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OUTLINE OF A THREE-STAGE POLICY OF INTERSTATE GROUNDWATER ALLOCATION THAT PROMOTES EQUITY, EFFICIENCY, AND ORDERLY DEVELOPMENT

Arthur H. Chan, Ph.D.*

INTRODUCTION

The United States Supreme Court in Sporhase v. Nebraska ex rel. Douglas ruled that "ground water is an article of commerce" and is subject to commerce clause regulations. Within this regulatory context, the market is destined to play a much wider role in interstate groundwater allocation, and the question of ability to pay becomes the dominant factor.

Water allocation is most appropriately discussed in terms of water rights distribution. Water rights are property rights, but as usufructuary rights, their owners do not "own" the corpus of the water itself; instead they are entitled to the enjoyment of its use. Rights to interstate water resources can be allocated by a variety of mecha-

* Assistant Professor of Economics, New Mexico State University. I would like to thank Professors E. Clayton Hipp of Clemson University, Albert E. Utton and Charles T. DuMars of the University of New Mexico for their valuable comments. They, of course, are absolved of all remaining errors.
2. Id.
nisms, including state regulation, congressional or judicial division, and market competition. Market allocation of water refers to "the distribution of [water] rights which would result from the operation of a system of free market transactions."

There is a relatively long history of judicial involvement in the allocation of interstate surface water. In that regard, the Supreme Court has consistently recognized equitable apportionment as the governing principle in resolving disputes. Under equitable apportionment principles, an interstate stream is divided fairly among the states sharing it, without regard to their relative economic power.

In contrast to interstate surface water allocation, judicial policy regarding interstate groundwater allocation is still in its infancy. The Sporhase decision marks the Court's initial major involvement in interstate groundwater allocation. In deciding the case, the Court resorted to commerce clause principles—principles at variance with the equitable apportionment principles which govern interstate surface water allocation.

Using different legal doctrines to resolve disputes involving disparate entities ordinarily would not create serious problems. However, scientific studies have quite conclusively demonstrated that surface water and groundwater are actually different components of the same hydrologic system. Water moves laterally from an aquifer (as groundwater) into a stream channel (as surface water), and vice versa. When the Court applies different principles to govern the interstate allocation of these two interconnected components, the legal status of the moving water changes without good physical or scientific reason. At one moment the water, as groundwater, would be susceptible to market exchange under the commerce clause. A moment later it has become surface water. Market principles would no longer govern; instead, equitable apportionment would apply. This inconsistency would create great confusion and complication in litigation, adjudication and administration, since legal rules work well only to the extent that they are compatible with and applicable to real situations.

The problem with allocating interstate groundwater through market exchange is not merely that such exchange is inconsistent with the allocation of surface water under equitable apportionment principles.

8. Utton, supra note 6, at 988.
There are substantive concerns as well. These concerns were underscored by a recent federal district court decision, *City of El Paso v. Reynolds*.10

In *El Paso*, the City of El Paso, Texas had sought permits to appropriate a large quantity of New Mexico's groundwater, not yet in private ownership, for export to Texas. These permits had been denied due to provisions of a New Mexico statute, which prohibited the export of New Mexico's groundwater.11 The court held that New Mexico's prohibition on groundwater export constituted an unreasonable barrier to trade in an interstate commodity. The prohibition was therefore struck down as violating the commerce clause.12

The *Sporhase* and *El Paso* rulings are important because, in the current absence of legislative or executive directive, they effectually form the existing policy of interstate groundwater allocation.18 In essence, the policy mandates that groundwater resources be distributed among the states by means of unfettered market competition on the basis of ability to pay. Those with the greatest financial resources therefore will have the water; those without, will not.

The rulings have tremendous impact in the arid West because many poor rural communities and states in the region fear the possible loss of groundwater resources to their wealthier industrial counterparts. To defend against that possibility and to protect their livelihood, lifestyle, and economic health, all of which are dependent on the availability of water resources, analysts have suggested strategies designed to disrupt orderly market transaction of water rights.14

The potential loss of precious resources by poorer communities is only one of the concerns raised by the *Sporhase* doctrine. Others are equally critical to water resources management. Given that surface water and groundwater are connected and should be conjunctively managed, several issues cry out for resolution. One is whether efficiency is the only goal of a proper policy for allocation of interstate groundwater, or whether equity should also be a consideration. A second is whether market exchange should be the exclusive mechanism of allocation, or whether state regulation might also have a role to play. Yet a third is whether the commerce clause or equitable apportionment should provide the governing principles of such allocation.

13. It should be noted, of course, that *El Paso*, being a district court ruling, does not have mandatory authority outside the federal district. Nevertheless, the ruling, which came on the heels of the Supreme Court decision in *Sporhase* and which has not been challenged in any jurisdiction, may have gained great persuasive power in policy debate and formation.
14. T. Bahr, Prepared Statement for testimony before Interim Water Usage and Resources Committee, New Mexico State Legislature, October 28, 1983, at 1-2 (mimeographed). One suggested disruptive strategy involves New Mexico initiating appropriation proceedings all over the country for water export to the state.
Finally, should interstate groundwater be made compatible with the allocation of interstate surface water, and if so, how?

This article will clarify some of the confusion by placing the Sporhase and El Paso decisions in their proper contexts. It will explain that efficiency is the sole economic justification for commerce clause analysis. It will show that focusing exclusively on efficiency is a major flaw in the existing policy, which must also address the issue of benefit and cost distribution. Finally, this article will outline an alternative three-stage policy of interstate groundwater allocation.

The proposed three-stage policy of interstate groundwater allocation would proceed in this fashion: first, divide a common aquifer between the states; second, assign water rights to their initial owners; third, exchange those rights in the market. This article, however, will discuss these stages in reverse chronological order, both to correspond to the sequence in which case law developed and to expose the shortcomings of the existing policy. This article will first address the issues of market exchange and economic efficiency raised in Sporhase. Then, it will deal with the question in El Paso of whether a state can discriminate against out-of-state interests when it exercises its discretionary power in creating property rights to groundwater. The article will conclude by arguing for the need to obtain clear knowledge of a state’s groundwater entitlement for orderly resources development.

THE ALTERNATIVE DOCTRINES USED IN INTERSTATE WATER ALLOCATION

The manner in which the courts divide water in an interstate water dispute often hinges on the particular legal doctrine deemed to "govern" the conflict. It is therefore useful to clarify to some extent the nature and purposes of the two legal doctrines being used at present to resolve such disputes.

Equitable Apportionment

Equitable apportionment is the doctrine traditionally used by the courts to allocate interstate surface water resources; commerce clause analysis, on the other hand, has been called upon more recently to settle interstate groundwater disputes. It has been observed:

Both the commerce clause and the doctrine of equitable apportionment are concepts for maintaining the critical inner balance of the federal union. Equitable apportionment is a doctrine which

15. There are other, nonjudicial mechanisms for resolving such disputes. They include interstate compact, congressional legislation, and market transaction. The first two will not be discussed in this article because they are largely outside the scope of the present endeavor. The last one, market transaction, will be discussed in the context of the commerce clause.
the courts have fashioned to maintain the balance between states by "dividing the pie" of an interstate stream between the states that share it . . . .

If there is a dispute between two states over interstate rivers and interdependent groundwaters, it is settled by allocating to each a fair share—equitable apportionment. 16

Equity is the underlying concept of this doctrine, as well as the focus and operating principle of judicial decrees relative to this class of disputes. The court, when apportioning interstate water between the states, attempts to divide the benefits derived from the water according to some sense of fairness. 17

Under equitable apportionment, the Court treats individual states as equal quasi-sovereigns. 18 Quasi-sovereignty entitles the states to certain territorial and proprietary interests. Further, states are on an equal footing with respect to the right to govern their respective territory and property. 19 However, equality of right does not imply an equal division of water; it merely reflects the Court's recognition that the rights and interests of all the states will be considered as being on an equal level. 20 An extreme example of an unequal division can be found in Colorado v. New Mexico, 21 where the Supreme Court, while declaring that equitable apportionment should govern the dispute over the water in the Vermejo River, 22 declined to grant Colorado an equitable apportionment decree. 23 Colorado received a zero share of the water as a result.

This example demonstrates that "the doctrine assures each state . . . a fair share and prevents any state, simply because it is upstream, bigger, more economically advanced, or more aggressive, from taking more than its share of the river." 24 In general, then, equitable apportionment recognizes the quasi-sovereign nature of individual states, but limits that recognition in order to accommodate the competing

16. Utton, supra note 6, at 986-87 (footnotes omitted).
19. Comment, supra note 17, at 795; Utton, supra note 6, at 988.
22. Id. at 184.
23. Colorado v. New Mexico, 467 U.S. 310, 322-23 (1984). The central issue in this case concerned taking water from existing uses and reallocating it to future uses in it is the Court's reluctance to grant such a request in the absence of careful long-range planning and evaluation. For a more detailed discussion of this case, see infra notes 164-179 and accompanying text.
24. Utton, supra note 6, at 987.
needs of other states. Equitable apportionment respects state lines, but limits what can be done within them.\textsuperscript{26}

An advantage that stems directly from equitable apportionment is certainty. A state, having been allocated a fair share of the river, therefore knows for sure how much water is available for its uses. The state is then able to plan and manage those uses. With better planning and management, a state can more effectively advance its interests and satisfy its needs.\textsuperscript{26} Indeed, more recent Supreme Court decisions certainly encourage, if not actually require, long-range water resources planning.\textsuperscript{27}

**The Commerce Clause**

Politically, the commerce clause is aimed at protecting the federal union from divisive fragmentation.\textsuperscript{28} It achieves that objective by eliminating trade barriers which states might erect to further their own special interests, to the detriment of the national welfare.\textsuperscript{29} The commerce clause therefore has the effect of widening the market and promoting free trade. Justice Robert Jackson provided an eloquent description of an unfettered national market:

Our system, fostered by the Commerce Clause, is that every farmer and every craftsman shall be encouraged to produce by the certainty that he will have free access to every market in the Nation, that no home embargoes will withhold his exports, and no foreign state will by customs duties or regulations exclude them. Likewise every consumer may look to the free competition from every producing area in the Nation to protect him from exploitation by any. Such was the vision of the Founders; such has been doctrine of this Court which has given it reality.\textsuperscript{30}

To that end, the Court has used the negative commerce clause to limit the power of states to regulate commerce.\textsuperscript{31} To withstand a commerce clause challenge, a questionable state regulation must survive a

\textsuperscript{25} Id. at 988. See also Nebraska v. Wyoming, 325 U.S. 589 (1945); Tarlock, The Law of Equitable Apportionment Revisited, Updated, and Restated, 56 U. Colo. L. Rev. 381, 394 (1985).

\textsuperscript{26} Chan, To Market or Not to Market: Allocation of Interstate Waters, 29 Nat. Resources J. 529, 543 (1989).

\textsuperscript{27} See, e.g., Colorado v. New Mexico, 487 U.S. at 320-21.


\textsuperscript{31} The Court inferred from the commerce clause that it is "both a grant of [positive] legislative power to Congress and a [negative] judicially administered restraint on state legislation alleged to be inconsistent with federal interests." Tarlock, So Its [sic] Not "Ours"—Why Can't We Still Keep It? A First Look at Sporhase v. Nebraska, 18 Land & Water L. Rev. 137, 146 (1983).
two-step analysis. The statute first is examined to see if it is facially discriminatory. If confirmed as facially discriminatory, it is then subject to the "strictest scrutiny." If the statute will be upheld only if it "serves a legitimate local purpose, . . . is narrowly tailored to that purpose and . . . there are no adequate non-discriminatory alternatives." If, on the other hand, a regulation is initially not found to be facially discriminatory, it is then subject to a test which attempts to balance the costs and benefits of a recognized local interest:

Where the statute regulates even-handedly to effectuate a legitimate local public interest, and its effects on interstate commerce are only incidental, it will be upheld unless the burden imposed on such commerce is clearly excessive in relation to the putative local benefits. If a legitimate local purpose is found, then the question becomes one of degree. And the extent of the burden that will be tolerated will of course depend on the nature of the local interest involved, and on whether it could be promoted as well with a lesser impact on interstate activities.

From an economic standpoint, expanding free trade under the commerce clause mandate is purported to improve efficiency. According to traditional economic theory, consumers and producers in a competitive market will take the price as a given and will respectively consume and produce a commodity in quantities that maximize their individual net benefit. When every consumer and producer in the market is maximizing his/her net benefit, the total net benefit of the entire market must necessarily be maximized as well. Maximum total net benefit implies that efficiency in both the production of a commodity and the allocation of resources has been achieved. These results are supposed to be realized automatically in a free market. Since efficiency is often considered a desirable social objective, allocation of water resources by the market, not surprisingly, has long been proposed.

33. City of El Paso v. Reynolds, 563 F. Supp. at 388 (citing Hughes, 441 U.S. at 336). This case describes what is sometimes known as the Hughes test.
35. The net benefit for a consumer, called the consumer surplus, is "[t]he difference between the maximum price a consumer is willing to pay for an additional unit of a good and its market price. . . ." D. HYMAN, MODERN MICROECONOMICS 169 (1988). The net benefit for a producer, called the producer surplus, "is the difference between the market price of a unit of output and the minimum price required to make that unit available." Id. at 317.
37. "The price system . . . induces those self-interested parties to make choices which are efficient from the point of view of society as a whole." Id. at 42.
38. "The basic proposition is that market forces should be permitted to play an expanded role in the allocation of water rights thus encouraging or at least permitting efficiency in water use." Oeltjen & Fischer, supra note 5, at 245. But see Chan, supra note 3, at 1159-62.
Market allocation has a down side, however. Efficiency may be improved at the expense of equity. The commerce clause, which promotes interstate trading of commodities on the basis of market competition, "favors those states with the greatest economic power and, in the case of water, it is a single-edged sword which protects the state wanting to take water from another." This is especially true when the taking state (or region) is industrial or commercial while the state (or region) from whence the water is taken is agricultural. The former use requires far less water, and thus can better afford higher priced water than the latter.

The root cause of this form of favoritism can be traced to the operational bias of the commerce clause analysis. Even though the Pike test may have the "merits of candor and conciseness,... it is open to the criticism that the factors balanced give insufficient weight to legitimate state interests." For example, although the court in El Paso recognized the commerce clause distinction "between economic protection, on the one hand, and health and safety regulation, on the other," its definition of the scope of permissible regulations for health and safety purposes can be considered exceedingly narrow. In particular, the court concluded that "the Supreme Court [in Sporhase] held that a state may discriminate in favor of its citizens only to the extent that water is essential to human survival. Outside of fulfilling human survival needs, water is an economic resource [and hence is subject to commerce clause regulation]."

The practical effect of this narrow interpretation of health and safety needs was the rejection of New Mexico's claim that there would be a severe shortage of water in the southern part of the state by the year 2020. The court specifically disallowed the inclusion of "water requirements for municipalities, industry, fish and wildlife, and recreation" in water demand forecasts because such factors are merely "requirements for water related to economic activities." The court expressed the valid concern that "to extend the state's power to discriminate to all potential uses of water would remove ground water from Commerce Clause constraints" and could, in turn, undermine the national unity.

39. Utton, supra note 6, at 988. The requirement of greater economic power is not relevant in the case of City of El Paso v. Reynolds, 563 F. Supp. 379 (D.N.M. 1983). Since the water is at present unappropriated, there is no need for El Paso to purchase water rights in order to obtain the water it wants. The water is therefore costless to El Paso. Whether El Paso has greater economic power is immaterial. See Chan, supra note 26, at 537 n.53 and accompanying text.
42. Id.
43. Id. at 389-90.
44. Id. at 390.
45. Id.
46. Id.
At first glance, the El Paso decision seems to be quite consistent with the Supreme Court ruling in Sporhase that groundwater is an article of commerce and the fundamental constitutional principle that "the peoples of the several states must sink or swim together." But that position could become overly rigid when used as a blanket rejection of regulations designed to protect a state's economic activities. This is not an idle concern, for an example can already be found in El Paso.

Another concern which has been raised is that "commerce clause analysis tends to erase state lines." Without the minimal protection afforded by those political boundaries, "the unrestrained big fish will eat the small fish in a largely unregulated environment." The Supreme Court disagreed with that proposition and issued a reassurance. In discussing the "reality" of legal expectation in Sporhase, the Court stated explicitly, "Our law ... has recognized the relevance of state boundaries in the allocation of scarce water resources."

The commentator's insight might have been validated in El Paso, the Supreme Court's assurances notwithstanding. The district court argued that since El Paso is the economic center of the region, the groundwater in southern New Mexico not needed for human survival needs should be exported across the state line and put to more productive municipal uses in El Paso. In the court's view, "what is good for El Paso is good for the entire region, including southern New Mexico."

That conclusion invites scrutiny. It may be instructive to speculate as to what would happen should the excess water not be available to El Paso. Would the regional economic hub move to southern New Mexico, to be located in, say, Las Cruces? Would the area's principal employers then relocate their businesses to where the water is—in southern New Mexico? The answer to both questions is yes. In that situation, the bulk of economic activities would take place in New Mexico rather than in Texas. With a larger volume of economic activities would come a growing population, increased employment, higher income, a larger tax base, and more tax revenues. These factors all contribute positively to a vibrant community, region, or state as well as the financial soundness of the governments.

One must remember that revenues from income, sales, and property taxes do not, as a rule, flow across a state line, even though

48. See supra notes 41-42 and accompanying text.
49. Utton, supra note 6, at 988. Contrast this with his view on equitable apportionment. See supra note 25 and accompanying text.
50. Utton, supra note 6, at 989.
51. 458 U.S. at 956.
53. Id.
54. For example, money from New Mexico's state treasury cannot be spent with-
groundwater might. The analysis in *El Paso* clearly shows the district court’s intention to completely disregard state boundaries. That intent is contrary to the Supreme Court’s position; it also ignores the political reality of public finance. New Mexico may be made worse off as its public infrastructure and services decline.

It is quite possible that the *El Paso* court has come to the realization that its interpretation of health and safety regulation permissible under the commerce clause was too narrow. After its groundwater embargo statute was struck down, New Mexico enacted legal provisions to deal with the transportation and use of water outside the state. The new statute establishes conditions under which water can be exported: “the state engineer must find that the applicant’s withdrawal . . . is not contrary to the conservation of water within the state and is not otherwise detrimental to the public welfare of the citizens of New Mexico.”

*El Paso* initiated a fresh challenge to these new provisions. This time, however, the court ruled in New Mexico’s favor. With regard to the criterion of “conservation within the state,” the court construed it to mean that conservation efforts by New Mexico are directed toward water located inside the State’s borders, reasoning that “New Mexico cannot legislate as to groundwater that is not found within the state.”

More revealing, however, is the court’s analysis of the criterion of “not otherwise detrimental to the public welfare.” The district court was not content with simply stating that the Supreme Court had previously approved a Nebraska public welfare criterion very similar to that of New Mexico. Instead, it went on to explain that “[(p)ublic...
welfare’ is a broad term including health and safety, recreational, aesthetic, environmental and economic interests.” The court acknowledged that nearly every aspect of the public welfare has economic overtones. That did not mean that New Mexico could constitutionally exercise a limited preference for its citizens only when their survival was at stake. As the court noted, Sporhase had not equated public welfare with human survival.

The nature and purposes of equitable apportionment and the commerce clause should now be clear. Both doctrines strive for the same goal of achieving the “inner balance of the federal union.” Nevertheless, they take very different approaches toward that end. The commerce clause doctrine strives for economic integration through a nationwide market. States may compete freely against one another, without hindrance from discriminatory state regulations, in a marketplace that largely disregards state boundaries. In addition to avoiding economic fragmentation, economic efficiency is achieved as a result.

Equitable apportionment, on the other hand, operates on the recognition that state boundaries are important, that some states are economically or financially more powerful than others, and that fair treatment of all the states helps enhance interstate comity and maintain the delicate balance within the federal union. With these principles in mind, the courts make an equitable division of the available resources among the states. One consequence of that division is that each state knows how much water it is entitled to, and thus is better able to manage its resources and plan for its own future.

A FIRST APPROXIMATION

To provide some guideposts for the development of a more coherent interstate groundwater allocation policy, it is useful to briefly summarize the physical-legal context within which the policy will be operating. First, most groundwater aquifers are connected hydrologically to river basins so that the same water can be found, in the course of its lateral movement, as groundwater at one point and as surface water at another. This hydrologic connection suggests that the same legal method should be used to allocate surface water and groundwater. If different methods are used to deal with surface water and groundwater, as is currently the case, then administrative and legal confusion could arise because the same water molecule in its lateral migration could be alternately subject to equitable apportionment or commerce clause principles.

65. Id.
66. Id.
67. Utton, supra note 6, at 986.
68. See supra note 26 and accompanying text.
Second, the United States has a fairly long judicial tradition in the allocation of interstate surface water resources. In dividing a river shared by two or more states, the Court has consistently used equitable apportionment as the "governing" principle. By comparison, allocation of interstate groundwater is currently in its infancy. In this new area of judicial involvement, the courts have chosen to apply the commerce clause and thus have allowed the market to decide how much water a state is able to obtain, primarily on the basis of the state's ability to pay. As earlier analysis shows, this doctrine is fundamentally different from that of equitable apportionment. Applying disparate legal rules to different components of a hydrologically integrated system can be seen as a mismatch between two realities. On the one hand, the physical reality requires uniform treatment of system components. But the legal reality is that fundamentally different treatments are used instead. This is a serious inconsistency, which may result in considerable administrative and legal confusion. Restoring consistency between the two realities is therefore crucial to the success of any proposed policy.

Finally, embodied in the doctrines used to allocate interstate water are the dual objectives of equity and efficiency. Undoubtedly, equitable apportionment is better able to achieve the former while the commerce clause is more suited for the latter. Ideally the alternative policy should provide adequate opportunity for achieving both equity and efficiency.

Property Rights and Liability Rules

A good grasp of economics and its interaction with law is necessary when analyzing the alternative doctrines used to allocate water resources. This is especially true when examining the commerce clause, because both the nature and operation of this legal doctrine center around the economic institution of the market. The next section will explore the primary economic principle which is relevant to the commerce clause. First, however, some background information will be helpful in understanding the later arguments.

One of the central concepts in economics, the science concerned with the allocation of resources to alternative uses, is that of property rights. Indeed, "[w]hat economics deals with is the buying and selling, or leasing, or using, of property rights."69 In turn, property rights are conceived as the "bundle of entitlements defining the owner's rights, privileges, and limitations for use of the resources."70 In this light, previous discussion of equitable apportionment and the commerce clause can be succinctly summarized, respectively, as judicial allocation of property rights on the basis of equity, and market allocation of

69. J. Dales, Pollution, Property and Prices 59 (1968).
70. T. Tietenberg, supra note 36, at 39.
property rights on the basis of ability to pay.

While property confers certain rights on its owner, limitations are frequently imposed on the exercise of those rights. Property rights, therefore, are not unattenuated. At the same time, they specify the correlative liabilities of other parties. These liability rules can take the form of either prohibition or obligation. For example, ownership of a car means that others may not use it without permission; or in another case, ownership of real property means that the state taking such property must provide just compensation.

Market Exchange of Property Rights and Liabilities

Scholars have argued that well-defined property rights are desirable because they give owners strong incentives to husband their assets, as any decline in the value of those assets automatically translates into a personal loss. Furthermore, when well-defined property rights are traded in the market, the exchange will promote economic efficiency.

Given these attributes, one may be inclined to draw the following inferences: (1) clarity in defining property rights often will give rise to clarity in defining liability rules, and (2) the way property rights and liability rules are defined will influence final economic outcomes. The first proposition is widely accepted; the second, however, is open to debate. The debate started when Ronald Coase advanced the argument that if the parties involved in a liability dispute were able to enter into voluntary negotiation and if the transactions costs incurred were negligible, then the ultimate economic results would be the same whatever the specific liability rules might be.

Professor Coase began his analysis by challenging the conventional way of looking at choice-making:

The question is commonly thought of as one in which A inflicts harm on B and what has to be decided is: how should we restrain A? But this is wrong. We are dealing with a problem of a reciprocal nature. To avoid the harm to B would inflict harm on A. The real question that has to be decided is: should A be allowed to harm B or should B be allowed to harm A? The problem is to avoid the more serious harm.

Coase then demonstrated how the more serious harm could be avoided through private bargaining of damage liabilities. The solution involves compensatory payments necessary to offset any harm in-

71. J. Dales, supra note 69, at 66.
72. T. Tiitenberg, supra note 36, at 40.
73. Id. at 42; Oeltjen & Fischer, supra note 5, at 246-47.
75. Id. at 2.
flicted on, or lost benefits sustained by, a party.  

Consider the hypothetical situation above. Suppose A’s marginal benefits from continuous operation were greater than the additional harm inflicted on B by such operation. A and B could negotiate and come to an agreement whereby A would make a payment to B equal to the damage sustained so that B would be made whole again. Meanwhile, A still would realize a net gain by continuing operation because the marginal benefits would outweigh the marginal costs incurred in the payment to B.

Suppose, instead, A’s marginal benefits from continuous operation were less than the harm inflicted on B. It would be in B’s interest to induce A to cease operation by making a payment to A. The payment, equal to the marginal benefits that A could have generated through continued operation, would compensate A for the lost benefits. Meanwhile, B would be realizing a net gain in benefits as the marginal costs to induce A to cease operation would be more than offset by the marginal benefits derived from not having to suffer the harm.

As illustrated in the example, a net gain in marginal (and therefore total) benefits would be realized in each instance, implying an overall improvement in economic welfare. The example shows that if the parties involved in a liability dispute were to engage in voluntary negotiation to determine mutually acceptable terms, and if the transaction costs of this bargaining were negligible, then the ultimate economic consequences of maximum value of total output and efficient allocation of resources could be achieved, regardless of how the liability rules were defined. This conclusion, known as the Coase Theorem, is considered extremely important to economic analysis. No doubt economic efficiency is the only concern of the exchange scheme described above; other equally important policy objectives are ignored.

76. Id. at 2-8.
77. One implicit assumption in this example is that the status quo confers on A the right to harm B. In other words, the analysis presumes a particular pattern of property rights assignment. See J. HARTWICK & N. OLEWILER, THE ECONOMICS OF NATURAL RESOURCE USE 408 (1986). But in the real world, the more basic question of property rights assignment must be settled first before an analysis of property rights exchange can be properly carried out. See later section entitled “Assignment of Property Rights by the State.”
78. See supra note 36 and accompanying text.
79. If transaction costs were significant, the procedure would have to be modified to account for those costs. Total transaction costs would be subtracted from total benefits, resulting in a smaller net gain in benefits. The principle of the analysis remains the same; some of the exchanges that otherwise would be concluded would no longer be feasible in view of the higher total costs, however. See Coase, supra note 74, at 15-19.
81. There are serious theoretical, structural, and ethical problems facing the Coase Theorem. The analysis implicitly assumes a zero wealth effect. “The decision to confer the property right on a particular party results in a shift of wealth to that party.
The same analysis can be applied to the problem of property rights. Professor Coase's question is reformulated and brought to bear on the problem at hand. It becomes: should A have the right to use a resource or should B have the right to use the same resource? The problem is to obtain the most benefits.

The analytical procedure is essentially the same. First, consider the simple case. Suppose A has the right to use the resource and the marginal benefits A is able to derive from the use of that resource exceed those of B. No exchange will take place because the resource is already allocated in the most efficient manner. Value of total output, too, is maximized. Now suppose A has the right to use the resource, but B has the ability to obtain higher marginal benefits from the use of that resource than A. It will be to B's advantage to negotiate with A for an exchange of the resource. B can pay A an amount equal to the marginal benefits A will derive from the use of the resource. In return B will now own the resource and can use it to produce greater marginal benefits than the payment made to A, thereby obtaining a net benefit.

In this process, the resource would be shifted to its highest and best use as measured in economic terms, resulting in improved economic efficiency and maximum value of total output. As in the case of liability rules examined above, insofar as resource allocation and total output are concerned, the pattern of property rights distribution is likewise entirely immaterial. Given that voluntary transaction of property can result in improved efficiency and maximum output, it is easy to understand the usefulness of the commerce clause in governing interstate groundwater allocation. Those very desirable eco-

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This transfer might shift the demand curve out, as long as the income elasticity of demand is not zero. . . . As long as there are wealth effects, the type of property rule [i.e., the initial allocation of property rights] affects the outcome."T. TiETENBERG, supra note 36, at 59.

In addition, the bargaining solution is workable only when the number of affected parties is small. When that number is large, it could be difficult to induce all affected parties to participate in the bargain. Thus the "free rider" problem could impede the effort. Id.; J. HARTWICK & N. OLEWILER, supra note 77.

The solution also does not explain the behavior which generates damage liabilities. It does not identify the causes of an externalities problem such as pollution. Why would a factory emit noxious gases from its smokestacks? Could it be that, as the Coase analysis seems to imply, the owner of the factory was anticipating receiving from the neighbors a bribe as inducement to stop pollution? If so, would this not encourage more factory owners to pollute? Would that not result in more pollution?

Then there are the ethical questions: Why should society condone or even encourage and reward anti-social behavior? Is it fair to ask the neighbors, who had already suffered the ill effects of pollution, to further suffer the indignity of having to pay a bribe to the polluter? The Coase analysis is silent on all these issues.

82. This argument applies equally well to usufructuary rights, a situation characteristic of water rights cases. For a discussion of the correspondence between liability rules and property rights, see supra notes 71, 77 and accompanying text.

83. When transaction costs involved in the exchange are significant, modification must be made to the analysis. See supra note 79.

84. But see supra note 81.
nomic outcomes are precisely the ones the doctrine is supposed to engender, and the Coase Theorem provides the necessary economic justification. Moreover, the commerce clause has the added advantage of being able to control the coercive monopoly power of a state that possesses an important commodity. Given the state’s unique position, it is conceivable—indeed tempting—for the state to shift some of the cost of in-state benefits to outsiders by means of burdensome restrictive regulations. Out-of-state economic interests are powerless to act because they lack political representation in the endowed state. By insisting on nondiscriminatory treatment for in-state and out-of-state interests, the commerce clause is able to overcome the obstacles legally that federalism is unable to surmount politically.

The State as a Market Participant

In its turn, the state can circumvent the commerce clause prohibition of discriminatory behavior by actually entering the market as a participant (a buyer or a seller) rather than merely as a regulator. Market participation produces a special exception to the rule. In such an instance, the state is somewhat immune to the limitations imposed by the commerce clause, thereby curtailing the doctrine’s ability to control a state’s monopoly power. For example, in Hughes v. Alexandria Scrap Corp. and Reeves, Inc. v. Stake, the Supreme Court held that states may impose embargoes and preferences, or prefer its residents in allocating state-owned resources. Insofar as groundwater is concerned, the state can become a seller by first acquiring water rights through appropriation or purchase. It is then in a position to sell the rights to willing buyers.

Nonetheless, the state’s immunity as a market participant is by no means absolute. According to one commentator, state actions are still subject to limitations imposed by the equal protection clause of the fourteenth amendment. Courts have given states great latitude in establishing classifications that may affect social or economic welfare so long as there is a rational relationship between the asserted purpose and the classification chosen to effectuate that purpose. But "if a state adopts a market participant stance for the express purpose of discriminating against interstate interests, it might violate the

85. Anson & Schenkkan, Federalism, the Dormant Commerce Clause, and State-Owned Resources, 59 Tex. L. Rev. 71, 82 (1980). This argument, of course, is predicated on the assumption that resources are immobile, thus preserving the state’s monopoly position. When resources are mobile, which is generally the case, this argument loses much of its force as much of the state’s monopoly power is eroded.
86. 426 U.S. 794 (1976).
88. 426 U.S. at 812; 447 U.S. at 429. See also Anson & Schenkkan, supra note 85, at 86-88.
90. Id.
equal protection clause."91

By this standard, a state pursuing the genuine objectives of resource conservation and public welfare, and demonstrating a rational relationship between those objectives and the means chosen to advance those objectives, stands an excellent chance of surviving an equal protection challenge.

Assignment of Property Rights by the State

Distribution of income and wealth is highly dependent on property right distribution; even Professor Coase conceded this point.92 Acquisition of a property right means indulgence to its owner; failure to do so, deprivation. Because owners of property are entitled to (1) use their assets in ways considered acceptable and appropriate by society, (2) prevent others from using those assets, or set the terms on which others may use them, and (3) sell the assets to ready buyers,93 property ownership represents real wealth, which can be converted to financial wealth through use, lease, or sale. Consequently, distribution of property rights will have great influence on the distribution of wealth and income.

Of course property rights transaction cannot take place unless someone is willing to sell. And no one may sell what he/she does not own. Free market exchange of property rights, as has been advocated by Professor Coase and mandated by the commerce clause, therefore must be preceded by the assignment of these rights to owners.

The state thus plays a vital role in the determination of individual and community welfare by virtue of its power to create property rights. Even more critical is the way the state allocates the rights it has created. The central question is whether the state should be required to assign property rights to groundwater resources which are physically located within its borders to in-state and out-of-state residents in a nondiscriminatory way. Or, put another way, whether there are sufficient reasons to allow the state to discriminate in favor of its residents in assigning rights to its resources. The question revolves around whether commerce clause regulations extend to the assignment of property rights to individual owners by the state.

Ordinarily, the commerce clause regulates either activities in interstate commerce or those affecting interstate commerce.94 The activities being regulated obviously must be connected to something corpo-

91. Id. (footnote omitted).
92. Coase, supra note 74, at 15.
93. J. DALES, supra note 69, at 59; J. HARTWICK & N. OLEWILER, supra note 77, at 8.
real; otherwise, the regulations are essentially empty or moot. In addition, the regulations are applicable only to commodities already in private ownership.86 In Sporhase, for example, the issue was "the commerce that occurs when a person who owns a right to use water on land in one state transfers the water across a state line for use on land in a different state."86 Messrs. Joy Sporhase and Delmar Moss were only seeking permission to transfer their groundwater87 pumped from their well in Nebraska to irrigate their field in Colorado. Presumably, they felt this transfer would shift the resources to their highest and best use.

The issue in City of El Paso v. Reynolds88 was entirely different. El Paso was seeking permission from New Mexico to acquire rights to appropriate groundwater in New Mexico for future use in Texas. These were rights to use as-yet-unappropriated resources. As such, they were new rights which would be created only when and if El Paso's applications were approved. If El Paso were to acquire the rights it coveted, it would be able to use New Mexico water without paying for it because the water was not yet privately owned.89 In contrast, Sporhase did not entail creating and granting new rights, only a transfer of existing rights, i.e., a change in the location of exercising those rights.

The difference between Sporhase and El Paso is profound for two reasons. First, while Sporhase fits the pattern of a commerce case as that described by Justice Jackson,100 El Paso does not.101 As an illustration: suppose one of the plaintiffs in Sporhase were a Nebraska resident owning a farm in Nebraska which abutto the state line and the other a Colorado resident owning an adjacent farm in Colorado. In Justice Jackson's construction, the Colorado farmer needing water to irrigate his fields ought to be able to get the cheapest water available. He could get it from his Nebraska neighbor, who would charge a price equal to his opportunity cost, assuming a competitive market existed. The opportunity cost would be the value of the crop the Nebraska farmer would have to forego in order to make the water available for sale. The Colorado farmer could also try to obtain water from one of

97. The water in question belongs to the plaintiffs because "the owner of Nebraska land is entitled to take a reasonable portion of ground water for reasonable and beneficial use upon his overlying land." Id. at 357. See also Sporhase v. Nebraska, 458 U.S. at 950.
99. See supra note 39.
100. See supra note 30 and accompanying text.
his Colorado neighbors. If the price charged by the Nebraska farmer were lower than those charged by his Colorado neighbors, he should not be prevented from getting the cheapest water by a Nebraska law which discriminated against out-of-state residents. Likewise, the Nebraska farmer should not be prevented by a Nebraska embargo statute from selling his water in Colorado, where he could get the highest price.102

This competitive market transaction situation does not exist in El Paso. Arguably, El Paso could have purchased water from nearby irrigators and landowners in Texas.103 New Mexico, meanwhile, has no intention of engaging in the competition as a potential seller. In response to El Paso’s groundwater appropriation applications, New Mexico does not “have free access to every market in the Nation” to seek the highest price for its water. In fact, it does not sell its water rights at all, not at any price.104 El Paso, too, would not really benefit from Justice Jackson’s idea of “free competition,” with the possible exception of avoiding paying for Texas water by taking without charge New Mexico groundwater, which could hardly be considered a real benefit from any perspective other than that of El Paso.

Second, if commerce clause regulations can only be applied to privately owned commodities that are involved in or affecting interstate commerce, then applying these regulations to activities governing the creation and assignment of groundwater rights would be overextending their proper scope. After all, the requisite corporeal entities that make the regulations meaningful do not yet exist; instead, they are in the process of being created. “Water rights are a species of real property . . . [and] Congress may regulate water rights if and when they move in interstate commerce, or when water rights affect inter-

102. Adapted from Trelease, id.
103. Texas landowners have virtually unlimited rights to the groundwater underneath. “[T]he rule in Texas was that an owner of land could use all of the percolating water he could capture from the wells on his land for whatever beneficial purposes he needed, on or off the land, and could likewise sell it to others for use on or off the land and outside the basin where produced, just as he could sell any other species of property.” City of Altus v. Carr, 255 F. Supp. 828, 833 n.8 (W.D. Tex. 1966). That rule still applies.
104. Groundwater in New Mexico does not belong to the owner of overlying land. Instead, it has been declared “to belong to the public and to be subject to appropriation for beneficial use.” N.M. Sat. Ann. § 72-12-1 (1978). Any party desiring to appropriate for beneficial use any of the waters . . . shall apply to the state engineer . . . .” Id. § 72-12-3 (1978). The state engineer charges a fee for the application, Id. § 72-2-6 (1978), but the applicant does not have to pay for the water. This is a system designed to manage New Mexico’s water resources. See infra notes 106, 107 and accompanying text. In that effort the state does not claim public ownership of its groundwater in the ways that Texas and Nebraska did. Those methods have been ruled impermissible. See City of Altus v. Carr, 255 F. Supp. 828 (W.D. Tex. 1966) and Sporhase v. Nebraska, 448 U.S. 941 (1982). Rather, New Mexico is attempting to “preserve and regulate the exploitation of an important resource,” a legitimate and important state power recognized by the Supreme Court, paradoxically, under its construction of public ownership of resources as a legal fiction. See Toomer v. Witsell, 334 U.S. 385, 402 (1948).
state commerce." The water rights Congress may regulate are, of course, existing water rights. But who regulates those rights that have yet to be created? Historically, Congress has left that task to the states. In the West, creation and assignment of water rights are traditionally in the province of state water law and the state engineer. By granting an applicant a permit to appropriate water, for example, the state engineer is creating a new property right and assigning it to the first owner. By exercising his discretion to grant or deny an appropriation permit, the state engineer administers the state’s water law and manages the state’s water resources. “Congress did not—and I think never seriously contemplated—displacing the indispensable services of state engineers. These are individuals . . . who wrote the foundation of the water law for most western states. This was state law.”

Apart from the greater competency of states to fashion laws more suited to local conditions and of law administration by state engineers is the more fundamental question of territorial sovereignty of a state. “Water is territory”—similar to land, it is a part of the territorial base of a state. The law is clear that a state’s territorial integrity cannot be undermined at will. Professor Utton was unequivocal on this point:

Under the Constitution, a state has a right to continue to exist. The Constitution protects the territorial integrity of the states. But in many arid states, these constitutional protections may be of little solace and the territorial land base may be of limited utility without the appurtenant water to make it productive.

An adequate supply of good quality water is always vital to the economic prosperity of a state. This condition is simply more critical to the arid western states. The problem is that much more acute for the agricultural states in the region.

More than economic prosperity is at stake. Social relationships, morale, and institutions are imperiled when a community is threatened with an insufficient water supply and residents begin to leave for places where opportunities are more plentiful. As illustrated elsewhere:

105. Corker, supra note 94, at 413.
106. Although it has clear constitutional authority to regulate existing water rights when they are involved in interstate commerce, Congress has often deferred to state law rather than imposing its will. This is done for practical reasons. Because of extreme variation in climatic conditions in the United States, “Congress cannot provide the substantive law or the administration of that law to achieve effective ground-water management in fifty states from Florida to Puget Sound.” Id.
107. Id. at 439.
108. Trelease, supra note 96, at 361; Utton, supra note 6, at 991.
109. U.S. Const. art. IV, § 3.
110. Utton, supra note 6, at 991 (footnotes omitted).
A depopulating rural community is unquestionably on the decline. Many long-established social relations within the community are destroyed. Its future dims as the community stops growing; that, in turn, leads to erosion of confidence in and commitment to the community. Without proper support or nurturing, community fabric begins to unravel and institutions begin to crumble, thereby furthering the decline. Many once-viable communities are either dying or have already turned into ghost towns.111

Whereas a community may wither and die as its water runs out, a state facing the problem of resource depletion does not have that "luxury." The Constitution requires that the state preserve itself. "[P]rinciples of federalism do not tolerate 'ghost states' when a state's . . . resources are depleted. Rather a state has a duty to its citizens to continue to exercise the powers reserved to it under the tenth amendment—it cannot constitutionally go out of business."112

That being so, states should have the necessary authority so they can prudently manage their groundwater resources as a part of their territorial sovereignty.113 The authority should include allowing the states to undertake measures, such as regulations, that enhance the advantage of their citizens in specific situations.114 Of course, the implementation of those regulations is not free from judicial or congressional restraints. For instance, the Supreme Court in Sporhase has described several situations in which states could exercise limited discrimination in favor of their own residents. However, that permission is conditioned on an "absence of a contrary view expressed by Congress."116

A state exercises sovereignty over its territory in a number of ways. As examples, "[t]he state defines the property rights in the resources, identifies the incidents and extent of the rights, and regulates the relationships among their owners. The state can own the resources, either as proprietor or as 'trustee' of the public domain."116 It must be recognized that "public ownership" of groundwater has been characterized by the Supreme Court as mere "legal fiction."117 Accordingly, states may not use the argument that they own the groundwater to impede the flow of this resource across state lines.118 Even so, unap-

111. Chan, supra note 3, at 1161.
113. Trelease, supra note 96, at 361; Utton, supra note 6, at 991.
116. Trelease, supra note 96, at 361.
117. Sporhase v. Nebraska, 458 U.S. at 951.
118. Id.
propriated groundwater within a state remains in the public domain of that state. As trustee, the state enjoys some discretion in deciding how and by whom interests in the resources can be acquired.119

As trustee of unappropriated groundwater in its public domain, and in the exercise of its territorial sovereignty, a state might choose to use state residency as a distinguishing factor in the assignment of property rights in that groundwater. The question would then arise whether such use of state residency would violate the commerce clause.

The initial inquiry is when should the commerce clause apply. This, in turn, can be broken into two parts: the first determines whether the item in question has been "reduced to possession" so that ownership can be clearly established; only then does the analysis turn to the second part, the exchange of property rights between an owner, who wants to sell, and a potential buyer, who is an out-of-state resident.

The critical issue is whether the item in question has been reduced to possession. This can best be shown by analogy: "[I]t is pure fantasy to talk of 'owning' wild fish, birds or animals. Neither the States nor the Federal Government, any more than a hopeful fisherman or hunter, has title to these creatures until they are reduced to possession."120 But once the wild creatures have been captured and "reduced to possession," state regulations that obstruct interstate exchange of the captured prey likely will be held subject to the commerce clause.121

Groundwater should be treated the same way—once appropriated and withdrawn, it is "regarded as an article of commerce."122 But before the groundwater has been appropriated, and before the right to its use has been assigned to an owner by the state, it is not an article of commerce and should not come under commerce clause regulation.123 Residency thus could be used as a factor in allocating a property interest in groundwater.

The commerce clause is not the only legal doctrine used to deal with the problem of a state placing greater burdens on outsiders than its own residents. The privileges and immunities clause124 may also be relevant in analyzing state action which discriminates on the basis of state residency.125 However, the Court has consistently demonstrated that it is reluctant to invoke this constitutional provision unless some

119. Trelease, supra note 96, at 361.
121. See the tests set forth in Hughes, 441 U.S. at 337 or Pike 397 U.S. at 142.
123. For a contrary view, see Anson & Schenkan, supra note 85, at 96-97.
125. Trelease, supra note 96, at 363 (footnotes omitted).
"fundamental" or "basic" privileges and immunities are involved. The Court expressed its view clearly in Baldwin v. Fish & Game Commission,\textsuperscript{126} when it upheld Montana's discriminatory pricing scheme in elk hunting licenses and stated, "[s]ome distinctions between residents and nonresidents merely reflect the fact that this is a Nation composed of individual States, and are permitted . . . . Only with respect to those 'privileges' and 'immunities' bearing upon the vitality of the Nation as a single entity must the State treat all citizens, resident and nonresident, equally."\textsuperscript{127}

Historically, the Court has held that the privileges and immunities clause does not permit a state to enact regulations which would impose "unreasonable burdens on citizens of other States in their common callings within the State, in the ownership and disposition of privately held property within the State, and in access to the courts of the State."\textsuperscript{128} Among such regulations, those respecting "the ownership and disposition of privately held property"\textsuperscript{126} seem the most relevant to the problem at hand. In addition, "[s]ates may not compel the confinement of the benefits of their resources . . . to their own people whenever such hoarding and confinement impedes interstate commerce."\textsuperscript{130} Here the privileges and immunities clause and the commerce clause join and support each other.

Whether state assignment of groundwater rights comes under privileges and immunities clause regulation will have to be resolved in accordance with the constraints outlined above. Part of the answer can be found in Toomer v. Witsell.\textsuperscript{131} Even though South Carolina was enjoined from discriminating against a nonresident's interest in the business of catching shrimp, the Court nonetheless recognized "the importance to its people that a State have power to preserve and regulate the exploitation of an important resource."\textsuperscript{132}

Much of the remaining doubt was cleared away by Chief Justice Burger in Baldwin. He addressed the distinction between a grant of access to hunt wild animals, which belong to no one, and the market exchange of those animals subsequent to their capture:

Montana does not offend the Privileges and Immunities Clause by granting residents preferred access to natural resources that do not belong to private owners . . . .

Once wildlife becomes involved in interstate commerce, a

\textsuperscript{126} 436 U.S. 371 (1977).
\textsuperscript{127} Id. at 383.
\textsuperscript{128} Id. (footnotes omitted).
\textsuperscript{129} Id. (emphasis added).
\textsuperscript{130} Id. at 385-86. For a discussion of issues relating to the privileges and immunities clause and with the state acting as a market participant, see Rodgers, supra note 89, at 366-71.
\textsuperscript{131} 334 U.S. 385 (1948).
\textsuperscript{132} Id. at 402.
State may not restrict the use of or access to that wildlife in a way that burdens interstate commerce.\textsuperscript{133}

"Access" to natural resources is often obtained by acquiring a permit to capture or to use the resources. Whether for hunting elk or for appropriating groundwater, the permit represents a property right. But in both instances, the property right is created by the state and is granted to an applicant. Access to natural resources remains "public" so long as the resources are still in the public domain—\textit{i.e.}, they have not yet been captured and "reduced to possession" and, therefore, "do not belong to private owners."\textsuperscript{134} Altogether, the Court's rulings indicate that a state can prefer its own residents in assigning newly created property rights to resources which have not been captured and do not belong to any private owner.

The following conclusions can be drawn from the analysis above: (1) the commerce clause and the privileges and immunities clause should not extend to the creation, distribution, and assignment of property rights by a state; (2) states have limited authority to regulate and control the exploitation of their resources; and (3) that regulatory authority extends to differential treatment of residents and nonresidents with respect to the distribution and assignment of property rights in the public domain. These conclusions will be used next to evaluate \textit{Sporhase} and \textit{El Paso}, the two most important cases that, in the absence of legislative or executive pronouncements, essentially form the current interstate groundwater allocation policy.

\textit{The Different Issues of Sporhase and El Paso}

In the first place, and more generally, groundwater is "an important resource"\textsuperscript{135} in an arid state. Being an arid state, New Mexico most certainly has "a special interest"\textsuperscript{136} in its groundwater resources. New Mexico therefore should have the "power to preserve and regulate the exploitation"\textsuperscript{137} of its groundwater.

More specifically, \textit{Sporhase} and \textit{El Paso} are fundamentally different. The former deals with market exchange of private groundwater rights; the latter is concerned with the creation and assignment of such rights by a state. These crucial differences prompted Dean Trelease to conclude:

\textit{Sporhase} is right and \textit{El Paso} is wrong. States can live with \textit{Sporhase}'s ruling that a state cannot tell its citizens that they

\textsuperscript{133} Baldwin v. Fish \& Game Comm'n of Montana, 436 U.S. at 393 (C.J. Burger, concurring) (emphasis added).
\textsuperscript{134} Id.
\textsuperscript{135} Id.
\textsuperscript{136} Toomer v. Witsell, 334 U.S. at 402.
\textsuperscript{137} Baldwin v. Fish \& Game Comm'n, 436 U.S. at 393.
cannot sell out of state when it permits them to sell within the state. This applies to both sales of water and sales of water rights . . . . On the other hand, the state cannot live with *El Paso.* *El Paso* would require a state to sit by and see other states deprive its people of future opportunities for growth and development, while preserving only "noneconomic" water for the public health and safety of stagnating communities.\textsuperscript{138}

*Sporhase* is consistent with the commerce clause as well as the privileges and immunities clause because it is concerned with the market transaction of privately owned rights. *El Paso* is in error because the court has misapplied the analysis in *Sporhase* to the transfer of unowned resources in the public domain to initial ownership and, in the process, exceeded the proper reach of the commerce clause.

A federal policy governing the allocation of interstate groundwater resources can incorporate *Sporhase*’s analysis into its final stage. Here, property rights have already been created and assigned. Private owners are now free to sell those rights to whomever is ready to buy. Even if the buyer were an out-of-state resident, the state would be prevented from impeding interstate commerce unless there were legitimate local interests involved.

*El Paso* addresses issues in a different stage of the process. In this earlier stage, the state is creating and assigning rights to appropriate groundwater, often at the request of permit applicants. Preceding discussion shows that neither the commerce clause nor the privileges and immunities clause applies here. Hence, incorporating *El Paso*’s analysis into this early stage of the process is ill-advised because it will unduly curtail a state’s power to manage the orderly development of vital groundwater resources. Contrary to previous Court rulings, *El Paso* will have the states treat their own citizens in the same way they treat outsiders in assigning rights to groundwater resources. That simply will not do. Apart from an apparent misapplication of *Sporhase*’s analysis is the question of interstate equity. On the one hand, the importing state often can take water at no charge,\textsuperscript{139} but on the other hand, not only is the exporting state unable to control the development of its resources, it may not benefit from that development at all.\textsuperscript{140} To the extent that *El Paso* forms a part of the current policy, revision is needed.

A Two-Stage Arrangement

The task now is to structure an alternative arrangement, which encompasses both stages of the policy, that will enable a state to exercise its limited right to control the development of its resources while

\textsuperscript{138} Trelease, supra note 101, at 321.
\textsuperscript{139} See, e.g., supra note 39.
\textsuperscript{140} See supra note 64 and accompanying text.
at the same time satisfying the constraints imposed by the commerce clause and the privileges and immunities clause. Such an arrangement is illustrated below.

Suppose Astor is a resident of State Aqua and the owner of a tract of land in that state. In order to increase his income, Astor would like to convert his operation from dry-land to irrigated farming. He applies to the state engineer for permission to appropriate groundwater. Upon receiving the permit, Astor begins irrigating his fields and eventually produces an additional $100 worth of corn. He sells this crop to the Agro Grain Company in the nearby town of Acropolis. Marginal cost of production is $70, and Astor realizes a marginal profit of $30.

Tax on the profit is $3; an additional property tax of $7 is levied due to reclassification of the land to a higher value use. State Aqua is thus able to collect a total of $10 in new taxes as a direct result of Astor's irrigation operation.

Astor spends most of his $20 net income on goods and services in Acropolis. His spending, of course, generates secondary impacts (multiplier effects) in the economy—among them, incomes for the merchants in town and additional tax revenues for the state. Payments of input cost and spending of after-tax income by Astor produce a total of $7 in sales and income taxes. Agro pays $6 in profit tax when it sells Astor's corn to a grain trading company for $130.

Now suppose Bustle, a rapidly growing city in State Bargain, is looking for new sources of water to meet its expanding needs. It offers Astor $200 for the right to his water. If it is in Astor's best interest to accept this offer, he is free to sell his groundwater right across the state line to Bustle. Astor's appropriation permit represents a privately-owned transferable property right. Because of the commerce clause, State Aqua is enjoined from erecting trade barriers to keep the water from flowing out-of-state in the same way that the state may not pass legislation to keep the corn at home.

What if Astor sells his groundwater right to Bustle? For him, irrigation will cease; his operation reverts to dry-land farming. For the economy, all multiplier effects stemming from Astor's irrigated farming operation will be lost. For State Aqua, it means losing $7 in sales and income taxes from the merchants in Acropolis as well as $6 in profit tax from Agro. It also loses $3 in profit tax and $7 in property tax from Astor.

Not all is lost to State Aqua or the economy surrounding Acropolis, however, because Astor gains an income of $200 from the sale of his water right. He spends money on consumption or investment; he also pays taxes.141

141. This example is modeled after Trelease, supra note 96, at 357-59. Since As-
In addition, any attempt by the state to regulate interstate economic activities "downstream" from the initial transfer of resources to private owners must not unduly burden interstate commerce or unreasonably impede the private owners from selling the groundwater out-of-state.\textsuperscript{142} Thus the important point is:

Oil and gas brought to the surface, netted shrimp, seined minnows, felled trees from state public land . . . were once "natural resources," free-roaming or at least unpossessed, subject to no private claim of ownership. All are now property in the hands of those who reduced them to possession or who have acquired a property right to take them. The state has received the economic benefit from the activity that transferred them out of the public domain and into private hands, but it may not burden or prevent interstate commerce carried on by the owners of the appropriated things. \textit{Sporhase} correctly adds water to this list.\textsuperscript{143}

Another important point is that the state retains the right to prefer its own residents when assigning rights to unappropriated groundwater.\textsuperscript{144} Had Bustle applied for the right to appropriate the same groundwater that Astor desired, the state engineer of State Aqua could have ruled in favor of Astor and granted him the right. That would allow the state and its residents to capture the primary benefits of transferring public resources to private ownership for the first time. Unlike El Paso, which could obtain New Mexico groundwater for free, Bustle could gain access to groundwater in State Aqua only if it paid Astor a fair price for the water. Income from the sale of resources could help State Aqua develop its economy. Compensating the export-

\textsuperscript{142} Anson & Schenkan, \textit{supra} note 85, at 77.

\textsuperscript{143} Trelease, \textit{supra} note 96, at 359 (footnotes omitted).

\textsuperscript{144} A state's ability to discriminate in favor of its residents should not be limited to interstate groundwater resources only but should extend to water resources lying wholly within the boundaries of the state. This protective regulation is necessary when one recognizes the force of the Second Law of Hydraulics: Water flows uphill to the money. Advancing technology has made it much more feasible to transport water economically over great distances. A nationwide water market may not be as far-fetched as one may think.
ing state for its resources thus would maintain equity.

Judicial Allocation of Interstate Groundwater

At least one final problem remains. Property rights are meaningful and useful to their owners if the entitlements and liabilities are clearly specified and if access to the use of the assets is not frequently interrupted. A permit holder who cannot actually divert water on a regular basis is the owner of a water right of doubtful value due to the insecure supply. When there is insufficient water to meet the demand of all existing rights in a normal water year, the state in effect has created "empty" water rights. That is why municipalities seeking new sources of water often resort to purchasing irrigation rights because they generally are the most senior and represent the most secure supplies.

No state wishes to create empty water rights that are useless and worthless to their owners. The most crucial factor in avoiding the creation of empty water rights clearly is information. With accurate information the state engineer will know when a body of water is fully appropriated and will not issue any more permits, thereby avoiding the creation of meaningless paper rights that cannot be converted to wet water. When an interstate aquifer is at issue, specification of the quantity of groundwater to which each state is entitled is absolutely essential. Otherwise, the states may feel compelled to engage in an unrestrained race to the bottom of the aquifer in order to protect their respective interests, with grave economic and environmental consequences. One way to avoid these problems is to have the Supreme Court allot a fair share of the common resources to each state.

By following the tradition in interstate surface water, the Court can employ the federal common law of equitable apportionment to

145. J. Dales, supra note 69, at 66.

146. Prior appropriation is the most widely used doctrine of water rights allocation in the western United States. It operates on the principle of "first in time, first in right." In times of shortage when water is insufficient to meet all the demands, supply is cut off in the reverse order of the date of appropriation. Junior right owners—those whose dates of appropriation are the most recent—will lose their supplies so that water to senior right owners can continue. The most senior water rights in this region are usually irrigation rights. The problem of "empty" water rights is most clearly seen in jurisdictions following the prior appropriation doctrine, although the situation and the reasoning remain essentially the same in states where riparian rights or correlative rights apply.

147. This is not to suggest that the equitable apportionment decree is the only, or perhaps even the best, method of dividing interstate water resources. Indeed, some have argued that interstate compact or congressional legislation can apportion common resources far more fairly and efficiently. However, recent equitable apportionment rulings have given strong indication that the Court is finally exploiting the potential of this doctrine by linking it to policy concerns. See, e.g., Tarlock, supra note 25, at 383-84.
determine the allocation of interstate groundwater.\textsuperscript{148} When applying this doctrine,\textsuperscript{149} the Court has always recognized that each state has an equal right to the benefits derived from using the water which flows through its territory.\textsuperscript{150} "The problem in equitable apportionment disputes is the equitable remedy: how to define and quantify the extent of the states' property rights."\textsuperscript{151}

The Court has undergone a definite evolutionary development in its thinking and analysis of equity. In \textit{Kansas v. Colorado}, the Court determined equities on the basis of what one commentator called a "crude cost-benefit analysis,"\textsuperscript{152} and Colorado was granted the right to continue appropriating the full flow of the Arkansas River.\textsuperscript{153} In retrospect, the fact that Colorado was rewarded for its more advanced irrigation economy perhaps can be interpreted as the Court adopting a variation of the Social Darwinist view of equating maximum economic production with equity.\textsuperscript{154}

Over the years the Court's equitable apportionment rulings have become more sophisticated as a number of important policy considerations were incorporated into the doctrine. First, state water law was taken into account in \textit{Wyoming v. Colorado}.\textsuperscript{155} Since both Wyoming and Colorado have adopted the same system of water law (prior appropriation), the Court divided the water in the Laramie River largely by adhering to the order of appropriation.\textsuperscript{156} Prior appropriations for irrigation in Wyoming thus enabled that state to claim the lion's share of the water even though Colorado's proposed diversion would be more beneficial.\textsuperscript{157}

The Court's adherence to the order of appropriation has prompted some to criticize this ruling because it would perpetuate the existing pattern of use and would inhibit the development of more efficient uses or the transfer of water resources to their most beneficial use.\textsuperscript{158} However, current users have built up certain reasonable expectations about their supplies and have often made sizable investments on the basis of those expectations. A change in water allocation proba-

\textsuperscript{148} See supra section entitled "Equitable Apportionment." Application of this doctrine is no longer limited to interstate water disputes. More recently, it has been used to apportion anadromous fish in an interstate stream (chinook salmon and steelhead trout in the Columbia-Snake river system). See Idaho v. Oregon, 462 U.S. 1017 (1983).

\textsuperscript{149} The doctrine was established in Kansas v. Colorado, 206 U.S. 46 (1907). See also supra note 7.

\textsuperscript{150} See, e.g., Kansas v. Colorado, 206 U.S. at 98.

\textsuperscript{151} Comment, supra note 17, at 796.

\textsuperscript{152} Tarlock, supra note 25, at 387.

\textsuperscript{153} Kansas v. Colorado, 206 U.S. at 114.

\textsuperscript{154} Tarlock, supra note 25, at 387.

\textsuperscript{155} 250 U.S. 419 (1922).

\textsuperscript{156} Id. at 470.

\textsuperscript{157} Id. at 496.

\textsuperscript{158} Tarlock, supra note 25, at 395-96 (citing Bannister, \textit{Interstate Rights in Interstate Streams in the Arid West}, 36 HARV. L. REV. 960 (1923)).
bly would inflict harm on these users. Favoring existing uses would protect current users' interests and correspondingly would impose on a proposed use a higher and more difficult, but by no means insur-
mountable, standard before a change in allocation could take place.

Later the rule of strict adherence to local water law was modified in *Nebraska v. Wyoming.*169 Equity was to be determined by a multi-
tude of factors, including physical and climatic conditions, the con-
sumptive use of water, return flows, established uses, the availability of storage water, the practical effect of wasteful uses on downstream areas, and a comparison of the damage to upstream areas versus the benefits to downstream areas.169

Further, the Court deliberately left unspecified the weights of these factors because "[t]he standard of an equitable apportionment requires an adaptation of the formula to the necessities of the particu-
lar situation."162 Rather than setting any "hard and fast" rule,162 the Court endeavored to develop "a flexible standard of ad hoc justice, designed to achieve an equitable result in water disputes."163

Recently, the doctrine of equitable apportionment was further re-
fined in order to better deal with the kind of water conflicts likely to arise in the future. Because the era of large-scale federal water projects is fast coming to a close, opportunity for water development by this means is now much more limited. Supply for new uses can be obtained only by reallocating water from some current use. Such a proposed reallocation was the issue in the *Colorado v. New Mexico* cases.164 Colorado petitioned to have the Vermejo River water reallo-
cated by equitable apportionment so that part of the flow would be available to a Colorado user. In response to the new reality of fixed supply, the Court added efficient use and conservation165 as well as long-range planning166 to the list of factors for equity determination.

In the first *Colorado v. New Mexico* case, hereinafter called *Ver-
mejo I*, the focus was on waste and inefficiency. The Court made it clear that wasteful or inefficient use of interstate water, "[E]specially in those Western States where water is scarce,"167 may invalidate one's claim to that water. In that regard, it laid down some rather stringent conditions: "We have invoked equitable apportionment not only to require the reasonably efficient use of water, but also to impose on States an affirmative duty to take reasonable steps to con-

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160. Id. at 618.
161. Id. at 627.
162. Id. at 622.
serve and augment the water supply of an interstate stream."

Significantly, both the petitioning state and diverting state are required to pursue efficient use and conservation of the resources. More remarkable still, the Court remanded with specific instructions to determine whether reasonable conservation measures by New Mexico users could offset losses due to diversion. This heavy emphasis on efficiency and conservation might have been the Court's response to suggestions that prior appropriation is inherently not conducive to efficient water use.

The most radical development occurred in the challenge to existing allocation by proposed future uses. Previously, a compelling need for municipal drinking water was the only future use which the Court had ever entertained as the basis for an equitable apportionment decree. This earlier reluctance reflected a strongly felt desire to preserve stability in water law and to protect existing property rights and economies. Yet in Vermejo I the Court not only permitted the inclusion of a future use in its equitable remedy formulation, it went so far as to consider supporting the proposed diversion, even at the expense of existing economies, if "the benefits of the diversion substantially outweigh the harm that might result." In the second case, hereinafter called Vermejo II, the Court tempered both its support for a future use that purported to confer great benefits and its enthusiasm for an efficiency-based balancing. Cognizant that "[t]he harm that may result from disrupting established uses is typically certain and immediate, whereas the potential benefits from a proposed diversion may be speculative and remote," the Court imposed a heavy burden of proof on the proposed diverter so that it would "bear most, though not all, of the risks of erroneous decision." In part, the petitioning state must be able to demonstrate by "clear and convincing evidence" that there is a high probability of actually realizing the benefits from the proposed use or that present uses are inefficient.

In the end, the Court in Vermejo II concluded that Colorado had

168. Id. at 185.
169. Id. at 190.
170. Prior appropriation assigns water rights according to the date of appropriation. See supra note 146. The emphasis is on early development. Furthermore, current law seems to suggest that an appropriator saving water through improved efficiency or conservation may not keep or sell that water. Thus there is no incentive to be efficient or to conserve. W. Goldfarb, supra note 4, at 18.
171. Comment, supra note 17, at 809.
172. See Wyoming v. Colorado, 259 U.S. 419 (1922); supra note 157 and accompanying text.
175. Id. at 316.
176. Id.
177. Id. at 321.
not "committed itself to any long-term use for which future benefits can be studied and predicted."\textsuperscript{176} Hence the equitable apportionment decree requested by Colorado was denied. The policy lessons to be learned from the Vermejo cases are (1) the Court is tightening the standards according to which diverting states can retain their water for historical uses, and (2) the Court is requiring long-range planning involving careful analysis and evaluation by both the petitioning and diverting states to "reduce the uncertainties with which equitable apportionment judgments are made."\textsuperscript{176}

This brief summary of selected interstate water cases is intended to highlight the increasing sophistication of the Court in applying the principle of equitable apportionment. Gradually the Court has integrated policy concerns into the doctrine and, in the process, taken advantage of the potential of the doctrine in resolving interstate surface water disputes. This tradition, and the attendant policy, can be profitably applied in a similar manner to interstate groundwater to protect existing property rights, to preserve existing economies, and to promote efficiency in water use. Moreover, applying the same judicial rules to surface water and groundwater is to recognize them as two components of the same unified hydrologic system and to deal with them as such. In so doing, the consistency between judicial and policy considerations on the one hand and physical reality on the other is maintained.

The preceding analysis shows the process by which groundwater resources are developed and put to use efficiently. The process begins with a fair division of an interstate aquifer to promote equity among the states, as well as certainty in a state's groundwater resources management. Groundwater resources allotted to a state but still in the public domain are then transferred by the state to initial owners by means of appropriation. Individual and public welfare are shaped by the state's distribution of property. Finally, rights to groundwater are exchanged in the market to achieve economic efficiency.

A Policy Taking Shape

The general outline of an integrated interstate groundwater allocation policy is now taking shape. This policy takes into account the social goals of equity and efficiency, the legal doctrines of equitable apportionment and the commerce clause, the opportunities afforded and constraints imposed by these doctrines, as well as the physical-hydrologic reality of surface water and groundwater interconnection. In structuring this policy, the entire process is broken down into three distinct stages, with the effect of bringing to light relevant issues at each stage. Thereafter, it is possible to address the issues more di-

\textsuperscript{176} Id.
\textsuperscript{179} Id. at 322.
rectly, and eventually to develop a more coherent and enlightened policy.

The water management authority of a state, which has the power and responsibility to create and assign water rights to private owners, must possess accurate information of the quantity of water available to the state if it is to avoid creating meaningless water rights. The first stage of the process therefore deals with this particular issue.

A clear division of interstate groundwater resources into specific shares to be allotted to the various states will advance the cause significantly. A number of means are available to achieve that end, including congressional legislation and inter-state compact. But judicial equitable apportionment should also be seriously considered, especially in light of continuous effort by the Supreme Court to incorporate many important policy considerations into the doctrine.

After a state receives its fair share of the aquifer it is able to plan and manage the conservation and use of the water in ways that are in its interest. While a state can and apparently must undertake some degree of planning prior to apportionment,\(^{180}\) such plans are speculative at best in the absence of specific knowledge of the state’s entitlement. Only when it knows how much water it is entitled to, can a state develop concrete and meaningful plans for its future growth and development. At the same time, the state can avoid creating useless and worthless water rights.

The issues in the second stage have to do with the creation of water rights and the assignment of those rights to private owners by the state. Because the groundwater resources are still in the public domain and do not belong to any private owner, the commerce clause does not yet apply. Therefore a state is not enjoined from favoring its own citizens in assigning the rights to those resources; its water management authority is under no obligation to treat in-state and out-of-state appropriation permit applicants in like manner.

Indeed, the state is responsible for protecting its territorial sovereignty. Groundwater resources form a very important part of the territory of an arid western state. The state thus is entrusted to safeguard the integrity of those resources which remain in the public domain. Fulfillment of that responsibility depends to a large degree on the state’s ability to control the conservation and use of its resources. Having the discretionary power in groundwater rights assignment, including the ability to discriminate in favor of its own citizens, engenders that control by the state. It also enables the state to reap the primary benefits from the orderly development of those resources.

Once the rights to appropriate groundwater have been created and transferred to private owners, they can be made available for

\(^{180}\) Id.
market exchange and are subject to commerce clause constraints. State regulations which would impose barriers to interstate commerce of private water and water rights can be justified only when legitimate local interests are evident. And even then, the burdens on interstate commerce cannot be disproportionate to the putative benefits.

In addition to enhancing equity and efficiency in interstate groundwater allocation, a policy so structured will make the treatment of surface water and groundwater consistent with one another. As well, uncertainty concerning the legal status of water moving laterally between an aquifer and a stream will be eliminated, resulting in enhanced clarity in the property rights. Finally, greater specificity with regard to applicable legal rules and respective state shares of the resources will enhance adjudication and management of interstate waters.