Little comprehensive basin management exists, but the population and other human demands on the river do not exceed its capacity and thus require minimal management.

Kansas-Oklahoma and Oklahoma-Arkansas compacts have allocated the waters amicably among the three states and the current system appears stable. Because of these compacts and the lack of current stresses on the river, long term management will likely be successful along this stretch of the Arkansas River, at least in the near future. Of course management without contention comes easier when every stakeholder can be satisfied. This balance will naturally be more elusive when population pressures grow, but for now, the river is not overallocated.

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CHAPTER 5: CANADIAN RIVER

The Canadian River

The final river in the study area is the Canadian River. Like the Platte River, the Canadian consists of two branches, the North Canadian and the South Canadian. Local residents often refer to the South Canadian simply as the Canadian River; conforming to this tradition, the same will be done here. Both Canadian Rivers rise out of the mountains of northeastern New Mexico and flow east across New Mexico, Texas and Oklahoma to join the Arkansas River near Muskogee in eastern Oklahoma.

Technically, below the confluence of the two Canadians, it becomes a tributary of the Arkansas River. Therefore the North and South Canadian were included in the comprehensive Arkansas Basin study of the 1930's conducted by the Corps of Engineers.[1] While much of the terrain through which the Canadian Rivers flow is similar, it is easier to understand their underlying geography and geology by considering them separately, as did the Corps.[2]

THE NORTH CANADIAN

Rising in the high plateau region of northeastern New Mexico, the North Canadian river has its humble beginnings as the Corrumpa Creek.[3] The mainstem has its source in the

foothills of the Rockies, and flows easterly through New Mexico and into the panhandle of Oklahoma where it is known as Beaver Creek until its junction with Wolf Creek where it becomes the North Canadian River near Woodward, Oklahoma. From this point the river flows southeasterly until it merges with the Canadian river near Eufaula, Oklahoma.

The North Canadian extends, from source to mouth, a total length of 800 miles and drains an area of 14,310 square miles.[4] Beginning with a broad fan-shape, the North Canadian becomes long and narrow in the eastern half of the watershed. There are no large tributaries until the Paloduro and Coldwater Creeks, both spring fed, merge with the river in the Oklahoma panhandle.[5] Lined with table lands up to 150 feet above the valley along the western end of the panhandle, the watershed gives way to a belt of sand hills. Very little cultivation exists in this region of the watershed but some grazing goes on. The valley is shallow with a sandy bottom, similar to the neighboring Cimarron River.

When the river reaches the urban expanse of Oklahoma City, the watershed becomes more rolling and precipitation also increases; from Oklahoma City to Shawnee, the greater part of the watershed is cultivated with the rest being mostly in timber. Continuing east to Weleetka, the hills become more steep where runoff is rapid and well defined.

Timber gradually increases in proportion to agriculture which still covers roughly half of the watershed.

The western division of the watershed is devoted to stock raising and dry farming with only small amounts of irrigation. In the eastern division, general farming of grains, corn, cotton and forage crops predominates. Large production of oil and gas has increased and hastened the development of the eastern area of the watershed, thus the population increases steadily from west to east across the basin.[6]

THE (SOUTH) CANADIAN

Beginning in the Sangre de Cristo mountains in northeastern New Mexico, the Canadian flows south briefly then bends to the east and flows across the panhandle of Texas, across western Oklahoma and finally comes together with the North Canadian River at the Eufaula reservoir in Oklahoma. Approximately 900 miles long, it drains a basin area of 30,600 square miles.[7] Proportionately, half the basin expanse lies within New Mexico while thirty percent is in Texas and the remaining twenty percent lie in Oklahoma.[8]

The headwaters begin over 12,000 feet above sea level and are fed by perennial streams, much of their summer flow being diverted for irrigation purposes. Flowing through

two canyons cut deep in the plateau formations in the broken and rugged New Mexican topography, the Canadian emerges into a wide valley below the mouth of the Conchas River. Continuing toward Texas, the water cuts deeper and deeper into the plains formations, until at the New Mexico-Texas border, the river lies in a canyon about 300-400 feet below the general elevation of the surrounding plains.

Across Texas, the river flows in a broad, deep canyon from 400 to 600 feet below the surface of the adjacent plains. The plains on either side of the river beyond this rough and broken marginal strip is solidly farmed and very fertile.[9] Gradually, the canyon gives way to sloping hill sides and the basin narrows gradually to about 25 miles at the Texas-Oklahoma state line. It remains a long, thin watershed extending 300 miles across Oklahoma and occupies a wide, meandering channel until the Canadian reaches the edge of the Oklahoma City urban area. East of this, the banks gradually increase and the adjacent upland become more heavily timbered.

In similar fashion to the western areas of the previous watersheds, the western area of the Canadian watershed experiences sporadic and often violent bouts of precipitation. Three-fourths of the rainfall in New Mexico and Texas happens during the growing season, while in Oklahoma the heaviest rains occur in the spring and fall.

A lack of tributaries in combination with its narrow channel have prevented it from producing any major floods.

Reservoirs

Before the Tucumcari Project of the 1950's, only the upper reaches of the New Mexico end of the Canadian were utilized for irrigation. By 1935, a modest 70,000 acres were irrigated, but possibilities were noted for more extensive development near Tucumcari.[10] The Conchas dam and reservoir had been constructed in 1940 under the auspices of the 1936 Flood Control Act, and the Tucumcari Project uses this reservoir for its water supply. With the new irrigation system in place, another 45,000 acres can be irrigated.[11] Not far downstream from the Conchas at the confluence of the Canadian river and the Ute Creek is the Ute Reservoir. Built by the state of New Mexico in the 1960's, this dam and reservoir began with an initial capacity of 109,000 acre-feet.[12]

The Canadian River Compact

Lake Meredith is the only reservoir along the Canadian in Texas; it was completed in the 1960's and provides a municipal water source for the cities of the Texas panhandle, Amarillo and Lubbock. Built by the Bureau of

Reclamation, its capacity is 1,400,000 acre-feet.[13] Congressional authorization for this project, at New Mexico's vehement insistence, was contingent upon ratification of what came to be called the Canadian River Compact.[14] Negotiations between New Mexico, Texas and Oklahoma had already taken place three decades earlier, but Texas failed to sign the compact proposed at that time. This time around, the compact was signed.

Even though Texas and New Mexico already carried heavy doses of mutual paranoia from previous water dealings, Texas was dragged to the negotiating table out of desperation. The Bureau of Reclamation had, in its report on the Canadian River Project in Texas, recommended that a compact be in place before construction began on what would be Lake Meredith. Aware of this, the New Mexico delegation in Congress successfully attached amendments to the authorization for the Texas project requiring the compact to be ratified by the states involved before any funds were appropriated for construction on Lake Meredith.[15]

Allocation of waters appeared straight forward. New Mexico would be allowed to develop 200,000 acre-feet of storage below the Conchas dam. On the North Canadian, Texas was limited to storing water for municipal and farm purposes; on the Canadian, Texas could impound a quantity equal to 200,000 acre-feet plus whatever amount Oklahoma could store west of the 97th meridian. Oklahoma was not

restricted as to use or storage of Canadian River water, since as the downstream state such actions would not affect the other states in the compact.[16]

OKLAHOMA AND TEXAS V. NEW MEXICO

In 1984, New Mexico enlarged the Ute reservoir's capacity to 278,000 acre-feet. Suddenly what appeared straight forward was no longer so simple. This enlargement of the Ute reservoir meant a dam below the Conchas now had capacity larger than 200,000 acre-feet. Texas and Oklahoma promptly claimed this to be a violation of the compact. New Mexico disagreed, retorting that the compact referred to water which originated below Conchas dam; New Mexico argued that water released from Conchas but originating above the Conchas dam could still be stored in the Ute without affecting the limitations of the compact. The problem became more tangible in 1987 when a flood above Conchas caused 250,000 acre-feet of spill over. By 1988, the capacity was not the only issue, the Ute actually retained 232,000 acre-feet of water, of which nearly 200,000 was alleged to be from the Conchas spill.[17] Oklahoma and Texas had already filed suit with the Court and this latest episode was added to the complaint.

In 1991, the Court ruled on Oklahoma and Texas v. New Mexico in an effort to interpret the compact. The Court

decided that increasing the capacity of the Ute did not violate the compact but decided that the meaning of the word originate was more ambiguous than New Mexico had claimed. The intent of the compact really meant to address waters stored, used or diverted for use at or above Conchas Dam.[18]

NORTH CANADIAN RESERVOIRS

Along the North Canadian River, there are three major reservoirs, all built upstream of Oklahoma City. The Optima Reservoir, built in the west end of Oklahoma's panhandle, was designed to capture the flow of Coldwater Creek (one of the spring fed tributaries previously mentioned). While the capacity of storage is 129,000 acre-feet, the name is rather ironic since Optima has never held more than 2,200 acre-feet of water. Fort Supply, the second major diversion project, controls the Wolf Creek tributary just above the mainstem and has a capacity of 150,000 acre-feet. Canton reservoir regulates the flow of the North Canadian as it enters Oklahoma City. In the city itself, the river is regulated by Lakes Overholser and Hefner. It should be noted that this is a major source of water for the metropolitan area of Oklahoma City.

OTHER MANAGEMENT PROBLEMS

While the North Canadian has not seen any major court cases revolving around its management, or lack thereof, other problems do exist which must be addressed. It is not likely that these problems will be solved by the Supreme Court, but that is merely because most of the North Canadian flows through the same state, rather than across state lines.

Like the other rivers within the study area, the North Canadian is continually overallocated. This is partly due to the increasing population pressures put on the river as it moves from west to east across its watershed.

Another cause of the allocation problems rests in the complicated chain of uses and reuses along the river. For instance, the average daily volume of water withdrawn for municipal and industrial uses in combination with the average daily volume of water returned to the river exceeds the average daily stream flow by a factor of three. Thus, the flow of the North Canadian available for domestic, industrial and recreational use between Oklahoma City and Eufaula is frequently 100% waste waters. In fact, there would be no flow at all in the North Canadian at times at Wetumka if the sewage return flow were suddenly stopped.

The North Canadian is the main source of water for multiple uses for Oklahoma's largest population center

(Oklahoma City metro area with a population over one million in 1990, and smaller towns dotting the banks along the river) as well as its largest industrial complexes, which include Tinker Air Force Base. The river is also the recipient of runoff waters from large scale agriculture, municipal waste (sometimes treated adequately, sometimes not), and at times petroleum leakages. As a consequence of this over use and abuse, the North Canadian River and its users face some major pollution problems. As of 1970, the North Canadian River had greater maximum concentrations of metals, nutrients and trace elements than any of the twelve largest river basins in the United States.

All of the current users tacitly assume that the flow of the river will remain constant as time passes. In fact, this has not been the case. The level of flow in the North Canadian is declining, especially in the west end of the basin. Precipitation variations cannot account for the drop in surface flow. One current theory behind this disappearance is the explosive growth in well irrigation along the upper reaches of the basin in Oklahoma, Texas, New Mexico, and especially Colorado and Kansas. If irrigators in this region have pumped well water in excess, the flow of groundwater used to recharge the river may no longer be available for this purpose. Unfortunately, the groundwater and surfacewater connection with respect to

river flows is only now beginning to be thoroughly understood.

The implications of this situation along the North Canadian may cause future problems for the already completely allocated Canadian River to the south. If the North Canadian waters become too tainted or the surface flow shrinks to the point that all users cannot be accommodated, they will look elsewhere for water supplies; there are not a whole lot of other choices besides the Canadian River.

What ultimately will happen with the Canadian and North Canadian Rivers is not clear. What is clear is that the current management practices do not seem to be working. The one shining example of cooperation and long range management, the Canadian River Compact, still had to be interpreted by the Supreme Court and will likely end up there again in the near future. Within the state of Oklahoma, all of the users on the North Canadian are at least within the same state. However, there is severe overlapping of jurisdiction concerning these waters with at least seven separate state agencies and three federal entities all simultaneously presiding over river matters. That these agencies may be mired in bureaucratic red tape or may be operating with conflicting agendas does not begin to explain the scale and variety of problems along the

river today. And these agencies will likely not be able to solve the problems on a satisfactory scale either.

Conclusion

To date, the Canadian River system has been dotted with several reservoirs and diversion projects, mostly for municipal water use and irrigation. Multiple irrigation projects in the area also tap vast amounts of groundwater. While each of these sources are managed separately, the hydrological connection cannot be ignored. In fact, the reduced flow of the Canadian is believed to be a direct result of excessive groundwater exploitation. At the present time, no current management practice addresses both uses at once, which will undoubtedly limit managerial success.

The one compact on the Canadian between Texas, New Mexico and Oklahoma hasn't completely laid to rest conflict between the users; the Court has been called on to make compact interpretations, but no new allocations have come of it. Even if the compact does not require further judicial intervention, current allocation along both Canadian Rivers saps every drop of water, leaving no room at all for new growth and leaving the current users precariously balanced on the edge of overallocation. Any new strain on the water

supply runs the risk of disrupting the delicate balance of current users. Even with the present situation, growth and development along the rivers has not stopped. Because of this reality, further Court intervention seems imminent; the question is not if but rather when will the Court again be called on to settle disputes along the Canadian.

Of course, all these speculations will be for nought if the river water quality declines to the point that the water is unusable. As pointed out earlier, the Canadian Rivers suffer from abuse, not just the prospect of overuse. Reduction of water quality would usually dissuade potential users from turning towards the Canadian. Unfortunately, there are no other viable water sources through the state of Oklahoma or the Texas panhandle.

With the resource stretched to its limits now, any long term management will be difficult. In comparison to the other rivers of the study area, the Canadian River system could be considered less contentious. However, the very real possibility exists that the Canadian just has not overextended its resource capacity yet. When this does happen (and it's just a matter of time) the Canadian will probably experience the same kinds of management dilemmas which plague the other rivers now.

CHAPTER NOTES

1. United States Army. Corps of Engineers, "Arkansas River and tributaries," H. Doc. 308, 74th Cong., 1st Sess., (Washington D.C.: Government Printing Office, 1936).

2. Z. McCormick, "The Use of Interstate Compacts to Resolve Transboundary Water Allocation Issues," (Dissertation, Okla. State University, 1994), p.226.

3. Corps of Engineers, supra, n.1, p.996.

4. Ibid., at p.996.

5. Ibid., at p. 997.

6. Ibid., at pp.999-1000.

7. Ibid., at p.823.

8. Ibid., at p.823 see table No.1.

9. Ibid., at p.822.

10. Ibid., at p.858.

11. McCormick, supra n.2, p.229.

12. Ibid., at pp.228-231.

13. Ibid., at p.230.

14. Oklahoma and Texas v. New Mexico 111 S. Ct. 2281,2285 (1991).

15. McCormick, supra n.2, p.237.

16. Ibid., at p.237.

17. Oklahoma and Texas v. New Mexico, supra n.14, 2281.

18. McCormick, supra n.2, p.243.

19. Ibid., supra n.2, p.231.

CHAPTER 6: ANALYSIS AND CONCLUSIONS

After outlining the historical development of water problems along each of the rivers in the study area, assessments of the management of these rivers can now be considered. In order to accomplish this, we go back to the fundamental questions concerning scope and method of allocation and criteria for gauging longterm management success or failure.

As a reminder, the aspects of water disputes to be compared revolve around the following inquiries. With respect to the scope of allocation, how have the waters been used to date? What parties were included or excluded in the allocation process? Which parties did the allocation affect? Exactly what waters were allocated? This question has to do with the intertwined fate of surface and ground water in river systems as well as any tributary waters. What was the method of allocation? What role did the specific method of allocation play in determining the manageability of the river in question?

Criteria must also be established for assessment of long term management success or failure, or the potential thereof. Those criteria include the absence of protracted disputes, the ability of the current system to adjust to new problems, and the potential for longterm management if none

exists now. The implications of success or failure of long term management must also be addressed.

THE RIVERS AS A GROUP

Many of the problems each river faces exist for all the rivers in the study area. As in any natural system, there are unique attributes along each river, and some circumstances cannot be generalized. Nevertheless, the pattern of water problems remains strikingly similar along the Platte, Arkansas, and Canadian River systems. The same can be said for attempts at solutions to these problems.

All of the rivers in question have similar geographic attributes; they begin in the Rockies, cover long distances, and flow from a region of water surplus through regions of seasonal water scarcity across the Plains. Each of the rivers flows across several political boundaries, thus complicating efforts to manage the waters in terms of naturally occurring watersheds and basins. Other similarities include the pattern of historical development along the rivers, the philosophy of water usage and management, the problems associated with management, and the mechanisms employed as solutions to those problems.

In terms of historical development, all the rivers in question supply population centers, agricultural diversion projects involving irrigation and grazing, and various

industrial uses. Along all three rivers, these interests have met with conflict since there are more potential users than water to use. The pace of development differs among the rivers but the kinds of development suggest parallel courses of evolution.

Whoever got to the water first had unimpeachable rights to use it. As more and more users began tapping the resource, water rights became of paramount importance. Even after all possible water rights were established, still more potential users appeared. The most powerful interests involved pressed for a reshuffling of existing rights, until finally the number of users eclipsed the amount of available water. An uneven distribution of water needs created more conflict since the downstream users, by circumstances of geography, remained at the mercy and discretion of the upstream users. However, due to the lack of reliable water flow and dominance of agricultural development, the downstream users consumed more water than the upstream users.

Along each of the rivers, the philosophy of water management and development remains consistent. Water plays such an important economic role in this semi-arid region that nearly all residents vie for a share. To that end, they have used river water at its source, transported it within and between basins, diverted it, stored it, consumed it, and exploited it in all manner of economic development.

When the surface water becomes over extended, potential users resort to tapping groundwater. As long as there is enough water to supply all potential users, little thought is given to the consequences of these uses, and even less thought is given to the interests of any potential downstream users. Eventually, certain political influences become apparent and users (or potential users) align themselves in block interests usually associated with state boundaries.

Within each block of interests, the philosophy of water usage centers on exploitation. Tension arises both among and between states when attempting to prioritize uses of this limited resource, but the overriding goal has historically been that of maximum exploitation. If one state doesn't use the water which flows across its boundaries, then other states either up or downstream will use it. When the scale of water uses approaches the maximum amount of water within the river, development becomes more costly but doesn't slow its pace unless there is no other option. Needless to say, this philosophy presents serious longterm managerial problems. Since not all users can be satisfied, some will win while others will lose.

THE SCOPE OF ALLOCATION

Along with the inherent difficulties of transposing regional geographic and hydrologic issues onto the legal system, the scope of allocation continues to yield incomplete solutions to transboundary water problems. In every case of allocation, interpretation of allocation or attempt at basinwide management in the study area, surface water concerns have been divorced from groundwater concerns. Since ground and surface waters are in fact not separated hydrologically, this segregation is unnatural and ineffective. Both the Arkansas and the Canadian Rivers, for instance, are tied into the Ogalalla aquifer which is itself being exploited beyond its capacity for regeneration. Ignoring this important factor will consistently hinder any of the sanctioned pathways of water allocation. Mobile resources cannot be adequately allocated if only a portion of the resource itself is included in said allocation.

A continuing problem with allocation occurs when major tributaries leading into the main surface water flow get left out of consideration. If river waters are allocated in a piecemeal fashion, leaving out major tributaries, problems often arise later due to development along those tributaries which dramatically affects previously allocated, downstream waters. If one were to allocate water in a river system, the most logical approach suggests allocating the

tributaries first, then the mainstem of the river itself, so that all changes in downstream flow can be accounted for. We rarely see this done, though which creates problems with the allocation, as time rolls on.

Other problems occur when parties directly affected by allocation do not get considered. When cases come before the Court, this can be a real limitation since the Court only considers parties which are immediately involved in the litigation at hand. If the ultimate solution to the problem requires consideration of more parties than those directly involved in the law suit, the Court does not consider this option. Unfortunately, this results in very limited solutions to very complex problems.

Also to be considered in the scope of allocation is the limit to which allocation can make sense. As is the case with most western states, the underlying philosophy of allocation within the study area rests on exploiting every drop of water between the states. Until very recently, no thought has been given to federal or Indian tribal rights which might supersede state rights. The assumption that every drop of surface water in a given river belongs only to the states across which it flows does not take these other potential stakeholders into account, not to mention leaving water for future generations. Allowing for the possibility of other potential players could mean a total reallocation of rivers if some amount of water must be left as instream

flow. The specter of this distresses current users to no end.

Allocation of waters does not make sense if the quality of said water deteriorates to the point that uses are limited. Quality rarely comes up when discussing the allocation of water. Divorcing quality from quantity, however, creates problems in the long run for allocators. Ignoring any changes in water quality which might come about as side effects of allocation in water quantity will all but ensure future disputes concerning allocation. In light of reserved Indian rights and instream flow, the state of water quality ought to be considered in allocation. Rarely does this happen though.

METHOD OF ALLOCATION

When assessing methods of allocation, we see two major distinctions in the process. Voluntary allocation arises out of interstate compacts, but involuntary allocation can also come from litigation at the Supreme Court level. Each of these has flaws, and each can boast of a measure of success, depending on the circumstances for each allocation. It is important to realize the limitations of either possibility, though, in terms of effective management.

Interstate Compacts

Very few cooperative management efforts have been attempted unless out of necessity. In the form of the compact, interstate cooperation could be seen as successful. Unfortunately, compacts do not always result in true interstate management of interstate waters. Many compacts arise, not from mutual cooperation and a shared vision of the future for the resource at hand, but rather from mutual distrust and paranoia. With a compact in place, vying interests know exactly how much water they can use; they also know exactly how much competing interests can access as well. Some agreements arise from the thinnest veneer of synthetic civility hatched out of mutual interest in obtaining more water, which requires federal funding for more diversion projects, funding that would not be possible without agreement.

Aside from motives for promoting compacts, various methods of allocation create differing risks for participants based on their geographic situation. In their 1995 paper, Matthews and McCormick outline four major methods for allocation in western compacts: storage allocation and flow allocation based on either 1) hydrologic models 2) percentage flow or 3) guaranteed quantities. With each of these allocation methods, a certain amount of risk is assumed by the parties involved in the compact.1 However, the burden of risk can be widely disparate depending on the terms of the compact. In the extreme, up-

stream states shoulder the burden of risk if allocation is achieved through guaranteed flow, while the downstream states assume all risk if the allocation is based on storage allocation. With the former, the upstream states guarantee a certain flow of water will be delivered to the downstream states, no matter what. Thus, any annual variation or risk of dry years is assumed by the upstream states. In the latter case, the upstream states create storage facilities, capturing their water before any flows downstream. The risk then falls on the downstream states if any shortfall in expected water flow occurs; since the upstream states possess the geographic advantage they will receive water first leaving only what is not captured to flow downstream.

This is not to say that all interstate compacts are fatally flawed, but as pressures increase on the finite source, stakeholders become more desperate and less cooperative. Some compacts were successful at their inception but did not include the flexibility to adapt to changing situations as time went by. In the case of dispute resolution, the compact as a form of management can create some problems. Most states involved in compacts are not willing to yield much sovereignty to an outside board such as a compact commission which might arbitrate disputes. Thus, the compact retains very limited managerial power over interstate waters. It becomes a true test of cooperative

spirit when the parties involved must make adjustments with the changing times in order to preserve the compact. The rivers analyzed here have employed compacts as a solution to interstate water disputes, but with only partial success.

With all of its problems, the prospect of interstate compacts often sounds more palatable than the possibility of a Court imposed allocation.

THE ROLE OF THE SUPREME COURT

With such large interests at stake, the Supreme Court evolved into an unlikely player in the game of water management. This has also shown to be problematic. When faced with an intractable dispute between two or more sovereign states, the Court attempts to equitably apportion the surface waters between the states. This task has proven to be arduous since each case retains individual attributes which create unique problems and demand unique solutions. With each new case the Court evolves more criteria for what must be considered an equitable apportionment.

Nevertheless, the Court makes every effort to avoid litigation of this sort and hears cases on the subject of equitable apportionment only as a last resort for the parties involved. One reason for this might be the inherent ambiguity of applying the law, with its limitless potential

for interpretation, to situations where parties require very specific solutions to specific problems.

The more clearly defined methods of allocation through the interstate compact often do not transfer smoothly to the machinery for decision-making in the Supreme Court. When the Court allocates water, the decision-making process is based on an attempt to achieve a balance. Ostensibly, the Court attempts to weigh the balance of harms to existing users against benefits to potential users when making an allocation. However, potential benefits may be difficult to quantify, while harms appear more tangible since new uses must obviously reduce supply for existing users. Thus, there appears an implicit trend towards protection of upstream users, as well as entrenched economies and existing uses of the water, although not always. Other factors in allocation include establishment of priority, since most of the western states adhere to the legal tradition of prior appropriations, and the protection of pre-existing uses. Clearly, these criteria differ from those established within the more flexible venue of the interstate compact. The Court uses nebulous, mercurial interpretations of such intangibles as "balance" of harms and benefits, "equity", or "reasonable" uses, applied uniquely to each situation, when creating allocations. This, combined with the Court's tendency to make allocations simple and limited in scope, means unpredictability for all parties involved.

When developing allocations, another problem lies in the Court's lack of expertise in matters relating to fields as diverse as hydrology, geology, geography, water ecology, resource management, economics and civil engineering. Whether achieved by interstate compact or Court induced allocation, the goal remains the same, to prevent conflict by establishing rights on an interstate level. However, this can be an enormous undertaking, especially for those uninitiated with the complexities of hydrologically related factors which cannot sensibly be left out of any attempt at allocation.

The Court, when faced with cases concerning interstate disputes over water allocation, must make decisions based solely on the equity. As a consequence of this, what is correct by the measure of law may not serve justice to the parties involved. At the very most, it may set guidelines concerning water allocation, or interpret guidelines already set, as in the case of interstate compact disputes. The Supreme Court cannot, however, actually manage the resource in question, nor should it. The role of allocator, not simply arbitrator, elevates the Court's position to that of being a party in the management of said resource, this is a role the Court does not desire and cannot fulfill.

The history of litigation, at least for the rivers within the study area, suggests that the Supreme Court can function only in a limited capacity to resolve such

disputes. This can be seen in the lack of lasting solutions to come out of the litigation before the Court. Unfortunately, lack of regional or basin-wide management plans leaves a power vacuum which disputing parties look to the Court to fill. This reality in combination with the shortsighted philosophy of water exploitation, rather than stewardship does not bode well for the near future of the rivers in question.

IMPLICATIONS FOR LONG TERM MANAGEMENT

With the present system of water allocation, disputes which arise cannot be sufficiently addressed except by voluntarily cooperative parties, or by a Court imposed allocation, which may not satisfy any of the parties involved. If the parties fail to act in a cooperative manner, there exist few infrastructural options for resolving disputes in a satisfactory way. As it stands now, the only sanctioned pathway for water management comes out of a structure to mediate water disputes. This implies a behavioral pattern of crisis management, not planning to avoid crises. A reactionary policy of water management means a lack of formal regional planning unless a dispute already exists. Until we consider management from a preventative point of view, it is unlikely that the infrastructure to avert water disputes will arise. Given

all the divergent interests concerned with water use, the prospect of voluntary longterm management with no infrastructure in place is a distant dream.

The Missouri River Alternative

Not every major river in this region evolved in the same manner. One glaring exception can be seen in the Missouri River. The basin is comparable in size to the Mississippi and the river flows across two Canadian provinces and seven states. Rather than piecemeal development at different times and along discrete portions of the river, the Missouri underwent an attempt at basin-wide management as a direct result of the Pick-Sloan Act of 1944. As an alternative to the management strategies adopted for the rivers within the study area, a brief look at the Missouri shows an early attempt to integrate a variety of uses and users.

The original plan involved building some 200 reservoirs and diversion projects along the Missouri for flood control, irrigation, recreation, and municipal uses. Millions of acres of land along the river were flooded to create a series of long thin lakes along the river channel. Each state that participated in this venture received a guarantee of certain amounts of water for irrigation projects to boost the level of crop producing farmland along the Missouri.

Dozens of hydroelectric generating plants also came on line at dam sites along the basin. These power plants now supply power sold to six different states. Managing all of these enterprises became the responsibility of the Corps of Engineers, as it remains today.

While only 15% of the original plans came to fruition, the completed projects permanently altered the river system and its surrounding ecological habitats. As extensive as the plans were, they did not include many of the people in the region in the decision making process. Ultimately, this resulted in an uneven distribution of the benefits and the costs of such massive management schemes. For instance, a sizable portion of the acreage flooded in order to create the lakes that exist today was originally Indian tribal land. Large scale irrigation using water from these lakes occurs now on different tracts of land, which are mostly owned by large corporations and a few wealthy white farmers, leaving little if any tangible benefit to the original owners of the now flooded lands.

For fifty years, there have been no major law suits along the Missouri, in contrast to the problems the Platte, Arkansas and Canadian have seen. There are however, several inequities and unaddressed issues which have come back to haunt the managers of the Missouri River Basin. As an example, most of the electricity generated from the Missouri originates in three upstream states, the Dakotas and

Nebraska. Ninety percent of the electricity, however, is sold to six downstream states. Thus, electricity actually costs significantly more for the residents of the states which house the hydroelectric generating plants than for those residents of the consuming downstream states. Not surprisingly, this creates tensions between upstream and downstream users. Things are not likely to remain as stable as the last five decades suggest. Discontent in the Dakotas reached large enough proportions in 1990 for the congressional representatives to initiate a severe revision of the remaining Pick-Sloan proposals and a reworking of the existing ones. In the near future, a Missouri River compact might be in the works or interstate litigation or both. Many stakeholders remain unsatisfied with the current state of affairs, which does not even include adjustments to accommodate the regions growth over the last fifty years.

A basin-wide regional management scheme of some sort appears to be the most reasonable approach to managing a mobile resource which crosses political boundaries such as rivers. It has not yielded particularly encouraging results in the case of the Missouri, but much can be learned from its example. Such wide-scale management requires satisfying many divergent interests. Cooperation is a must. Achieving this is unlikely if affected parties are left out of the decision-making process, as was the case with the Missouri River. Equitable division of the resource itself, or at

least the benefits of use versus the cost of exploitation, must be a priority. The method of allocation became quite complicated, relying on a mixture of several different schemes. In the end, upstream states appear to be burdened with much more risk than downstream states by virtue of the Pick-Sloan plans which did come to fruition, much to the chagrin of upstream residents.

On a more optimistic note, this massive attempt at basinwide management did conclusively show the need for a stable managing body which can address problems as they arise with changing circumstances. It is the nature of rivers, as part of a dynamic hydrologic system, to require ongoing and flexible management. The Missouri, with all its inequities has nonetheless fared better, when managed as an organic whole, in contrast to the Platte, Arkansas, and Canadian River systems which have been managed as discrete units.

Also in favor of the Missouri management plan, the scope of allocation created the necessity of evaluating proposed projects on one stretch of the river in terms of possible effects to up and downstream users. When the reality of politics creeps in, there can be no guarantee that this consideration would prevent inequities. Clearly it did not. However, the mere acknowledgement of such inequities goes far beyond the present management systems of the Platte, Arkansas and Canadian Rivers, where potential

managers stretch the limits of credulity by continually ignoring this reality.

All of the current management schemes for river water lack very basic elements. There is no sense of finality in the allocation methods. None of the management techniques has the flexibility to solve new problems as they appear. Most of this can be seen as a lack of management structure. There is no administrative body which addresses the health of the water and the stability of its allocation on a regular basis. We rely instead on sporadic and haphazard resolution of disputes after they arise.

An attempt has been made to overcome this on the Pecos River. It has been embroiled in controversy for over 150 years. While the Pecos is a small river with exceedingly variable flow, its water is desperately needed in the region of Texas and New Mexico, the two states through which the river flows. The two states have a history of litigation, there is also an interstate compact. Unfortunately, the mechanism for resolving disputes over this compact reverts back to a compact commission which has one member from each state. With more than a century of distrust between the two states, an agreement among the commission on any subject appeared doubtful. A special master then was appointed in an effort to create a tie-breaker in this predictably polarized commission.

The implications of these practices with respect to water allocation do not suggest any easy answers in the near future. With each successive generation of water managers, the act of management becomes more complicated. Given the past history of allocation and the present lack of ability to resolve water disputes on an interstate level, more disputes are on the horizon.

It is ingrained as part of the mythology of the American dream to conquer, or at least tame nature. This mindset continues to pervade the present generation of water managers. Unfortunately, this is a shortsighted view and leads to many dilemmas. Obviously, total exploitation of a resource is at cross purposes with conservation and/or preservation of that same resource. Yet both philosophies exist in our present culture. Until we decide as a culture how we want to prioritize our resource use, long term management will elude us. It is one of the paradoxes of water management that different stakeholders simultaneously vie for control over the same resource with conflicting management goals in mind.

UNANSWERED QUESTIONS

In this thesis, an attempt was made to analyze the structure and function of the mechanisms applied to resolve interstate disputes concerning three transboundary rivers in

the Plains states. In this endeavor, questions remain unanswered which could fill in some missing pieces in the continuing puzzle of resource management in the face of conflicting priorities. How will future generations manage the rivers?

The legacy of exploitation appears to be fully entrenched in the dominant social paradigm of this generation in terms of resource management. Until recently, any mention of the river waters as parts of a larger ecological system was ignored. The users tacitly assume that river water can be exploited up to 100% with no adverse natural reactions. This of course isn't true, but no indication has been made that we are facing this reality. Acknowledging the necessity for retaining ecological health of rivers requires a shift in our entire mindset concerning the use and abuse of this resource; it will be difficult to create a consensus on the pragmatic value of having access to a resource and not using it to the fullest extent possible in order to preserve the life of the resource itself.

If the Court is an inappropriate venue for deciding the ultimate allocation of resources shared between states, then what is the appropriate venue? At the moment, we see a lack of any viable mechanism for solving transboundary disputes. Where will interested parties look in the future for such management?

To date, disputes over water traditionally revolve around who gets what and how much. In other words, water quantity has been the issue. With increasing industrial and municipal demands on limited water resources, the issue of water quality now enters the picture. Since they cannot be extricated from each other, what guidelines will be used to balance water quality and quantity in the future and will this fall on the shoulders of the Court as well? Tied up in the question of quality and quantity is the increasing understanding that surface water and groundwater are so intimately hydrologically connected that one cannot be fully discussed without mention of the other. How will this impact the legal system which, to date, insists on addressing each of these as separate entities?

Obviously, there remain unanswered questions concerning the allocation and management of water. Much research has yet to begin in this field. At the very least, it is imperative to ask the right questions, even if answers are a while in coming.

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