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Less is More: A Limited Approach to Multi-State Management of Interstate Groundwater Basins

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LESS IS MORE: A LIMITED APPROACH TO MULTI-STATE MANAGEMENT OF INTERSTATE GROUNDWATER BASINS

JAMES H. DAVENPORT

INTRODUCTION.....	139
I. THE INTERESTS OF FOVEREIGN STATES	142
II. EQUITABLE APPORTIONMENT	146
III. STATE AREA-OF-ORIGIN STATUTES (INTERSTATE WATER TRANSFER EMBARGOES)	149
IV. IINTERSTATE GROUND WATER: A COMPLEX RESOURCE	154
V. ATTRIBUTES OF GROUNDWATER RIGHTS UNIDER VARIOUS STATE'S LAWS: CONFLICT OR INTEGRATION? .	158
VI. ADMINISTRATION OF SHARED GROUNDWATER BASINS: LESS IS MORE	172
CONCLUSION	178

INTRODUCTION

Whenever a legal system has to consider natural resources for human use, it needs to consider carefully all the physical, chemical, hydrogeological, environmental interconnections. Groundwater can be no exception. Political, social, and economic "interconnections" are of equal importance with the physical ones. The need for simultaneous emphasis on all of them has been known for a long time, at least academically, but institutional accommodation has been lacking for too long.¹

At the opening of the twenty-first century, hydrogeology and law still are not wholly integrated. . . . The intertwined relationship between law and hydrogeology, that has had a long-established history, will become even more intimate in the future.²

Beginning with the first compact between Maryland and Virginia in 1785 designating the waters in the Potomac River as a "common highway,"³ American states have sought means to settle, quantify and allo-

1. JOSEPH W. DELLAPENNA, 3 WATERS AND WATER RIGHTS § 18.06 (1991 ed. repl. vol. 2003) [hereinafter DELLAPENNA].

2. *Id.* §18.02.

3. DAN SELIGMAN, COLO. RIVER COMM'N OF NEV., "LAWS OF THE RIVERS:" THE LEGAL REGIMES OF MAJOR INTERSTATE RIVER SYSTEMS OF THE UNITED STATES 225-26 (Oct. 2006).

cate rights to the nation's interstate waters.⁴ In the American West, at least since 1922, when Colorado, Wyoming, Utah, New Mexico, California, and Nevada adopted the Colorado River Compact,⁵ followed in 1928 by the Congress,⁶ states have again sought means to settle, quantify, and allocate their competing rights to interstate surface water systems. In recent decades, as hydrologists have more accurately estimated the hydrologic volume of surface water supplies, where demands for supply have become greater, where entities have imposed environmental servitudes upon the supplies' natural flow, underground⁷ water is becoming an ever more important resource.

In 1995, Professor Abrams analyzed the problem of the security of water rights in interstate water systems before and after the allocation of the volume of those systems between the involved states.⁸ Acknowledging the three established methods of equitable apportionment, congressional allocation, and interstate compact, he posited that individual rights are more secure once conferred under the "umbrella" of a state's apportionment.⁹ However, Abrams observed that water users have traditionally made use of interstate waters without awaiting legal pronouncements of interstate allocation:¹⁰

[The] rights to interstate water exercised in advance of interstate allocations are not secure.

...

The hard cases, and the interesting cases, are the ones that seek security in advance of allocation. Here the pathways to security are less clear. Real-world self help (going out and making use of the water

4. *Id.* at 26, 28 (with respect to these waters, this paper uses the words "interstate" and "shared" interchangeably).

5. *Id.* at 71, 73 (Arizona did not adopt the 1922 Compact until 1944).

6. *Id.* at 73.

7. The proper form of reference to underground water seems to differ depending upon the writer. Here, the convention used is that "ground" is an adjective when used to modify the noun "water" (as with "surface water"), but a noun when used as one, e.g., "buried in the ground." The two words "ground" and "water" are therefore not merged. "Groundwater" is an adjective but not a noun. Thus the two words "ground" and "water" are merged when the adjective is used to modify a different noun, e.g., "groundwater supply." (Compare Slater's style that hyphenates such merged adjectives. *See infra* note 125.)

8. Robert H. Abrams, *Secure Water Rights in Interstate Waters*, in *WATER LAW: TRENDS, POLICIES, AND PRACTICE*, 332 (Kathleen Marion Carr & James Crammond eds., A.B.A. SEC. OF NAT RESOURCES, ENERGY, ENVTL. L. 1995). Professor Abrams presumes that the equitable apportionment rationale of the U.S. Supreme Court is essentially that of the international law concepts upon which cross-border water bodies are shared. *See also* Gabriel Eckstein & Yoram Eckstein, *A Hydrogeological Approach to Transboundary Ground Water Resources and International Law*, 19 AM. U. INT'L L. REV. 201, 205 (2003).

9. Abrams, *supra* note 8, at 331.

10. *Id.*

before anyone else does) can succeed because priority of use enjoys a measure of protection in subsequent allocation litigation. Still, the advantage of priority is not absolute and those seeking greater security will have to be inventive or find a less risk-averse banker.¹¹

Security of the water right is, of course, not the only concern. Sustainability of the resource, environmental service, and efficiency of regulatory management must also be considered. In 2001, Professor Sax urged the importance of reconciling "hydrologic reality (or rationality)" with "managerial practicability" when considering watershed management:

One profoundly important question as one ponders watershed management is to what extent we may have to break problems down into artificial units simply to be able to cope with them at all. The watershed, or whatever the hydrologically-rational unit may be, usually bears little if any relationship whatever to governmental units at any level—from the county to the country. Nor is there any hydrological or ecological measure of managerial capacity.¹²

Western American states' water law is part of the law of conquest¹³ or capture:¹⁴ superlative ("I killed it, it's mine to eat."); declarative ("it's mine, I used it first." (albeit after many others)); and diminutive ("can't you see, I've marked all the corners."). Likewise, the sovereignty America's western states assert with respect to water within their boundaries is assertive and protective, reflecting the dog-in-the-manger attitude of their respective citizens ("It's mine even if I'm not using it. I might get thirsty.").¹⁵

Notwithstanding that assertiveness, the role of comity between the states, the mandates of the Full Faith and Credit Clause of the U.S. Constitution,¹⁶ and the overarching cloud of the Supremacy Clause of the U.S. Constitution¹⁷ necessarily constrain the states' claims to inter-

11. *Id.* at 334-35.

12. Joseph L. Sax, Boalt Hall Univ. of Cal. at Berkeley, Keynote Address at the 19th Annual Water Law Conference, *Watershed Management: A New Governance Trend: Issues in the Watershed Management Movement* (Feb. 15, 2001) (transcript available at A.B.A. Section of Environment, Energy, and Resources).

13. See ANDERS STEPHANSON, *MANIFEST DESTINY: AMERICAN EXPANSION AND THE EMPIRE OF RIGHT* 14, 54 (1995).

14. Lawrence J. MacDonnell, *Out-of-Priority Water Use: Adding Flexibility to the Water Appropriation System*, 83 NEB. L. REV. 485 (2004).

15. *Id.* at 488, 490.

16. U.S. CONST. art. IV, § 1 ("Full Faith and Credit shall be given in each State to the public Acts, Records, and judicial Proceedings of every other State. And the Congress may by general Laws prescribe the Manner in which such Acts, Records and Proceedings shall be proved, and the Effect thereof.")

17. U.S. CONST. art. VI, cl. 2 ("This Constitution, and the Laws of the United States which shall be made in Pursuance thereof; and all Treaties made, or which shall be

state water, be it surface or ground water. As the U.S. Supreme Court has stated in the equitable apportionment context, no state can impose its law on another, and no state must yield to another's law.¹⁸ The rights and responsibilities of U.S. states to control natural resources and the limitations of their claims to those natural resources under the jurisprudence of equitable apportionment, the Commerce Clause,¹⁹ and the Compact Clause²⁰ deserve some thought. Is there a fourth approach to interstate water management, perhaps a hybrid or a variant, which is especially suited to interstate ground water? That complex resource may indeed require a unique approach adapted to the unique attributes of individual aquifers.

I. THE INTERESTS OF SOVEREIGN STATES

The right and responsibility of U.S. states to control the natural resources within each state's boundaries arises from the American colonies' inheritance of England's common law. Under the common law, the King and derivative owners of land with chain of title to royal control, owned all the natural waters, forests, game, minerals, and profits upon or under the land.²¹ When the thirteen American colonies released English royal claims by Declaration of Independence, each state asserted the same governmental ownership or control of the waters, forests, games, minerals and profits within their boundaries.²² That claimed jurisdiction was not surrendered by the Articles of Confederation in 1787 or transferred to the United States government by the U.S. Constitution.²³ As new states entered the union, each entered on

made, under the Authority of the United States, shall be the supreme Law of the Land; and the Judges in every State shall be bound thereby, any Thing in the Constitution or Laws of any state to the Contrary notwithstanding.”).

18. *Kansas v. Colorado*, 206 U.S. 46, 97-98 (1907).

19. U.S. CONST. art. I, § 8, cl. 3 (“To regulate Commerce with foreign Nations, and among the several States, and with the Indian Tribes”).

20. U.S. CONST. art. I, § 10, cl. 3 (“No State shall, without the Consent of Congress, . . . enter into any Agreement or Compact with another State.”).

21. *Idaho v. Coeur d'Alene Tribe of Idaho*, 521 U.S. 261, 283 (1997); *Phillips Petroleum Co. v. Mississippi*, 484 U.S. 469, 479 (1988) (“[I]t came to be recognized as the ‘settled law of this country’ that the lands under navigable freshwater lakes and rivers were within the public trust given the new States upon their entry into the Union, subject to the federal navigation easement and the power of Congress to control navigation on those streams under the Commerce Clause”) (citation omitted); *Montana v. United States*, 450 U.S. 544, 545 (1981); *Ill. Cent. R.R. Co. v. Illinois*, 146 U.S. 387, 452 (1892); *Martin v. Waddell’s Lessee*, 41 U.S. 367, 410 (1842) (states as sovereigns “hold the absolute right to all their navigable waters and the soils under them for their own common use, subject only to the rights since surrendered by the Constitution to the general government.”); JOSEPH L. SAX ET AL., *LEGAL CONTROL OF WATER RESOURCES* 462 (3d ed. 2000).

22. SAX ET AL., *supra* note 21, at 462.

23. *Id.* Compare Katie O’Bryan, *Issues in Natural Resource Management – Inland Water Resources – Implications of Native Title and the Future of Indigenous Control and Management*

"equal footing" with those original thirteen.²⁴ That is, each new state was presumed to be endowed with all the same governmental rights and privileges as the original thirteen, including sovereignty with respect to all natural resources within the particular territory.²⁵ One such presumed right is a state's right of ownership, or at the minimum management, of natural resources, including water, within the limits of its political jurisdiction.

Various western state enabling acts or constitutions address jurisdiction over natural resources, generally, and water in particular. Wyoming's Constitution declares, for example, that "[t]he water of all the natural streams, springs, lakes or collections of still water, within the boundaries of the state are . . . the property of the state."²⁶ Likewise, Colorado's Constitution states that "[t]he water of every natural stream, not heretofore appropriated, within the state of Colorado, is hereby declared to be the property of the public, and the same is dedicated to the use of the people of the state, subject to appropriation as hereinafter provided."²⁷ Montana's Constitution provides that all the water within the state, including underground water, is the property of the state, and that all uses of that water are "public use[s]," notwithstanding the user or the purpose.²⁸ New Mexico's Constitution declares that all the "water of every natural stream, perennial or torrential, within the state" unappropriated at the time of statehood, "belong[s] to the public."²⁹ California's Constitution provides that "the use of all water" by appropriation is a "public use, and subject to the regulation and control of the state."³⁰

While Nevada's Constitution does not specifically address the public's ownership of water, Nevada's legislature stated clearly in 1913 that "the water of all sources of water supply within the boundaries of the state whether above or beneath the surface of the ground, belongs to

of *Inland Waters*, 14 *Murdoch U. E-Law J.* 280, 281-82 (Oct. 2007) (discussing Australian constitutional law), available at <https://elaw.murdoch.edu.au/index.html>.

24. SAX ET AL., *supra* note 21, at 462.

25. *Pollard v. Hagan*, 44 U.S. 212, 221, 222-23 (1845); *County of St. Clair v. Lovington*, 90 U.S. 46, 68 (1874); *Utah Div. of State Lands v. United States*, 482 U.S. 193, 202 (1987). Before statehood, the U.S. may reserve the lands underlying navigable waters for federal purposes if it clearly expressed the intent to do so.

26. WYO. CONST. art. VIII, § 1.

27. COLO. CONST. art. XVI, § 5.

28. MONT. CONST. art. IX, § 3 ("(2) The use of all water that is now or may hereafter be appropriated for sale, rent, distribution, or other beneficial use, the right of way over the lands of others for all ditches, drains, flumes, canals, and aqueducts necessarily used in connection therewith, and the sites for reservoirs necessary for collecting and storing water shall be held to be a public use. (3) All surface, underground, flood, and atmospheric waters within the boundaries of the state are the property of the state for the use of its people and are subject to appropriation for beneficial uses as provided by law.").

29. N.M. CONST. art. XVI, § 2.

30. CAL. CONST. art. 10, § 5.

the public.³¹ North Dakota's legislature declared both surface and ground water to "belong to the public,"³² as did Utah's,³³ Oregon's,³⁴ and Nebraska's³⁵ legislatures. Washington's legislature declared that "all waters within the state belong to the public," again subject to rights existing prior to that declaration.³⁶ Idaho's legislature declares that all its waters belong to the state.³⁷ California's statute declares only that surface waters are "public water of the State."³⁸ Likewise, Texas law also declares that surface water is the "property of the state."³⁹ Private rights to use water in these states are thus encumbered with the constitu-

31. NEV. REV. STAT. § 533.025 (2007).

32. N.D. CENT. CODE § 61-01-01 (2008).

33. UTAH CODE ANN. § 73-1-1 (2008) ("All waters in this state, whether above or under the ground are hereby declared to be the property of the public, subject to all existing rights to the use thereof.").

34. OR. REV. STAT. § 537.110 (2007) ("All water within the state from all sources of water supply belongs to the public.").

35. NEB. REV. STAT. § 46-202(1) (2007) ("The water of every natural stream not heretofore appropriated within the State of Nebraska, including the Missouri River, is hereby declared to be the property of the public and is dedicated to the use of the people of the state, subject to appropriation."); *see also* KAN. STAT. ANN. § 82a-702 (2007) ("All water within the state of Kansas is hereby dedicated to the use of the people of the state, subject to the control and regulation of the state in the manner herein prescribed.").

36. WASH. REV. CODE § 90.03.010 (2008) ("The power of the state to regulate and control the waters within the state shall be exercised as hereinafter in this chapter provided. Subject to existing rights all waters within the state belong to the public, and any right thereto, or to the use thereof, shall be hereafter acquired only by appropriation for a beneficial use and in the manner provided and not otherwise; and, as between appropriations, the first in time shall be the first in right. Nothing contained in this chapter shall be construed to lessen, enlarge, or modify the existing rights of any riparian owner, or any existing right acquired by appropriation, or otherwise.").

37. IDAHO CODE ANN. § 42-101 (2008) ("All the waters of the state, when flowing in their natural channels, including the waters of all natural springs and lakes within the boundaries of the state are declared to be the property of the state, whose duty it shall be to supervise their appropriation and allotment to those diverting the same therefrom for any beneficial purpose, and the right to the use of any of the waters of the state for useful or beneficial purposes is recognized and confirmed; and the right to the use of any of the public waters which have heretofore been or may hereafter be allotted or beneficially applied, shall not be considered as being a property right in itself, but such right shall become the complement of, or one of the appurtenances of, the land or other thing to which, through necessity, said water is being applied . . .").

38. CAL. WATER CODE §1201 (West 2008).

39. TEX. WATER CODE ANN. § 11.021 (2007) ("(a) The water of the ordinary flow, underflow, and tides of every flowing river, natural stream, and lake, and of every bay or arm of the Gulf of Mexico, and the storm water, floodwater, and rainwater of every river, natural stream, canyon, ravine, depression, and watershed in the state is the property of the state. (b) Water imported from any source outside the boundaries of the state for use in the state and which is transported through the beds and banks of any navigable stream within the state or by utilizing any facilities owned or operated by the state is the property of the state.").

tional or statutory reservation of states' sovereign powers⁴⁰ Professor Tarlock remarked "[s]tates, especially in the West, have traditionally asserted not only the power to set the ground rules for the recognition of private rights, but also the power to deny or to constrain private use choices to further broad community interests in water allocation."⁴¹

In 2003, Professor Leshy declared state administration of water rights "lax" – exacerbating almost every water rights dispute in the West through uncertainty about water measurement, management, and administration.⁴² Moreover, he declared the lax, status quo management was preferable to states and water rights holders because of the greater cost associated with "tighter management."⁴³ According to Leshy, "[i]t requires outlays for devices to measure and keep track of water use, for courts to adjudicate rights, and for bureaucracies to administer the system. . . . It is politically costly to change to tighter control."⁴⁴

40. There is, of course, disagreement on this issue. See Conference Materials, Alf W. Brandt, Cal. Assembly Comm. on Water, Parks & Wildlife, *An Historical Perspective on Water Ownership in Bureau of Reclamation Projects*, at the A.B.A. Section of Environment, Energy, and Resources 24th Annual Water Law Conference (Feb. 23-24, 2006) [hereinafter *24th Annual Water Law Conference*] (on file with American Bar Association); Steven L. Hernandez, Hubert & Hernandez, P.A., Las Cruces, New Mexico, *Ownership of Water Rights in Reclamation Projects: A Lesson from New Mexico*, at 24th Annual Water Law Conference, Clifford T. Lee, Deputy Attorney Gen., Cal. Dep't of Justice, *A California Perspective on the Water Right Ownership Issue*, at 24th Annual Water Law Conference, Nancie G. Marzulla, Marzulla & Marzulla, Washington, D.C., *Water, Property Rights, and Endangered Species*, at 24th Annual Water Law Conference, Christopher B. Rich, Senior Attorney, Intermountain Reg'l Solicitor's Office, Dep't of Interior, *Can You Own a Usufruct? Or Why the Concept of Ownership May Not Be the Most Apt Description of a Water Right*, at 24th Annual Water Law Conference. See also James H. Davenport & Craig Bell, *Governmental Interference with the Use of Water: When Do Unconstitutional 'Takings' Occur?*, 9 U. DENV. WATER L. REV. 1, 25, 33 (2005); Alf W. Brandt, U.S. Dep't of Interior, 21st Water Law Conference, *Water Project Deliveries = Property?*, at the A.B.A. Section of Environment, Energy, and Resources. 21st Annual Water Law Conference (Feb. 20-21, 2003) (on file with American Bar Association).

41. A. Dan Tarlock, *The Law of Equitable Apportionment Revisited, Updated, and Re-stated*, 56 U. COLO. L. REV. 381, 389-90 (1985).

42. John D. Leshy, Distinguished Professor of Law, Univ. of Cal., Hastings School of Law, *The Federal Role in Water Management in the West: Time for New Thinking?*, at A.B.A. Section of Environment, Energy and Resources 21st Annual Water Law Conference (Feb. 20-21, 2003).

43. *Id.*

44. *Id.* Professor Leshy also attributed preference for lax administration to the "rugged individualism" of those dependent on government-sponsored water projects, "the lingering Reagan-era legacy that government tends to be incompetent and foul things up whenever it gets involved," the temporary duration of shortages and genuine constraints on water use, the arrival of public money for more water projects to provide more storage and new supplies when shortages occur, and scapegoats such as Indians, federal agencies, environmentalists, the Endangered Species Act, and the Clean Water Act. *Id.*

Generally speaking, states sharing interstate surface water systems respect each other's laws regarding the creation of water rights. A California statute is a good example:

Upon any stream flowing across the State boundary, an appropriation of water in this State for beneficial use in another State may be made only when, under the laws of the latter, water may be lawfully diverted therein for beneficial use in this State.

Upon any stream flowing across the state boundary a right of appropriation having the point of diversion and the place of use in another state and recognized by the laws of that state shall have the same force and effect as if the point of diversion and the place of use were in this State if the laws of that state give like force and effect to similar rights acquired in this State⁴⁵

Notwithstanding its movement, all water "resides" somewhere. Its residence within any state makes that water an *intrastate* resource. But, as a portion of a resource that resides in more than one state, it is also an *interstate* resource.

II. EQUITABLE APPORTIONMENT

The Supreme Court exercises original and exclusive jurisdiction over suits between states.⁴⁶ Only that Court, finding facts through a special master, may entertain equitable apportionment litigation between states.⁴⁷ In order to secure the Supreme Court's original jurisdiction over interstate equitable apportionment cases, the plaintiff state must prove injury.⁴⁸ Sometimes state ownership of the resource or a state's *parens patriae* responsibility for the protection of the private interests of its citizens is the premise for standing.⁴⁹

Each state is entitled, of course, to some reasonable share of the common resource. States' sovereign rights under the American federal

45. CAL. WATER CODE §§ 1230, 1231 (West 2008).

46. U.S. CONST. art. III § 2, cl. 1 (extending the judicial power of the United States "to Controversies between two or more States"); U.S. CONST. art. III, § 2, cl. 2 (stating that the Supreme Court has original jurisdiction "in all Cases . . . in which a State shall be Party"); 28 U.S.C. § 1251(a) (2006) (providing the Supreme Court's exclusive jurisdiction over a suit is "between two or more States.").

47. See Anne-Marie C. Carstens, *Lurking in the Shadows of Judicial Process: Special Masters in the Supreme Court's Original Jurisdiction Cases*, 86 MINN. L. REV. 625, 653, 655 (2002).

48. *Colorado v. Kansas*, 320 U.S. 383, 386-87, 392 n.2 (1943); *Washington v. Oregon*, 297 U.S. 517 (1936); *Tarlock*, *supra* note 41, at 394 (" . . . if all claims, perfected or not, on a stream exceed the dependable flow, then a conflict exists and injury should be presumed.") (citing *Nebraska v. Wyoming*, 325 U.S. 589, 610 (1945)). See also *Arizona v. California*, 283 U.S. 423, 463 (1931).

49. *Tarlock*, *supra* note 41, at 389-91 (citing *Nebraska v. Wyoming*, 325 U.S. 589, 610 (1945)).

system stand on equal footing. The Supreme Court views states' competing claims to natural resources on the same premise. No state can impose its law on another, and no state must yield to another's law.⁵⁰ The objective of fair allocation guides the substantive law of equitable apportionment.⁵¹ The Court applies federal common law to determine each state's share.⁵² The Court's primary objective is to make an "equitable apportionment of benefits between the . . . States resulting from the flow of the river."⁵³

Fair allocation rather than consistency with locally generated expectations became the touchstone of equitable apportionment. Local law remains, however, central to an equitable apportionment inquiry. Although the Court has never been very precise about the source of the law of equitable apportionment, its early decision makes it clear that the grant of original jurisdiction requires a federal law and a federal law that will not allow one state to use its law to gain an unfair advantage over another.⁵⁴

But local law may serve as a source of principles to apply since a federal common law must of necessity examine the most relevant sources of substantive law.⁵⁵

As local law is not determinative, the idea of superiority of rights, whether by prior appropriation⁵⁶ or otherwise, is not controlling upon the Supreme Court. Nor is the Court bound by the variance between two states' riparian or appropriative water law origins.⁵⁷ "[A]ll the factors which create equities in favor of one State or the other must be weighed . . ."⁵⁸ According to Abrams, "[t]he concept of entitlement to

50. *Kansas v. Colorado*, 206 U.S. 46, 97 (1907).

51. *See id.* at 98.

52. *Colorado v. New Mexico*, 459 U.S. 176, 183 (1982) (citing *Kansas v. Colorado*, 206 U.S. 46, 98 (1907) (characterizing the body of law as "interstate common law")).

53. *Kansas v. Colorado*, 206 U.S. 46, 118 (1907). *See also* *Nebraska v. Wyoming*, 325 U.S. 589 (1945).

54. Tarlock, *supra* note 41, at 394 (citing *Hinderlider v. La Plata River & Cherry Creek Ditch Co.*, 304 U.S. 92 (1938)).

55. *Id.* at 395 (citing *Illinois v. City of Milwaukee*, 406 U.S. 91, 107 (1972)).

56. MacDonnell, *supra* note 14, at 486 ("Priority is, however, a purely temporal basis for establishing rights. It says nothing about the nature of the use, its economic or social value, its importance in relation to other existing or potential uses of the water source, or its effects on the ability of subsequent appropriators to use that source.").

57. For example, *Kansas v. Colorado* involved a riparian-doctrine state and an appropriation-doctrine state. *Kansas v. Colorado*, 206 U.S. 46, 98 (1907). *Kansas* recognizes both riparian and appropriation doctrine rights, but it relied mainly on a riparian doctrine claim to the undiminished flow of the Arkansas River. *See also* *Wyoming v. Colorado*, 259 U.S. 419, 464 (1922) (discussing *Kansas v. Colorado*). *See generally*, Douglas L. Grant, *Interstate Allocation of Rivers Before the United States Supreme Court: The Apalachicola-Chattahoochee-Flint River System*, 21 GA. ST. U. L. REV. 401 (2004).

58. *Colorado v. Kansas*, 320 U.S. 383, 394 (1943).

'a reasonable and equitable share in the beneficial uses of the waters of an international drainage basin' is reinforced by the concept of the inherent equality of each of the several states. Indeed, equitable apportionment cases often sound like odes to sharing.⁵⁹

After *Colorado v. New Mexico*, the court is likely consider factors including a harm-benefit comparison,⁶⁰ the feasibility of means to improve water use efficiency and enhance water supplies,⁶¹ and protection of existing economies dependent on water.⁶² The Court may consider a state's commitment to water conservation and avoidance of waste relevant, because protection of existing, prior wasteful uses at the expense of newer, more conservation-oriented uses would not be equitable. The court will also consider population and economic demand relevant. As Tarlock points out:

Recognition of prior uses need not freeze all existing uses. It operates more to place the burden of water conservation on new users. This is a difficult but not impossible burden to discharge as the Court's most recent equitable apportionment case, *Colorado v. New Mexico*, illustrates. And . . . the burden may be a positive one to society because it encourages greater state planning and regulatory responsibilities to promote the efficient use of water.⁶³

Justice Marshall's request of the special master in *Colorado v. New Mexico* to make specific findings on remand illustrates the potentially more expansive concerns of a modern Supreme Court in an equitable apportionment case.⁶⁴ Marshall requested findings regarding:

(1) the existing uses of water [sic] from the Vermejo River, and the extent to which present levels of use reflect current or historical water shortages or the failure of existing users to develop their uses diligently; (2) the available supply of water from the Vermejo River, accounting for factors such as variations in streamflow, the needs of cur-

59. Abrams, *supra* note 8, at 332-33 (citation omitted). The Vermejo River litigation [*Colorado v. New Mexico*] suggests that the sharing principle is not prevailing, but that "reasonable conservation efforts are relevant in calculating a state's entitlement and that 'the equities supporting the protection of existing economies will usually be compelling,' but that apportionments for wholly future uses, nevertheless, could be obtained." *Id.* at 334. (quoting *Colorado v. New Mexico*, 459 U.S. 176, 187 (1982)).

60. See *Nebraska v. Wyoming*, 515 U.S. 1, 11-13 (1995); *Nebraska v. Wyoming*, 507 U.S. 584, 593 (1993); *New Jersey v. New York*, 283 U.S. 336, 345-46 (1931); *Kansas v. Colorado*, 206 U.S. 46, 114 (1907).

61. Grant, *supra* note 57, at 417-18.

62. *Colorado*, 459 U.S. at 187.

63. Tarlock, *supra* note 41, at 396. "Although *Colorado v. New Mexico* is, in terms of result, a replay of *Wyoming v. Colorado*, the two opinions suggest that the Court is tightening the standards that a state must meet to retain waters put to historic beneficial use." *Id.* at 408.

64. *Colorado*, 459 U.S. at 189.

rent users for a continuous supply, the possibilities of equalizing and enhancing the water supply through water storage and conservation, and the availability of substitute sources of water to relieve the demand for water from the Vermejo River; (3) the extent to which reasonable conservation measures in both States might eliminate waste and inefficiency in the use of water from the Vermejo River; (4) the precise nature of the proposed interim and ultimate use in Colorado of water from the Vermejo River, and the benefits that would result from a diversion to Colorado; and (5) the injury, if any, that New Mexico would likely suffer as a result of any such diversion, taking into account the extent to which reasonable conservation measures could offset the diversion.⁶⁵

It is reasonable to assume that the Supreme Court sitting today would perpetuate the tradition of recognizing socially important resource issues when considering equitable apportionment of interstate waters. Demographics matter. After *Colorado v. New Mexico*, it is also reasonable to assume that, balancing the equities and applying the harm-benefit comparison, the Court may be disposed to reallocate interstate water to achieve a more equitable apportionment of benefits.

III. STATE AREA-OF-ORIGIN STATUTES (INTERSTATE WATER TRANSFER EMBARGOES)

States may declare a defensive posture with respect to their water supplies (both intrastate and interstate) through the adoption of a statute precluding the movement of water from within the state to serve uses outside the state. Such statutes are typically called "area-of-origin" statutes. Such states seek to place embargoes on interstate water transfers. The primary question that arises with respect to such statutes is whether the negative implication of the Interstate Commerce Clause of the U.S. Constitution precludes such embargoes, taking into account the state's objectives premised upon its police power.⁶⁶ Essential to that question is whether water is a natural resource or a commodity, an economic or a social good. As Douglas Grant said,

The critical question that arises under the negative commerce clause is how much state interference with the free flow of commerce between the states is too much. The Supreme Court has used different approaches over the years in dealing with that question. Generally, however, the Court in its modern cases has weighed the national in-

65. *Id.* at 189-90.

66. *See* U.S. CONST. art. I, § 8, cl. 3.

terest in the free flow of interstate commerce against whatever interest a state might advance to justify the interference.⁶⁷

The primary case in this area is *Sporhase v. Nebraska ex rel. Douglas*.⁶⁸ Mr. Sporhase maintained a large, interstate farm with 140 acres in the State of Colorado and 500 acres in the State of Nebraska.⁶⁹ Sporhase maintained a groundwater well in Nebraska, along the Colorado/Nebraska state line.⁷⁰ Sporhase built a sprinkler system in Colorado and sought a Colorado permit to drill a Colorado well.⁷¹ Colorado turned down Sporhase's application because the aquifer, which the states share, was already overused.⁷² Sporhase thereafter delivered water from his Nebraska well to the Colorado sprinkler system without seeking a permit to transfer groundwater from Nebraska.⁷³ The Nebraska statute prohibited transfer of groundwater to any state that did not permit transfer to Nebraska.⁷⁴ The Colorado statute prohibited all out-of-state groundwater transfers.⁷⁵

Justice Stevens, writing for the Court, approached the fundamental question, whether water is a natural resource within the total control of the state where the water resides, or whether it is an article in commerce.⁷⁶ He divided his analysis into three other questions: whether ground water is an article of commerce; whether the Nebraska statute imposed an impermissible burden on interstate commerce; and whether Congress had granted the states permission to engage in groundwater regulation that otherwise would be impermissible under the Commerce Clause.⁷⁷ He answered the first question in the affirmative, finding that the state does not own the ground water, notwithstanding its significant regulatory interest, and that there is a federal interest in water commerce.⁷⁸ He also answered the second question in the affirmative, based on the conclusion that the reciprocity clause in the Nebraska statute failed the *Bruce Church* balancing test.⁷⁹ He then

67. Douglas L. Grant, *Commerce Clause Limits on State Regulation of Interstate Water Export*, 105 WATER RESOURCES UPDATE 10 (Autumn 1996), available at http://www.ucowr.siu.edu/updates/pdf/V105_A3.pdf.

68. *Sporhase v. Nebraska ex rel. Douglas*, 458 U.S. 941 (1982).

69. *Id.* at 944.

70. *Id.*

71. Brief for Colorado et al. at 3, as Amici Curiae Supporting Petitioner, *Sporhase v. Nebraska ex rel. Douglas*, 458 U.S. 941 (1982) (No. 81613), 1982 WL 608568.

72. *Id.*

73. *Sporhase*, 458 U.S. at 944.

74. *Id.* (citing NEB. REV. STAT. § 46-613.01 (1978)).

75. *See id.* at 944 n.2.

76. *Id.* at 943.

77. *Id.*

78. *Id.* at 953-54.

79. *Id.* at 954, 958; *see also Pike v. Bruce Church, Inc.*, 397 U.S. 137, 142 (1970) The Supreme Court established a new balancing test to evaluate the constitutionality of state legislation affecting interstate commerce:

answered the third question in the negative, finding that Congress had not permitted the states to engage in groundwater regulation that otherwise would be impermissible under the Commerce Clause (the negative implications of the Commerce Clause remain in effect unless Congress expressly states an “intent and policy” that state legislation should be free from attack under the Commerce Clause).⁸⁰ In dissent, Justices

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. (citation omitted).

Several cases leading to *Sporhase* establish the basis for the Supreme Court's ruling. See *Geer v. Connecticut*, 161 U.S. 519, 529, 535 (1896) (The Court upheld the constitutionality of a state law that prohibited the interstate transfer of game birds killed within Connecticut. The Court held that wildlife is the common property of all citizens of a state and, therefore Connecticut owned game birds “as a trust for the benefit of the people.” As owner of the birds, Connecticut could validly prohibit or condition their capture.); *Hudson County Water Co. v. McCarter*, 209 U.S. 349, 356-57 (1908) (The Court specifically addressed the power of a state to prevent interstate water transfers. New Jersey had enacted a statute forbidding water transfers out of state – stating the need to preserve fresh water for the health and prosperity of its citizens. A water company contracted to divert water from Passaic River in New Jersey and deliver it to New York City. New Jersey obtained an injunction against the transfer, which was appealed to the U.S. Supreme Court. Justice Holmes held that: “[T]he constitutional power of the State to insist that its natural advantages shall remain unimpaired by its citizens is not dependent upon any nice estimate of the extent of present use . . . and what it has it may keep and give no one a reason for its will.”); *West v. Kan. Natural Gas Co.*, 221 U.S. 229, 258 (1911) (Oklahoma adopted a law prohibiting the interstate sale of gas produced within Oklahoma. The Court limited its decision in *Hudson County Water Co.*, holding that only the initial possession of natural resources may be restricted for conservation purposes under a state's police power. Once the resource is in private hands, prohibitions on transfer must be evaluated under the Commerce Clause. The Court must decide whether the law constitutes an undue burden on interstate commerce.); *Hughes v. Oklahoma*, 441 U.S. 322, 337 (1979) (State regulation of natural resources is not exempt from Commerce Clause scrutiny. Oklahoma required licenses for commercial enterprises that seine, transport or sell minnows, and by another statute precluded shipment of minnows for sale in another state. The Supreme Court (Brennan) repudiated *Geer v. Connecticut*, rejecting the theory of state ownership of natural resources, finding “[t]he fiction of state ownership may no longer be used to force those outside the State to bear the full costs of ‘conserving’ . . . when equally effective nondiscriminatory conservation measures are available.”).

80. See A. Dan Tarlock, *We Are All Water Lawyers Now: Water Law's Potential But Limited Impact on Urban Growth Management*, in *WET GROWTH: SHOULD WATER LAW CONTROL LAND USE?* 92 (Craig Anthony Arnold ed., 2005) (“A few states with serious overdrafts have imposed substantial limitations on new groundwater use, but the dormant Commerce Clause may prevent the use of these regimes to limit urban growth. *Sporhase v.*

Rehnquist and O'Connor argued that water is not an article in commerce.⁸¹

In 1982, when the Supreme Court heard the *Sporhase* case, seventeen states and the District of Columbia had statutes limiting out-of-state transfers of water, either partially or completely: (1) absolute prohibition – Colorado, Idaho, Nevada, New Mexico; (2) discretionary approval power in state legislature or administrative officer – Arizona, Montana, Wyoming, Oregon, Oklahoma, Nebraska; (3) reciprocity – Kansas, South Dakota, Utah, Washington, Nebraska; and (4) no prohibition – California, North Dakota, Texas.⁸² At present, most western states have export statutes, fashioned primarily to satisfy the *Sporhase* test.⁸³ Each statute contains means by which the exporting state can determine, as a prerequisite to permitting the interstate transfer, whether a state can serve its intrastate water needs while making the transfer.⁸⁴

The *Sporhase* case raises the fundamental question of whether water is an economic good,⁸⁵ the value of which should be given freedom to

Nebraska ex rel Douglas holds that state water laws are subject to the dormant Commerce Clause because water is an article of commerce. *Sporhase* constrains state restrictions on interstate transfers and its impact on intrastate transfers is largely untested.” (citations omitted). See also Richard S. Harnsberger, Josephine R. Potuto & Norman W. Thorson, *Interstate Transfers of Water: State Options after Sporhase*, 70 NEB. L. REV. 754, 759 (1991), characterizing the Supreme Court's opinion in *Sporhase* as an “overview of governing federal constitutional constraints on state water law and policy.” The article explores ways that a state may act consistent with those federal constraints and describes the potential benefits and burdens of particular policy options. The article contends that the holding in *Sporhase* is narrow – addressing only reciprocity, that the holding applies both to ground water and surface water, that no constitutional obstacles prevent Congress from exercising exclusive control over ground water management, and that the *Bruce Church* test allows a state to prefer its own citizens in times of severe water shortage, assuming that the state establishes a close ends-means relationship.

81. *Sporhase*, 458 U.S. at 961 (Rehnquist, J., dissenting).

82. *Harnsberger*, *supra* note 80, at 817.

83. See ARIZ. REV. STAT. ANN. §§ 45-291 to 45-294 (2008); COLO. REV. STAT. §§ 37-81-101 to 37-81-104 (2008); IDAHO CODE ANN. § 42-401 (2008); KAN. STAT. ANN. §§ 82a-726, 82a-1502 to 82a-1504 (2006); MONT. CODE ANN. §§ 85-2-311, 85-2-316 (2008); NEB. REV. STAT. § 46-613.01 (2007); NEV. REV. STAT. ANN. §§ 533.515 to 533.524 (LexisNexis 2007); N.M. STAT. ANN. § 72-12B-1 (West 2008); OKLA. STAT. tit. 82, § 82-1B (2008); OR. REV. STAT. §§ 537.810 to 537.870 (2007); S.D. CODIFIED LAWS § 46-1-13 (2008); UTAH CODE ANN. § 73-3a-108 (2008); WASH. REV. CODE ANN. § 90.03.300 (LexisNexis 2008); WYO. STAT. ANN. § 41-3-115 (2008).

84. In addition to the statutes listed *supra* note 83, for a general discussion, see *City of El Paso v. Reynolds*, 597 F. Supp. 694 (D. N.M. 1984); *City of El Paso v. Reynolds*, 563 F. Supp. 379 (D. N.M. 1983).

85. See CARL J. BAUER, SIREN SONG: CHILEAN WATER LAW AS A MODEL FOR INTERNATIONAL REFORM 10 (Resources for the Future, 2004). The Dublin Principles, adopted by the International Conference on Water and Environment, Dublin, 1992 – a precursor event to the Earth Summit in Rio de Janeiro, 1992 – recognized among other things that “[w]ater has an economic value in all its competing uses and should

find its greatest utility.⁸⁶ Water is essential to human sustenance, public health, and food production. It works and produces energy. Its aesthetic and recreational value is now more greatly recognized. Water's role in society was not, obviously, a matter upon which the Supreme Court's members could agree in 1982⁸⁷ and probably is not a matter upon which its current members could now agree.

The question whether states technically "own" water resources or merely have constitutionally reserved rights to regulate them is essentially academic. There is a clear state interest in ground water preservation and use—an interest that states will need to utilize collectively in the case of interstate groundwater bodies. In *Sporhase*, the Court could not use its equitable apportionment thinking, balancing harms and benefits so as to apportion the resource, because the parties were not states.⁸⁸ Reliance on the Commerce Clause rationale was therefore required.⁸⁹ But, in the future, were state export statutes evaluated on the equitable apportionment rationale – that is, considering equity of benefit from the interstate water system, rather than the balance of commercial integration versus protection of a state's protection of the welfare of its citizens – those statutes might not stand.

be recognized as an economic good." Bauer observes: "The strongest market advocates argue that managing water as an economic good means treating water as a fully private and tradable commodity, subject to the rules and forces of the free market; from this perspective, the economic value of water is the same as its market price." *Id.* Bauer also notes:

"[t]he extreme opposing viewpoint considers access to water as a basic human right and sees market forces and prices as unacceptable or irrelevant. An intermediate position is that water should be recognized as a scarce resource, which means that the available supplies are insufficient to satisfy all demands and that trade-offs are therefore necessary in allocating water to different uses. These trade-offs, however, need not be made via private or unregulated markets."

86. Bauer explores the value of water as an "economic good" in an excellent comparative study of the several water codes adopted in Chile during the Twentieth Century. Bauer compares three generations of Chilean water law: Chile's first water code (1951); Chile's 1967 Amendment to its 1925 Constitution and consequent Agrarian and Water Reform laws; and Chile's third Water Code (1981). The three laws illustrate the normal Western U.S. states' type regulated-resource approach, a revolutionary distribution-of-wealth type approach, and a pure economic-good approach to water rights ownership and management. Bauer concludes that the first is best, albeit constantly in tension between social and economic objectives. See BAUER, *supra* note 85. See also, Matt Berkowitz, *Bottling the Water Bottlers: A Critique of Pennsylvania Groundwater Law*, 22 TEMP. ENVTL. L. & TECH. J. 235 (2004) (discussing the special problem of exportation of groundwater as an economic good).

87. See *Sporhase*, 458 U.S. 941 (1982).

88. *Id.*

89. *Id.*

IV. INTERSTATE GROUND WATER: A COMPLEX RESOURCE

The geologic history of the present North American continent includes an era of the presence of great surface water bodies which are now overlain by newer geologic materials. These geologic materials – sediments⁹⁰ or volcanic basalts, tuffs or ice- and water-relocated granitics⁹¹ – have captured now-deep water bodies that are large in area and extend under modern U.S. political boundaries.⁹² Likewise, more surficial, alluvial ground water, resulting from the contribution of modern-era (even current annual) precipitation through rain and snow, lies and moves in the porous and transmissive sands, gravels, tills and loams of the modern geologic surface, often under the hydrologic influence of surface water rivers. Like the larger deep connate or fossil aquifers, these higher elevation aquifers also do not respect U.S. political boundaries. Unlike interstate surface water systems, there has been little to no effort in defining a legal approach to the problem of apportioning underground hydrologic systems between the political subdivisions of the American political system – namely, the states.⁹³ According to the Cambridge Encyclopedia of Earth Sciences:

The world water cycle constitutes a transfer of water between reservoirs. The largest store of water is the oceans which contain 97.6 per cent of all water. Of the remainder, the atmosphere contains, at any one time, around 0.035 percent as vapor. On the land at the present day three-quarters of all non-ocean water occurs as ice in glaciers and ice caps, and almost a quarter consists of groundwater, stored in the voids of rocks beneath the surface. Moisture in the soil accounts for 0.06 percent while lakes and rivers contain only 0.33 percent of all non-ocean water. Nevertheless it is in the lakes and rivers that water is actually moving fastest, for it is through them that almost the entire terrestrial water cycle is funneled back to the sea. The relative rapidity of flow processes in the various stores may be seen by comparing their mean residence times, found by dividing their volume by their net throughput. The water cycle is the most vigorous at the Earth's surface, with residence times all much less than one year, whereas

90. "Connate water" is water that was entrapped within sediments when they were deposited. Such water typically does not ultimately supply surface flow. Connate water is usually very deep and has not traditionally been considered as available as a contribution to available groundwater supply.

91. "Fossil water" is water that is very deep, often found in aquifers within bedrock material.

92. See Figure 1, Principle Aquifers of the United States

93. In 1995, "nearly 60 percent of all groundwater used in the United States is pumped in just eight states - in the order of volume pumped within the state, California, Texas, Nebraska, Arkansas, Florida, Kansas, Arizona and Idaho." DELLAPENNA, *supra* note 1, at 18-2 (citing U.S.G.S. Circular no. 1200 (1998)). Groundwater withdrawal then was just under 20 percent of the total amount of water withdrawn in the United States. *Id.*

residence times in groundwaters are from a few years to thousands of years, averaging at a few hundred. The oceans and glaciers have residence times of thousands of years.⁹⁴

Generally speaking, groundwater bodies are heterogeneous.⁹⁵ They may be composed of varying or intersticed geologic matter.⁹⁶ Waters within those geologic masses move pursuant to hydraulic principles, albeit slowly compared to surface waters.⁹⁷

The movement of water within an aquifer is downhill hydraulically from where the water level in the aquifer is high to where the level is lower, but pressure and friction cause it to move slowly, without the turbulence marking surface flows.

... The velocity with which groundwater moves in any given direction will be determined by permeability, hydraulic conductivity, porosity, and the hydraulic gradient.⁹⁸

One aquifer may be hydraulically connected to another, either vertically or horizontally, with the pace of ground water affected by the geologic composition of intervening masses.

[F]ormations with the greatest head potential will lose water to those with lesser head potential. Natural gradients also may allow water to migrate from one formation to another in inter-aquifer exchange. Intervening aquitards slow the movement relative to some direct exchanges, but they do not stop it.⁹⁹

In some instances, there is a hydrologic connection between ground water and surface water,¹⁰⁰ one being "tributary"¹⁰¹ to the other.

94. THE CAMBRIDGE ENCYCLOPEDIA OF EARTH SCIENCES 291 (David G. Smith ed., Cambridge Univ. Press 1981).

95. "While the movement of water through homogeneous aquifers is understood, movement through non-homogeneous aquifers is not understood. The precise constitution, location, and extent of non-homogeneous aquifers are expensive and time-consuming to determine, if they can be determined at all." DELLAPENNA, *supra* note 1, at 18-13.

96. *Id.* at 18-9.

97. *Id.*

98. *Id.* at 18-8. Note that the "downhill" to which Dellapenna refers may be up, i.e., toward the earth's surface. Ground water flows from areas of high pressure to areas of low pressure. This is called the "hydraulic gradient." The terms "permeability" and "hydraulic conductivity" are sometimes used interchangeably.

99. *Id.* at 18-11. "Porosity is the fraction of a rock's bulk volume which is made up of voids. In general, clastic rocks are porous, especially if poorly cemented, while crystalline rocks have low porosity. Porosity is usually greatly decreased by diagenesis of sedimentary rocks but is increased by weathering." Smith, *supra* note 94, at 293.

100. See, e.g., D.E. Rice v. Harken Exploration Co., 250 F.3d 264, 270 (5th Cir. 2001); *In re General Adjudication of All Rights To Use Water In Gila River System And Source*, 9 P.3d 1069, 1073-74, 1083 (Ariz. 2000) (holding "subflow" can be regulated as

The hydraulic gradient or slope of the water in confined or unconfined aquifers slowly but massively provides volume to surface streams, in some seasons all of a stream's flow. Permeability as well as hydraulic gradient plays a significant role in this process. All groundwater in motion, and other than connate water "entrapped within sediments when they are deposited," ultimately will supply some stream.¹⁰²

Where ground waters supply streams, they are sometimes called "gaining streams."¹⁰³ Streams that supply ground waters are called "losing streams" or "losing reaches."¹⁰⁴ Ground water can be recharged from the unsaturated zone from precipitation, from losing streams or other surface waters, or from other ground water in adjacent aquifers.

When the upper boundary of the groundwater body in an aquifer is the water table, the aquifer is said to be unconfined. The ground water is fed by recharge from the unsaturated zone. In some cases an aquifer is overlain by an aquiclude and the water in it is under greater than atmospheric pressure. The aquifer is then confined. Water will rise up a borehole drilled into it until it reaches a level that defines the hydraulic head in the aquifer.¹⁰⁵

During floods or other occasions of supersaturation, surface water can have a higher potential than groundwater, thus reversing the normal relationship and directly charging the aquifer, wiping out the baffling power of the unsaturated zone.¹⁰⁶

surface water although it is not flowing at the surface and no unconstitutional taking occurs from its regulation); *Chatfield E. Well Co. v. Chatfield E. Prop. Owners Ass'n*, 956 P.2d 1260, 1267-68 (Colo. 1998); *Baumler v. Town of Newstead*, 668 N.Y.S.2d 814 (N.Y. App. Div. 1998); *Retkowski v. Dep't of Ecology*, 858 P.2d 232, 233-34 (Wash. 1993).

101. See J. David Aiken, *The Western Common Law of Tributary Groundwater: Implications for Nebraska*, 83 NEB. L. REV. 541, 542 (2004); Robert Jerome Glennon & Thomas Maddock, III, *The Concept of Capture: The Hydrology and Law of Stream/Aquifer Interaction*, 43 ROCKY MTN. MIN. L. INST. 22-1, 22-8 (1997); Robert Jerome Glennon & Thomas Maddock, III, *In Search of Subflow: Arizona's Futile Effort to Separate Groundwater from Surface Water*, 36 ARIZ. L. REV. 567 (1994).

102. DELLAPENNA, *supra* note 1, at 18-11 (citation omitted).

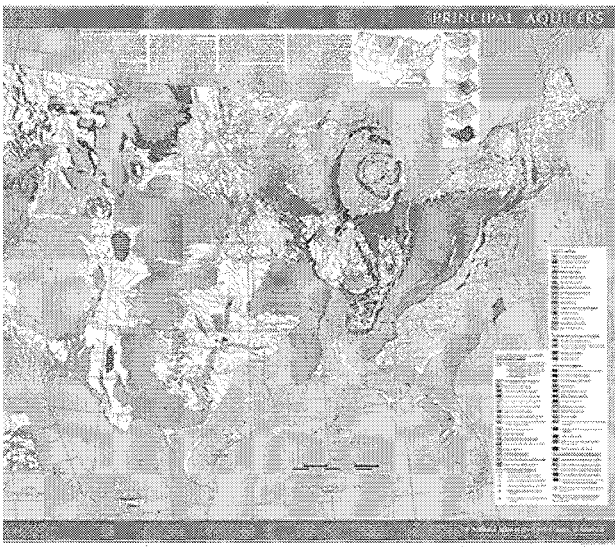
103. See Groundwater Glossary: The Groundwater Foundation, <http://www.groundwater.org/gi/gwglossary.html#G> ("Gaining stream: A stream in which groundwater discharges contribute significantly to the streamflow volume. The same stream could be both a gaining stream and a losing stream, depending on the conditions.").

104. *Id.* Losing reaches sometimes occur as a result of significant groundwater pumping in the vicinity of an otherwise gaining stream.

105. Smith, *supra* note 94, at 293.

106. DELLAPENNA, *supra* note 1, at 18-12.

ates Geological Survey has mapped principal aquifers
es (Figure 1).¹⁰⁷ The map reveals that the nation's
do not respect state boundaries.



Principal Aquifers of the United States

posed four case models to illustrate the trans-
s arising from shared groundwater resources' interac-
water.¹⁰⁸ Although the four cases anticipate applica-
tional boundary context, they are no less relevant in
nestic interstate groundwater basins. Eckstein refined
l Barberis' models when describing his six model

aquifers of the 48 Conterminous United States, Hawaii, Puerto
Virgin Islands, <http://nationalatlas.gov/mld/aquifrp.html> (last

is, *The Development of International Law of Transboundary Groundwa-*
167-169 (1991). The four model systems (1) ...

V. ATTRIBUTES OF GROUNDWATER RIGHTS UNDER VARIOUS STATES' LAWS: CONFLICT OR INTEGRATION?

Constructive conversation about apportionment or management of interstate groundwater resources will be more difficult where conflict exists between the governmental or proprietary law related to ground water of two or more states. Which state's law should apply? With surface water, the general appropriative/riparian distinction, applicable generally on a west/east axis, suggests that at least the same general jurisprudence will prevail throughout a region of states where an interstate water body may lie or flow. However, with ground water, adjacent states' law is more likely to vary.

Dellapenna notes "the states have not opted for a single legal rule to regulate groundwater."¹¹⁰ Glennon posits that "groundwater law has more variety between and among western states than does surface water law."¹¹¹ Although this is perhaps an apt generalization, an analysis of western states' laws regarding shared groundwater bodies suggests that those laws may, in fact, be more similar than different in particular cases.

Definition of the attributes of a water right, whether a right to surface or ground water, depends upon the origin of the right, whether from state statute or common law, federal statute, or contract. Dellapenna describes five potential legal doctrines for ground water in the

sected by an international border and hydraulically linked to a river that is also intersected by the same international border; (3) an unconfined aquifer that flows across an international border and that is linked hydraulically to a river flowing completely within one state's territory; (4) an unconfined aquifer that is completely within the territory of one state but that is linked hydraulically to a river that flows across an international border (the aquifer is always located in the downstream state.); (5) a confined aquifer, unconnected hydraulically with any surface water body, with a zone of recharge (perhaps in an unconfined portion of the aquifer) that traverses an international border or that is located completely in another state; and (6) an aquifer unrelated to any other body of water (e.g., a stream or lake) that is disconnected from the hydrologic cycle.

In the last model case, the aquifer does not recharge, contains non-renewable ground water, and a state could never sustainably utilize it. Such aquifers contain ancient waters and may be confined or unconfined as well as fossil or connate. If the aquifer is unconfined, a lack of recharge generally implies that it is located in an arid zone where annual precipitation is inconsequentially small. Moreover, as there is neither a distinct recharge or discharge zone, the ground water table in this type of aquifer is horizontal and the water is stagnant with little or no perceptible flow. The transboundary consequences associated with aquifers that do not recharge are almost exclusively a function of pumping the aquifer in one or more of the riparian states. When a state commences production of ground water from a water well penetrating such an aquifer, the state will generate an ever-expanding cone of depression that will eventually encroach in the subsurface across the international border.

110. DELLAPENNA, *supra* note 1, at §18.06.

111. Jedidiah Brewer et al., *Transferring Water in the American West: 1987-2005*, 40 U. MICH. J.L. REFORM 1021, 1027 (2006) (citation omitted).

United States, with variations and modifications, excluding rights based on prescriptive use and the federally-created rights: (1) the absolute dominion rule; (2) the reasonable use rule; (3) the correlative rights rule; (4) the regulated riparian system; and (5) the appropriative rights system.¹¹²

Under the absolute dominion rule, a landowner may withdraw ground water from an aquifer under his land for any purpose and use, be it on or off the land.¹¹³ Under the reasonable use rule, one may use ground water reasonably upon the land from beneath which it was withdrawn, but cannot be spread to use on other land, thus limiting the property rights in the aquifer to the overlying owners.¹¹⁴ The reasonable use rule does not require the institution of an administrative process.¹¹⁵ Under the correlative rights rule, landowners hold proportionate proprietary shares in the aquifer, depending upon their proportionate share of the overlying property.¹¹⁶ Like the reasonable use rule, the correlative rights rule does not require the institution of an administrative process. Under a regulated riparian system, permits to withdraw water for reasonable use must be obtained from a state permitting entity.¹¹⁷ Under an appropriative rights system, rights may have been established prior to enactment of permitting statutes, by acclaim and diversion.¹¹⁸ Modernly, anyone can establish appropriative rights

112. DELLAPENNA, *supra* note 1, at 19-18.

113. *Id.* at 19-20. The absolute dominion rule is also referred to as the "English Rule," as that is its origin. First stated in *Acton v. Blundell*, 152 Eng. Rep. 1223 (Ex. Cham. 1843), the rule provides that, absent malice or willful waste, a landowner has the right to take all the groundwater he can capture from under his land, and do with it as he pleases, and will not be liable to neighboring landowners even if in doing so he deprives his neighbor of the use of the water. The English Rule is actually a rule of tort law, rather than a rule of property law. The absolute dominion rule is also called the "rule of capture" as it permits a landowner to capture the ground water beneath the land without limitation other than through the protection of other landowners through tort law.

114. *Id.* at 22-19 to 22-21. The reasonable use rule is also sometimes referred to as the "American Rule," distinguishing it from the "English Rule." *Id.* at 22-12. Originally applicable to surface water, eastern American states adopting the reasonable use rule have extended it to ground water. With respect to surface water, the reasonable use rule provides that a landowner is "entitled to take only [those actions] as are reasonable, in light of all the circumstances of relative advantage to the actor and the disadvantage to the adjoining landowners, as well as social utility." *Ridge Line, Inc. v. United States*, 346 F.3d 1346, 1357 (Fed. Cir. 2003) (citing *Page Motor Co. v. Baker*, 438 A.2d 739, 741 (Conn. 1980). See also *Bassett v. Salisbury Mfg. Co.*, 43 N.H. 569, 577 (N.H. 1862).

115. See Henry E. Smith, *Governing Water: The Semicommons of Fluid Property Rights*, 50 ARIZ. L. REV. 445, 472-74 (2008).

116. DELLAPENNA, *supra* note 1, at 21-12 to 21-3.

117. *Id.* at 23-23.

118. Smith, *supra* note 94, at 467.

to withdraw water, notwithstanding their ownership of land, so long as they obtain a state permit.¹¹⁹

A survey of state statutes regulating groundwater rights reveals that there is a relatively consistent body of law throughout the states regarding groundwater rights, notwithstanding the commonly held view that the states' laws are diverse (Table 1).

Table 1¹²⁰

State	Groundwater Legal System	Statutory References	Surface Water System	Statutory References
Alabama	Regulated Riparian	ALA. CODE §§ 9-10B-1 to -30	Regulated Riparian	ALA. CODE §§ 9-10B-1 to -30
Alaska	Appropriative Rights	ALASKA STAT. § 46.15.040	Appropriative Rights	ALASKA STAT. §§ 46.15.010 to -.270
Arizona	Absolute Dominion Rule generally; Regulated Reasonable Use System in Active Management Areas	ARIZ. REV. STAT. § 45-103 ¹²¹	Appropriative Rights System	ARIZ. REV. STAT. § 45-103

119. DELLAPENNA, *supra* note 1, at 19-4.

120. ALYSON GOULD, NATIONAL CONFERENCE OF STATE LEGISLATURES, FIFTY STATE COMPARISON OF WATER WITHDRAWAL REGULATIONS (2009), <http://www.ncsl.org/>.

121. Willardson, Tony, "Ground Water Management in the West," Western States' Water Council (2004), unpublished manuscript, in possession of author. Brewer, et al., *supra* note 111.

State	Groundwater Legal System	Statutory References	Surface Water System	Statutory References
Arkansas	Regulated Riparian	ARK. CODE §§ 15-22-201 to 1313	Regulated Riparian	ARK. CODE §§ 15-22-205 to -223
California ¹²²	Reasonable use. ¹²³ "Overlying Rights"—correlative. ¹²⁴ Nonoverlying users ("appropriators") can pump surplus water for export from the basin or for nonoverlying uses. Where no surplus, right of the appropriator must yield to overlying owner.	No state ground water management in California. ¹²⁵	Regulated Riparian paramount. Appropriative Rights System (includes surface water and "subterranean streams flowing through known and definite channels")	CAL. CONST. ART. 10, §2; CAL. WATER CODE, § 1200

122. See David R.E. Aladjem, *California's Other "Dual System: Coordinated Management of Groundwater and Surface Water*, 49 ROCKY MTN. MIN. L. INST. §§ 7C.01—7 7C.03 (2003).

123. CAL. CONST. art. 10, § 2.

124. See *City of Barstow v. Mojave Water Agency*, 75 Cal. Rptr. 2d 477, 740 (1998) (stating that each owner "has a common right to take all that he can beneficially use on his land if the quantity is sufficient; if the quantity is insufficient, each is limited to his proportionate fair share of the total amount available based on his reasonable need."). See also Anne J. Schneider, *Evolving Federalism in Water Law and Policy*, at the A.B.A. Section of Environmental, Energy, and Resources 17th Annual Water Law Conference (1999).

State	Groundwater Legal System	Statutory References	Surface Water System	Statutory References
Colorado ¹²⁶	Appropriative Rights System (ground water not tributary to surface water). ¹²⁷	COLO. REV. STAT. § 37-82-101	Appropriative Rights System (includes tributary ground water)	COLO. REV. STAT. § 37-82-101
Connecticut	Regulated Riparian	CONN. GEN. STAT. §§ 22a-365 to -378	Regulated Riparian	CONN. GEN. STAT. §§ 22a-365 to -380
Delaware	Regulated Riparian	DEL. CODE ANN tit. 7, § 60, Environmental Control (scattered sections)	Regulated Riparian	DEL. CODE ANN. tit. 7, §§ 6003 to 6013
Florida	Regulated Riparian	FLA. STAT. ANN. §§ 373.013 - .71	Regulated Riparian	FLA. STAT. ANN. §§ 373.403 - .468
Georgia	Regulated Riparian	GA. CODE ANN. §§ 12-5-1 to -193	Regulated Riparian	GA. CODE ANN. §§ 12-5-20 to -53
Hawaii	Regulated Riparian	HAW. REV. STAT. §§ 174C-1 to -68	Regulated Riparian	HAW. REV. STAT. §§ 174C-1 to -95
Idaho	Appropriative Rights System ¹²⁸	IDAHO CODE ANN. § 42-202	Appropriative Rights System	IDAHO CODE ANN. § 42-202

125. See CAL. WATER CODE § 1200 (2008). See also SCOTT S. SLATER, CALIFORNIA WATER LAW AND POLICY § 11 (2007) (discussing state groundwater issues in California).

126. See COLO. CONST. art. XVI, §§ 5, 6. See also D. Monte Pascoe, *Plans and Studies: The Recent Quest for Utopia in the Utilization of Colorado's Water Resources*, 55 U. COLO. L. REV. 391, 395-5, 414 (1984); James J. Petrock, *Use of Colorado Water Rights In Secured Transactions* 18 COLO. LAW. 2307, 2309 (1989); Joseph L. Sax, *The Constitution, Property Rights and the Future of Water Law*, 61 U. COLO. L. REV. 257, 268 (1990); Note, *Nontributary, Nondesignated Ground Water: The Huston Decision*, 56 U. COLO. L. REV. 135, 136 (1984); Note, *Principles & Law of Colorado's Nontributary Ground Water*, 62 DEN. U. L. REV. 809, 811 (1985).

127. See Ramsey L. Kropf, *Colorado Groundwater Law: Colorado's System-Integration (or Not?) of Groundwater and Surface Water*, 49 ROCKY MTN. MIN. L. INST. §§ 7B.01, 7B.02 (2003); Hal D. Simpson, *Conjunctive Use of Surface and Ground Water in the Arkansas River Basin, Colorado*, at the A.B.A. Section of Environmental, Energy, and Resources 15th Annual Water Law Conference (1997).

128. See Karl J. Dreher, *Groundwater and Conjunctive Use in Drought Management, the Crisis on the Eastern Snake River Plain*, at the A.B.A. Section of Environmental, Energy, and Resources 23rd Annual Water Law Conference (2005).

State	Groundwater Legal System	Statutory References	Surface Water System	Statutory References
Illinois	Regulated Riparian	525 ILL. COMP. STAT. 45/1 - 45/7	Regulated Riparian	615 ILL. COMP. STAT. 50/1
Indiana	Regulated Riparian	IND. CODE §§ 14-25-1-1 to 15-13	Regulated Riparian	IND. Code §§ 14-25-1 to -2, -5
Iowa	Regulated Riparian	IOWA CODE § 455B.261 - .281	Regulated Riparian	IOWA CODE §§ 455B.261 - 279
Kansas	Appropriative Rights System	KAN. STAT. ANN. §§ 82a-705, 82a-1021 to -1039	Appropriative Rights System	KAN. STAT. ANN. §82a-705
Kentucky	Regulated Riparian	KY. REV. STAT. ANN. §§ 151.100 to -.210; §151.990	Regulated Riparian	KY. REV. STAT. ANN. §§ 151.100 to -.990
Louisiana	Regulated Riparian	LA. REV. STAT. ANN. §§ 30:2072 to -2089	Riparian	None
Maine	Regulated Riparian	ME. REV. STAT. ANN. tit. 38 §§ 401 to - 404	Regulated Riparian	ME. REV. STAT. ANN. tit. 5, §3331-8
Maryland	Regulated Riparian	MD. CODE ANN., ENVIR. §§ 5-201 to -1302	Regulated Riparian	MD. CODE ANN., ENVIR. §§ 5-201 to -1302
Massachusetts	Regulated Riparian	MASS. GEN. LAWS ch. 21 §§ 8 to 25A	Regulated Riparian	MASS. GEN. LAWS ch. 21G, §§ 1-19
Michigan	Regulated Riparian	MICH. COMP. LAWS §§ 324.30101-.30113	Regulated Riparian	MICH. COMP. LAWS §§ 324.32101-3420
Minnesota	Regulated Riparian	MINN. STAT. §§ 103A.001 - 103I.715	Regulated Riparian	MINN. STAT. §§ 103A.001 - 103G.801
Mississippi	Regulated Riparian	MISS. CODE ANN. §§ 51-3-1 to -55	Regulated Riparian	MISS. CODE ANN. §§ 51-3-1 to -55

State	Groundwater Legal System	Statutory References	Surface Water System	Statutory References
Missouri	Regulated Riparian	MO. ANN. STAT. § 640.400 to -.435	Regulated Riparian	MO. ANN. STAT. §§ 640.400 to -.435
Montana	Appropriative Rights System ¹²⁹	MONT. CODE ANN. §§85-2-101 to -907	Appropriative Rights System	MONT. CODE ANN. §§85-2-101 to -907
Nebraska	Correlative Rights ¹³⁰ Reasonable Use, managed by Natural Resource Districts	NEB. REV. STAT. §§46-635 to -642 NEB. REV. STAT. §§46-700 to -740 No state management of ground water	Appropriative Rights System	NEB. REV. STAT. §46-226
Nevada	Appropriative Rights System	NEV. REV. STAT. §§532.010 – 534.360. State management of ground and surface water is integrated.	Appropriative Rights System	NEV. REV. STAT. §§532.010 – 534.360
New Hampshire	Regulated Riparian	N.H. REV. STAT. § 482:1 to -:93	Riparian	None
New Jersey	Regulated Riparian	N.J. STAT.-ANN. § 58:1A-1 to -58:26	Regulated Riparian	N.J. STAT.-ANN. §§ 58:1A-1 to -17
New Mexico	Appropriative Rights System	N.M. STAT. §§ 72-12-1 to -28	Appropriative Rights System	N.M. STAT. §§ 72-5-1 to -39
New York	Regulated Riparian	N.Y. ENVTL. CONSERV. LAW §15-0101 to -3111	Regulated Riparian	N.Y. ENVTL. CONSERV. LAW §15-0101 to -2901
North Carolina	Regulated Riparian	N.C. GEN. STAT. ANN. §§ 143-215.11 to -.22B	Regulated Riparian	N.C. GEN. STAT. ANN. §§ 143-215.11 to -.22L

129. See Laura S. Ziemer, Eloise Kendy & John Wilson, *Ground Water Management in Montana: On the Road from Beleaguered Law to Science-Based Policy*, 27 PUB. LAND & RESOURCES L. REV. 75, 79 (2006).

130. Willardson, *supra* note 121.

State	Groundwater Legal System	Statutory References	Surface Water System	Statutory References
North Dakota	Appropriative Rights System	N.D. CENT. CODE § 61-04-02	Appropriative Rights System	N.D. CENT. CODE § 61-04-02
Ohio	Regulated Riparian	OHIO REV. CODE ANN. §1521.16	Regulated Riparian	OHIO REV. CODE ANN. §§ 1521.01 to .99
Oklahoma	Appropriative Rights System	OKLA. STAT. tit. 82 § 1020.7	Appropriative Rights System	OKLA. STAT. tit. 82 § 105.9
Oregon	Appropriative Rights System	OR. REV. STAT. § 537.120	Appropriative Rights System	OR. REV. STAT. § 537.120
Pennsylvania	Regulated Riparian	62 PA. CONS. STAT. ANN. § 631 to 641	Regulated Riparian	27 PA. CONS. STAT. ANN. §§ 3101 – 3136
Rhode Island	Regulated Riparian	R.I. GEN. LAWS § 46.15.7-1	Regulated Riparian	R.I. GEN. LAWS §§ 46.15.7-1 to -3
South Carolina	Regulated Riparian	S.C. CODE ANN. §§ 49-1-10 to 49-5-150	Regulated Riparian	S.C. CODE ANN. §§ 49-4-10 – 80
South Dakota	Appropriative Rights System ¹³¹	S.D. CODIFIED § 46-6-3	Appropriative Rights System	S.D. CODIFIED § 46-5-10
Tennessee	Regulated Riparian	TENN. CODE ANN. §§ 69-1-101 to -117	Regulated Riparian	TENN. CODE ANN. §§ 69-7-301to -309
Texas	Absolute Dominion Rule ¹³²	TEXAS WATER CODE ANN. § 36-002	Appropriative Rights System	TEXAS WATER CODE ANN. § 22.022
Utah	Appropriative Rights System	UTAH CODE ANN. § 73-3-1	Appropriative Rights System	UTAH CODE ANN. § 73-3-1
Vermont	Regulated Riparian	VT. STAT. ANN. Tit. 10 § 1410	Riparian	VT. STAT. ANN. tit. 10 § 1031

131. "South Dakota water law is a mix of Prior Appropriation and Riparian Doctrines running from the West to East." Willardson, *supra* note 121, (quoting Garland Erbele, South Dakota State Engineer).

132. See Dylan O. Drummond, Lynn Ray Sherman & Edmond R. McCarthy Jr., *The Rule of Capture in Texas—Still So Misunderstood After All These Years*, 37 TEX. TECH L. REV. 1, 13-15 (2004).

State	Groundwater Legal System	Statutory References	Surface Water System	Statutory References
Virginia	Regulated Riparian	VA. CODE ANN. § 62.1-263	Regulated Riparian	VA. CODE ANN. § 62.1-44.2 to -34:28
Washington	Appropriative Rights System	WASH. REV. CODE § 90.03.010	Appropriative Rights System (Regulated Riparian are also recognized)	WASH. REV. CODE § 90.03.010
West Virginia	Regulated Riparian	W. VA. CODE ANN § 22-12-1 to -14	Regulated Riparian	W. VA. CODE ANN § 22-26-1 to -9
Wisconsin	Regulated Riparian	WISC. STAT. ANN. §281.11 to .37	Regulated Riparian	WIS. STAT. § 30.18
Wyoming	Appropriative Rights System	WYO. STAT. ANN. §41-3-905, 906	Appropriative Rights System	WYO. STAT. ANN. §41-3-101

With respect to governmental law, i.e., the extent, nature and means of governmental involvement in water rights, adjacent states may differ constitutionally concerning the public/private character of the ground water resource. One state's statutes may provide for more, or less, regulative involvement in the management of the resource than others. Comparing Figure 1 (USGS's map of principal aquifers) with Table 1, it appears that most adjacent states sharing principal aquifers have relatively similar groundwater legal regimes. There are exceptions, for example: California/Nevada, Arizona/New Mexico, Texas/New Mexico, Texas/Oklahoma and possibly Oregon/Washington. Where states authorize groundwater use permitting, the extent, nature, and even the process of regulation may differ. The concept of comity, which is the deference and respect states show for each other's laws, generally resolves conflicts in the exercise of sovereignty, particularly if being applied within the geographic limits of that state's jurisdiction.¹³³ In natural resource matters, comity is the frequent and common basis under which adjacent states assist each other with fighting forest fires, protecting or managing migrating game, or addressing water pollution in interstate streams.¹³⁴

133. *Bean v. Morris*, 221 U.S. 485, 486 (1911).

134. The latter, of course, is more modernly actuated by federal statutory requirements under the Clean Water Act, rather than through simple comity. *Milwaukee v. Illinois*, 451 U.S. 304, 317-18 (1981).

With respect to the proprietary law of water, conflict is not between sovereign rights, but rather between private rights, i.e., a dispute between competing claimants premising their claims on adjacent states' differing legal principles of ownership. In the case of interstate surface water, the U.S. Supreme Court's historic decision in *Wyoming v. Colorado* suggests that where the legal regimes for development of the water right are the same, the legal principles of both are applicable, i.e., deference to prior rights in the adjacent state.¹³⁵ Where true conflict is joined, for example, in a conflict between a permitted ground water retrieval state and an Absolute Dominion Rule state,¹³⁶ some principles of conflict of law resolution may need to be applied.¹³⁷

Whether the guiding paradigm of a state's groundwater law differs from its neighbors' is only part of the context within which interstate ground water apportionments may be accomplished. Their respective laws may differ as it relates to various particular issues. For example, there is potential for a conflict of law where there is a hydrologic connection between ground and surface water.¹³⁸ The case law in western states has not developed to the same extent regarding how the laws of those waters interact. Where ground-surface water connectivity exists, surface water law may control all or some of the groundwater rights, defining their attributes differently than if there was no hydrologic connection.¹³⁹ Holders of ground or surface water rights may have rights vis-à-vis each other, notwithstanding state regulatory interests

135. *Wyoming v. Colorado*, 259 U.S. 419, 471 (1922).

136. For example, New Mexico and Texas.

137. Conflict of law resolution principles include: (1) a provision in the law of the choice of law state that permits the court to use the *lex fori*, i.e. law of the forum state; (2) the "significant contacts test," which evaluates the contacts between the states and each party to the case, and applies the law of the state that has the most significant contacts with the litigation as a whole; (3) the "seat of the relationship test," which examines the relationship between the parties to the lawsuit, and applies the law of the state in which the relationship between the parties was most significant; (4) the "balance of interests test," which examines the interests of the states themselves, and the original purpose for the laws in question. Other alternatives include the "comparative impairment test," which examines which state's policies would suffer more if their law was not applied, or the "better rule test," which seeks to apply the empirically-better law, as between the competing states. However, state judicial application of choice of law rules is subject to the limitations of the U.S. Constitution's Full Faith and Credit Clause and Fourteenth Amendment. *Allstate Ins. Co. v. Hague*, 449 U.S. 302, 312-13 (1981) (both the Full Faith and Credit Clause and the Fourteenth Amendment are satisfied so long as there are sufficient aggregate contacts between the forum and the event giving rise to the cause of action).

138. See *supra* text accompanying note 100.

139. DELLAPENNA, *supra* note 139, at 18-4. "[In the early twentieth century, t]he idea that all water was tributary to some stream (or that streams were tributary to groundwater), if followed rigorously to its logical conclusion, would have made chaos of existing legal regimes."

over either.¹⁴⁰ Some recent decisions from western states have begun to recognize the legal implications of interconnected surface and groundwater systems.¹⁴¹ Storage of surface water underground in some states also raises additional questions.¹⁴² Various states' recognition of the significance of hydrologic connectivity makes it likely that there will be differing outcomes on this matter in adjacent states.

Conflict of law may exist regarding the degree to which a public interest encumbers a state-based water right. Depending on the state, a water right may be regarded as a pure property interest. More commonly, however, the right is regarded as infused with some sort of reserved public aspect. The declaration by some states that water is always ultimately owned by the state or "the public" infuses the right with an encumbrance of responsibility to use water wisely even after a citizen establishes a valid right to use the water. A constitutional declaration of public or state ownership limits the legislative or administrative transfer of public rights to individual property owners.¹⁴³ A judicially-developed "public trust doctrine"¹⁴⁴ or a "public interest" component lodged within a state's permitting statute¹⁴⁵ may do the same. Where a

140. See David J. Aiken, *Hydrologically-Connected Ground Water, Section 858, and the Spear T. Ranch Decision*, 84 NEB. L. REV. 962, 964 (2006) (discussing the Nebraska Supreme Court's adoption of the Restatement (Third) of Torts § 858 (2005), to resolve conflicts between surface water and groundwater rights).

141. DELLAPENNA, *supra* note 1, at 18-29 (citing *Kansas v. Colorado*, 533 U.S. 1 (2001); *City of Barstow v. Mojave Water Agency*, 5 P.3d 853 (Cal. 2000); *State ex rel Johnny Appleseed Metro. Park Dist. v. City of Delphos*, 750 N.E.2d 1158 (Ohio Ct. App. 2001); *Salt Lake City v. Silver Fork Pipeline Corp.*, 5 P.3d 1206 (Utah 2000); *Hubbard v. State*, 936 P.2d 27 (Wash. Ct. App. 1997)). See also Robert Glennon, *Pinching Straws: Reforming Groundwater and Surface Water Law to Protect the Environment*, 49 ROCKY MTN. MIN. L. INST. § 7A-1, 7A-4 (2003).

142. Peter J. Kiel & Gregory A. Thomas *Banking Groundwater in California: Who Owns the Aquifer Storage Space?*, 18 NAT. RESOURCES & ENV'T, Fall 2003, at 25.

143. See *supra* text accompanying notes 26-41.

144. *Nat'l Audubon Soc'y v. Superior Court*, 33 Cal. 3d 419, 446-47 (Cal. 1983). See also SCOTT S. SLATER, 1 CALIFORNIA WATER LAW AND POLICY §§ 12.02, 13.11 (2007). Slater contends that California's judicially-declared public trust doctrine does not pertain to California's percolating ground water, premised on the observation that such water "does not constitute a navigable waterway under any stretch of the imagination." *Id.* § 13.11. This conclusion seems inconsistent with Slater's reading of California Constitution, Art. X, Section 2, extending that article's reasonable use requirement to ground water. *Id.* § 12.02.

145. See, e.g. ALASKA STAT. § 46.15.080(a) (2008); ARIZ. REV. STAT. ANN § 45-153 (2008); CAL. WATER CODE §§ 105, 1253, 1255, 1257 (2008); IDAHO CODE ANN §§ 42-202B, 42-203A, 42-222 (2008); KAN. STAT. ANN. § 82a-711 (2007); MONT. CODE ANN. § 85-2-311(3); NEB. REV. STAT. §§ 46-204, 46-234, 46-289 (2008); NEV. REV. STAT. ANN. § 533.370 (2007); N.M. STAT. ANN. §§ 72-5-6, -7, 72-12-3(E) (2008); N.D. CENT. CODE § 61-04-06(4) (2008); OR. REV. STAT. §§ 536.410, 537.153, 537.170 (2008); S.D. CODIFIED LAWS § 46-2A-9 (2008); TEX. WATER CODE ANN. § 11.134(b) (2007); UTAH CODE ANN. § 73-3-8(4) (2008); WASH. REV. CODE § 90.03.290 (2008); WYO. STAT. ANN. § 41-3-931 (2008). Colorado does not have a public interest review requirement, and Oklahoma had one, but eliminated it in 1963. *But see* OKLA. STAT. ANN. tit. 82 §1085.2 (discussing

water right is regarded as a pure real property interest with no public encumbrance, the outcome could differ.¹⁴⁶

While it is common that state statutes pertaining to intrastate, interbasin transfers of water rights, or petitions to change the nature or place of use of existing water rights, apply essentially similar substantive standards to such transfers or changes, such statutory provisions are by no means uniform. Conflict of law problems may therefore exist in this area as well.

States' laws may differ as to the salvaged water doctrine. In California, for example, where a water user uses water more efficiently, the water user may market the salvaged water.¹⁴⁷ If state law does not protect salvaged water, in a prior appropriation state the water is typically regarded as abandoned and available for subordinate appropriators to use.¹⁴⁸

State laws may also differ with respect to the limitation of the amount of ground water that the state will permit or allow one to withdraw, based on an estimate of the water available for withdrawal. These protections are normally stated in terms of "safe"¹⁴⁹ or "sustained" yield.¹⁵⁰ The Oklahoma groundwater statute, for example, pro-

that the Water Resource Board shall develop plans to meet the needs of the people of Oklahoma).

146. *But see* Joseph L. Sax, *The Constitution, Property Rights and the Future of Water Law*, 61 U. COLO. L. REV. 257, 260 (1990) ("[W]ater rights have less protection than most other property rights for several reasons . . . (a) because their existence may intrude on a public common, they are subject to several original public prior claims, such as the navigational servitude and the public trust, and to laws protecting commons, such as water pollution laws; (b) their original definition, limited to beneficial and non-wasteful uses, imposes limits beyond those that constrain most property rights; (c) insofar as water rights (unlike most other property rights) are granted by permit, they are subject to constraints articulated in the permits.").

147. CAL. WATER CODE §§ 1201, 1244 (2008).

148. *See* Colo. Water Conservancy Dist. v. Shelton Farms, Inc., 529 P.2d 1321, 1325, 1327 (Colo. 1974). *See also* JOSEPH L. SAX ET AL., LEGAL CONTROL OF WATER RESOURCES 182-89 (4th ed. 2006) (examining salvage issues in prior appropriation cases).

149. *See, e.g.*, UTTON TRANSBOUNDARY RES. CTR. MODEL INTERSTATE WATER COMPACT, art. III § K (Jerome Muys, George W. Sherk & Marilyn C. O'Leary 2006), ("Safe Annual Yield: The amount of water that can be withdrawn annually from a surface or sub-surface water resource without serious water quality, net storage, environmental or social consequences.").

150. Marcus Moench, *Groundwater: The Challenge of Monitoring and Management, in THE WORLD'S WATER 2004-2005, THE BIENNIAL REPORT ON FRESHWATER RESOURCE* 79, 80 (Island Press 2004). ("Aquifer 'sustained yield' is defined as the amount of water than can be pumped from a given hydrological unit without depleting the stock of water in storage. When extraction exceeds recharge aquifers are generally described as suffering from overdraft or overextraction, the primary warning sign that management may be required."). Predictions regarding the amount of ground water that can be reproduced in annual cycles, which predictions are typically based on "recharge," precipitation, evapotranspiration, previous withdrawal, etc., are most appropriate where disconnected, unconfined, alluvial aquifers are involved. Where connate

vides for the determination of maximum annual yield of groundwater basins.¹⁵¹

A simple, purely hydrological definition of safe yield would allow the extraction of no more water annually than is recharged—naturally or artificially—annually. . . . If we are to allow the meaningful exploitation of water at all in arid regions, however, the concept of safe yield must allow for a greater rate of annual withdrawal than annual recharge.¹⁵²

South Dakota's water code prohibits use of ground water in amounts above average annual recharge.¹⁵³ North Dakota¹⁵⁴ and Montana¹⁵⁵ statutes authorize public officers to reserve water supplies for future use, thereby encumbering the current grant of permits for appropriation of ground or surface waters. In Kansas, the state legislature reserves to itself the right to establish a "minimum desirable streamflow for any watercourse" in the state, thereby limiting the chief engineer's approval of proposals to appropriate water from that watercourse.¹⁵⁶ Instream flow statutes have become more common, as in Oregon¹⁵⁷ and Nebraska.¹⁵⁸

In recent years, political subdivisions, frequently known as management districts, increasingly manage ground water, particularly where there has been legislative or administrative concern that ground water supplies may be insufficient for current and future needs or there is a threat of overuse. Arizona's groundwater code created "Active Management Areas" in the Santa Cruz, Prescott, Pinal, and Tucson regions, for the purpose of establishing safe-yield goals.¹⁵⁹ In Kansas, "Ground Water Management Districts" recommend rules for state implementation and have created "intensive ground water use control

or fossil aquifers are at issue, predicting the amount of water in storage is more difficult.

151. OKLA. STAT. tit. 82 § 1020.5 (2008), (In determining maximum yield of groundwater, the Water Resource Board shall consider "(1) . . . the total land area overlying the basin or subbasin; (2) the amount of water in storage in the basin or subbasin; (3) the rate of recharge to the basin or subbasin and total discharge from the basin or subbasin; (4) the transmissibility of the basin or subbasin; and (5) the possibility of pollution of the basin or subbasin from natural sources.").

152. DELLAPENNA, *supra* note 1, at 18-47.

153. S.D. CODIFIED LAWS § 46-6-3.1 (2008).

154. N.D. CENT. CODE § 61-04-31 (2007).

155. MONT. CODE ANN. § 85-2-316 (2007).

156. KAN. STAT. ANN. § 82a-703a (2006).

157. OR. REV. STAT. § 537.334 (2008). *See also* Janet Neuman, Anne Squier & Gail Achterman, *Sometimes a Great Notion: Oregon's Instream Flow Experiments*, 36 ENVTL. L. 1125, 1129-130 (2006).

158. NEB. REV. STAT. §§ 46-2,107 to -2,119 (2008).

159. Jack A. Vincent, *What Lies Beneath: The Inherent Dangers of the Central Arizona Groundwater Replenishment District*, 38 ARIZ. ST. L.J. 857, 862-63 (2006).

areas."¹⁶⁰ Montana utilizes "controlled ground water areas."¹⁶¹ In Nevada, the state integrates ground and surface water management by basin, typically defined by topographic contours.¹⁶² The state has designated 111 of these 256 basins and sub-basins for special management, with another ten basins having partial designation.¹⁶³ Texas utilizes local "ground water management areas" with limited powers to regulate ground water pumping.¹⁶⁴ Where such management districts are adjacent to state lines and overlapping common ground water bodies, conflict may exist between these organizations' objectives.

Conflict of law issues may also arise between the application of state and federal law, giving due respect for the Supremacy Clause of the U.S. Constitution. Although neither the Articles of Confederation of the original thirteen states nor the Constitution transfer the states' right and responsibility to control and manage natural resources to the federal government, Congress has more recently enacted statutes, premised primarily on the Interstate Commerce Clause, that affect both intrastate and interstate natural resources. With respect to interstate surface water bodies, those relating to waterborne commerce are generally consolidated under the rubric of "navigational servitude."¹⁶⁵ "Reserved" rights to natural resources, including ground water,¹⁶⁶ are implied from congressional action reserving federal land for specific uses from the more general multiple-use characteristics with which the federally-owned lands are endowed. More modern national environmental legislation, also apparently premised on the Commerce Clause, imposes an as yet ill-defined "environmental servitude" upon natural resources. According to Dellapenna:

160. See John C. Peck, *Groundwater Management in Kansas: A Brief History and Assessment*, 15 KAN. J.L. & PUB. POL'Y 441, 445, 455 (2006) (examining several types of Groundwater Management District regulations, including the creation of "intensive ground water use control areas").

161. MONT. CODE ANN. § 85-2-506 (2007).

162. Department of Conservation & Natural Resources: Division of Water Resources, Nevada State Water Plan, S. 4-1, -22, available at <http://water.nv.gov/WaterPlanning/wat-plan/pt1-cont.cfm>.

163. E-mail from Robert H. Zeisloft, P.E., Section Chief, Surface Water and Adjudication Sections, Nevada Division of Water Resources (October 14, 2008) (on file with The University of Denver Water Law Review). See generally <http://water.nv.gov/> (under "Mapping/GIS" tab, follow "Basin Boundary Map" hyperlink) (map lists Nevada's basins and subbasins and the designation of each).

164. TEX. WATER CODE ANN. § 35.004 (2007).

165. Gilbert L. Finnell, Jr., *Public Access to Coastal Public Property: Judicial Theories and the Taking Issue*, 67 N.C. L. REV. 627, 628 (1988).

166. See Robert T. Anderson, Professor of Law, Univ. of Wash. School of Law, *Indian Reserved Water Rights – Legal Overview*, at A.B.A. Section of Environment, Energy and Resources 20th Annual Water Law Conference, (Feb. 21-22, 2002) (citing cases where federal reserved rights apply to groundwater).

Congress has not adopted a preemptive federal statute, although Congress has acted to deal with saltwater intrusion, public drinking water sources, and certain groundwater polluting sources. [citing e.g., Coastal Zone Management Act of 1972, 16 U.S.C. §§ 1452,1454(h); Safe Drinking Water Act of 1974, 43 U.S.C. § 300.g-1; Resource Conservation and Recovery Act of 1976, 42 U.S.C. §§ 6901 to 6987; and Comprehensive Environmental Response, Compensation and Liability Act of 1980, 42 U.S.C. § 9601.] Congress, however, has left allocating water quantitatively generally to the states.¹⁶⁷

Notwithstanding these federal legal overlays, which are not insignificant, modern state legislatures and administrations continue to assume their right and responsibility to manage and control natural resources, including water. Federal assertion of the "navigational servitude" to ground water seems inappropriate, as ground water does not support waterborne commerce. It is generally agreed that the U.S. Supreme Court, in 1976, found that federal reserved rights apply to ground water in *Cappaert v. United States*.¹⁶⁸ The implication of the more general "environmental servitude" resulting from national environmental legislation affecting ground water is less clear. The basis and effect of that legislation, combined with the quantification and state-recognition of the water right thereby created, make the implication less precise, particularly given the reservation of state regulatory authority also contained in numerous federal water (i.e., Reclamation) statutes. The result is a cloudier, and often contentious, definition of the particular effect of the federal statutory overlay.

VI. ADMINISTRATION OF SHARED GROUNDWATER BASINS: LESS IS MORE

Divided administration is the status quo with respect to state administration of shared groundwater basins. And, so long as claims for

167. DELLAPENNA, *supra* note 1, at 19-18.

168. *Cappaert v. United States*, 426 U.S. 128, 143 (1976). *See also In re General Adjudication of All Rights to Use Water in the Gila River Sys. & Source (Gila III)*, 989 P.2d 739, 747 (Ariz. 1999), *cert. denied*, 530 U.S. 1250 (2000). *But see* Debbie Shosteck, *Beyond Reserved Rights: Tribal Control over Groundwater Resources in a Cold Winters Climate*, 28 COLUM. J. ENVTL. L. 325, 331, 338, 344, 361 (2003) ("Gingerly evading the issue of whether the *Winters* doctrine holds true for groundwater, the [U.S. Supreme] Court concluded that the water in Devil's Hole was actually surface water.") ("The Court's emphasis on state sovereignty, disinclination towards creating federal common law, and tendency to narrow the federal reserved rights doctrine, indicate that the groundwater issue would not fare well if the Court ultimately encounters it. Despite the strong reasoning enunciated by the Arizona Supreme Court and favorable precedent espoused in *Winters* and *Cappaert*, the Court will likely reject the idea of a reserved right to groundwater.") ("Assuming a court determines that tribes indeed maintain a preemptive right to oversee their own groundwater resources, it remains unclear how an aquifer underlying both reservation and state land would be managed according to a dual legal regime.").

the use of water do not approach total water available to be administered, divided administration works. When claims do exceed supply, however, two outcomes are predictable: a race to the finish or an agreement, either one potentially leading to equitable apportionment. Professor Abrams ultimately concluded, in 2002, that the security of a state's "umbrella" may not be all that good; rather that "secure" water rights may be later made less secure if equitable apportionment reallocates interstate water due to inefficient use.¹⁶⁹ Again, security isn't everything. The watershed management approach has somewhat revised the positive view of multi-state division (apportionment) of interstate surface water systems.¹⁷⁰ Another alternative is to approach the shared resource from the perspective of agreeing upon the management tasks accomplishable without dividing the resource. These lesser tasks, if accomplished, may in fact produce more results in terms of managing interstate groundwater resources than would reaching an agreement splitting those resources.

Marcus Moench recommended an approach exemplifying "less is more." His suggestion is to utilize "simple data" and "direct measures of groundwater conditions as a basis for groundwater systems management, particularly including data regarding groundwater levels and water quality, rather than mass balance recharge-extraction equations."¹⁷¹ Indeed these are the equations upon which water resource managers more typically rely.¹⁷² Moench recommends simplicity in the face of hydrogeologic complexity:

Quantifying the water balance within aquifers, for example, requires quantitative estimates of deep groundwater inflow from other aquifers, groundwater discharge to streams, evapotranspiration by plants, and a wide variety of other factors. These factors often vary from year to year and require extensive recording periods (and assumptions of stable climatic conditions) to develop stable quantitative estimates. In addition, evaluation is complicated where boundaries of aquifers cannot be clearly identified—a common situation. Without clear boundaries, it is often difficult to accurately evaluate either recharge or extraction.¹⁷³

169. Robert Haskell Abrams, *Interstate Water Allocation: A Contemporary Primer for Eastern States*, 25 U. ARK. LITTLE ROCK L. REV. 155, 168-69 (2002).

170. See Robert E. Beck, *The Regulated Riparian Model Water Code: Blueprint for Twenty First Century Water Management*, 25 WM. & MARY ENVTL. L. & POL'Y REV. 113, 145 (2000).

171. Moench, *supra* note 150, at 97.

172. *Id.* ("In the groundwater case, managers often cannot develop effective management and allocation systems because they rely on concepts of sustained yield but cannot generate the basic scientific and monitoring data required to translate such concepts into practical tools for management.").

173. *Id.* at 80.

Moench also suggests:

Managers should also use some other simple indicators. These can include key groundwater quality parameters and operational well characteristics. When combined with existing hydro-geological information, they can provide a foundation for monitoring groundwater conditions at all levels from local regions or aquifers to global assessments. Furthermore, because each of these indicators is a direct measure, the level of uncertainty inherent in the measure itself is much lower than with extraction and recharge estimates.¹⁷⁴

Moench's proposal, which is applicable to the basis for the approval of groundwater withdrawals, suggests an approach for interstate managerial structure as well: states should develop limited agreements between themselves premised on the known characteristics of groundwater systems, rather than on their unbounded unknowns.

Professor Leshy's suggestion that federal support for state managerial programs "earmarked solely to improve state water management - measurement, adjudication and administration of water rights"¹⁷⁵ is also helpful, as such support would facilitate development of the more precise data necessary to understand and manage interstate groundwater resources, supporting the development of limited managerial agreements. Professor Sax' suggestion of contractually created regulatory structures is also apt:

[B]etween pure localism and total centralization of authority there is a wide range of intermediate choices. Recent efforts to deal with regional water problems, as on the Platte River, the Rio Grande, the Colorado, and the Sacramento/San Joaquin, have spawned some rather novel sorts of collaborative entities, borne out of negotiation (and sometimes litigation). They bring local stakeholders together with state and federal officials, generating new forms of governance that are essentially created contractually, rather than through the political process. One interesting question . . . is whether we are seeing viable new institutional arrangements being fitted to the hydrological

174. *Id.* at 97-98.

175. John D. Leshy, Distinguished Professor of Law, University of California, Hastings College of Law, *The Federal Role in Water Management in the West: Time for New Thinking?*, at A.B.A. Section of Environment, Energy and Resources 21st Annual Water Law Conference (Feb. 20-21, 2003) ("The withdrawal of federal dollars for water infrastructure has itself placed more financial demands on the states. Federal environmental laws have made the state's management job more difficult. And the general stream adjudications have proved more difficult, lengthy and expensive to litigate than anyone thought possible.").

realities, and a genuine withering away of some of the old boundaries and the old politics.¹⁷⁶

Where interstate water supplies are involved, states must decide how they will live with their neighbors: through agreement and compromise, or through disagreement and litigation. Under the race paradigm, each state presumes that it can administer the entire resource, notwithstanding its neighbor. Under the agreement paradigm, the several states agree as to the maximum available extent of water in the groundwater resource, apportion that total between themselves, and thereafter agree (or disagree) how to administer the shared resource within those limits.¹⁷⁷ The first problem is, given the complexity of aquifers and that they cannot be observed, it is not easy to determine the amount of available ground water. The second problem is the difficulty for a state to acquiesce that its neighbor should have as large an apportionment as the neighboring state will want. Negotiation over these issues may deter a successful outcome, perhaps interminably, causing the agreement paradigm to revert to the race paradigm, and thus to equitable apportionment.

The course through agreement and compromise has traditionally been thought to be implemented exclusively through compact thus avoiding equitable apportionment and congressional intervention.¹⁷⁸ Interstate compacts, authorized and entered pursuant to the Compact Clause,¹⁷⁹ are unfortunately difficult to put in place, as they require the approval of state political bodies (legislatures) and become frozen instruments difficult to modify with changing circumstances once the states obtain Congressional imprimatur.¹⁸⁰

176. Joseph L. Sax, *Issues in the Watershed Management Movement*, Keynote Address at the A.B.A. Section on Environment, Energy and Resources 19th Annual Water Law Conference, (Feb 15, 2001).

177. See, e.g., Susan J. Buck, Gregory W. Gleason & Mitchel S. Jofuku, "The Institutional Imperative": *Resolving Transboundary Water Conflicts in Arid Agricultural Regions of the United States and the Commonwealth of Independent States*, 33 NAT. RESOURCES J. 595, 620-21 (1993).

178. See Muys et al., *supra* note 149, at art. III § M ("Subsurface water: All waters below the surface of the ground whether or not hydrologically connected to surface waters."). See generally Jerome C. Muys, Muys & Associates, P.C., Washington, D.C., *Beyond Allocation: Equitable Apportionment and Interstate Watershed Protection and Management*, at the A.B.A. Section of Environment, Energy and Resources 19th Annual Water Law Conference (Feb. 15-16, 2001) (explaining that equitable apportionment by judicial decision accomplishes the same thing as interstate compacts); Charles T. DuMars, Professor of Law, Univ. of N.M. School of Law, *Interjurisdictional Compacts as Tools for Watershed Management*, at the A.B.A. Section of Environment, Energy and Resources 19th Annual Water Law Conference (Feb. 15-16, 2001) (discussing cases where compacts were useful).

179. U.S. CONST. art. I, § 10, cl. 3.

180. Douglas L. Grant, *Interstate Water Allocation Compacts: When the Virtue of Permanence Becomes the Vice of Inflexibility*, 74 U. COLO. L. REV. 105, 150 (2003).

Negotiation compromise among states is still the best apportionment vehicle, but in many cases the product of negotiation – interstate compacts – merely postpones the exercise of original jurisdiction. A compact is usually negotiated as a substitute for a Supreme Court equitable apportionment. But, when it becomes necessary to litigate the meaning of a compact term or concept, a court will turn to the law of equitable apportionment to ascertain the intent of the drafters.¹⁸¹

Agreements between agencies or political subdivisions of states¹⁸² may be more flexible and more particularly designed to the situation presented by different reservoirs and different state-law conflict problems. The advantages of such an approach are clear, even though agreement may be difficult to reach. A primary advantage is that it permits leaving unresolved, for the time being or for some extended period, the thorny issue of allocation of the resource. Allocation of the resource is, of course, the primary political concern, but may not be the primary resource management concern. States could pursue management of the shared resource in both states' common interest without first accomplishing strict allocation. The problem, however, is to find a means to manage the resource while allowing a state to grant new authority to withdraw water from the shared resource, without encouraging another involved state to veto that grant.

181. A. Dan Tarlock, *The Law of Equitable Apportionment Revisited, Updated, and Re-stated*, 56 U. COLO. L. REV. 381, 410-11 (1985).

182. The question whether an association of governments in different states, be they the sovereign states themselves, or another entity like an agency or a political subdivision, constitutes a "compact" is not a question of who the parties are, but what the effect of the association is on the political power of Congress. The U.S. Supreme Court has pointed out that not all "compacts" or "agreements" invoke the Compact Clause of the U.S. Constitution, article I, section 10, clause 3. See *New Hampshire v. Maine*, 426 U.S. 363 (1976) (boundary first established by King George II; court explained that "[t]he application of the Compact Clause is limited to agreements that are directed to the formation of any combination tending to the increase of political power in the States, which may encroach upon or interfere with the just supremacy of the United States") (quoting from and relying upon *Virginia v. Tennessee*, 148 U.S. 503 (1893) (boundary established by charters of English sovereigns (James I, Charles II) by whom colonies of Virginia and North Carolina were formed)); ; *North Carolina v. Tennessee*, 235 U.S. 1 (1914) (boundary established by cession act of North Carolina Legislature and later marked out by Commissioners appointed by North and Carolina and Tennessee); *U.S. Steel Corp. v. Multistate Tax Comm'n*, 434 U.S. 452 (1977) (creation of interstate agency (Multistate Tax Commission) by seven states, later joined by 14 other states, did not violate Compact Clause). See also Jennifer Evans, *Trans-boundary Groundwater in New Mexico, Texas and Mexico: State and Local Legal Remedies to a Challenge Between Cities, States, and Nations*, 30 WM. & MARY ENVTL. L. & POL'Y REV. 471, 488-89, 503 (2006) ("A regional groundwater agreement can also survive an application of the foreign affairs exclusivity or dormant foreign affairs cases."). Thus, the modern attitude about multi-state (some say "regional") government is to permit its enhancement, not judicially preclude it. Only in those cases where states are trying to politically aggrandize themselves, at the expense of Congress, is judicial intervention against multi-state agreements likely to occur.

The best approach is one which is built upon the specific situation in which it finds itself.¹⁸³ The specific hydrologic characteristics of the groundwater resource may well dictate the better form of management structure, the relevant stakeholders, and the appropriate relationship between the states possessing sovereign interests in the resource.

What might more limited agreements address? Two Colorado River agreements suggest some possibilities. In 1973, the United States and Mexico executed Minute 242¹⁸⁴ to the 1944 U.S.-Mexico Water Treaty.¹⁸⁵ Minute 242 established a salinity standard comparing water quality at Morelos Dam with water quality at Imperial Dam, authorized the Wellton-Mohawk Bypass Drain, and limited groundwater pumping within 5 miles of the international boundary.¹⁸⁶ The agreement's limited scope permitted its accomplishment. States might fashion a similar agreement establishing ground water chemistry characteristics at specific monitoring wells and prescribing changed use behaviors that might be required in the event of change of those characteristics.

The Secretary of the Interior has now adopted Interim Guidelines for the Operation of Lake Powell and Lake Mead.¹⁸⁷ The guidelines are premised on an agreement and proposal between Colorado River Basin states that share the river's resource values.¹⁸⁸ One of the reasons for success of that interstate agreement was a willingness on the part of the participants to limit the scope, both in breadth and time, of the matters necessary to be agreed upon. The states set aside other matters, for the time being, , including differences in interpretation of seminal legal questions.¹⁸⁹ Consistent with this limitation approach, states might strike agreements regarding solution of conflict of law problems; agreements regarding the collection of data and well monitoring; agreements limiting extraction to given volumes in respective

183. See Evans, *supra* note 182, at 479 ("A case-by-case approach that entails basin-oriented agreements is often advocated by scholars." (citation omitted)).

184. Agreement confirming Minute no. 242 of the International Boundary and Water Commission, U.S.- Mex., Aug. 30, 1973, 24 U.S.T. 1968 (setting forth a permanent and definitive solution to the international problem of the salinity of the Colorado River) (recognized and implemented by the Colorado River Basin Salinity Control Act, June 24, 1974, 88 Stat. 266).

185. U.S.-Mexico Water Treaty, Feb. 3, 1944, 59 Stat. 1219 (respecting utilization of waters of the Colorado and Tijuana Rivers and the Rio Grande).

186. International Boundary and Water Commission, *Minute 242: Permanent and Definitive Solution to the International Problem of the Salinity of the Colorado River*, Aug. 30, 1973, available at <http://www.usbr.gov/lc/region/pao/pdfiles/min242.pdf>.

187. Bureau of Reclamation, *Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lakes Powell and Mead*, (2005), available at <http://www.usbr.gov/lc/region/programs/strategies.html>.

188. See James H. Davenport, *Softening the Divides: The Seven Colorado River Basin States' Recommendation to the Secretary of the Interior Regarding Lower Basin Shortage Guidelines and the Operation of Lakes Mead and Powell in Low Reservoir Conditions*, 10 U. DENV. WATER L. REV. 287, 290, 292-93 (2007).

189. *Id.* at 293-94.

states; agreements establishing recognized monitoring wells and management choices given preset water level elevations; agreements requiring conservation activity of existing or future water users; agreements requiring groundwater extraction or use measurement systems; agreements establishing ground water chemistry characterization and monitoring for change; or other less encompassing details.

States may also consider shared administration of interstate groundwater basins.¹⁹⁰ First, shared administration addresses the principal shared water problem – race to consumption. Second, shared administration comports with developing concerns regarding sustainability, regional formats of growth management, and wet growth philosophy.¹⁹¹ Shared management is more likely sized to the regional scale of potential drought. It establishes a better framework upon which to organize data from a region regarding an underground source's geology, hydrologic characteristics, and water level. The U.S. Supreme Court has recognized interstate organizations designed to address regional problems since 1977.¹⁹²

States should exercise caution to not to bite off more than they can chew. States should limit agreements regulating resources in their duration, so that the agreements can accommodate new politics, new science, or new knowledge about the resource. It is better to tackle reasonably-sized problems, although in the context of groundwater resources this may be difficult given their size and relatively unknown characteristics. States should fashion agreement documents so that they are capable of alteration when consensus dictates. Agreement regarding smaller or component differences may lead to agreement regarding larger, overarching differences.

CONCLUSION

Interstate groundwater bodies are large and complex. They do not respect state boundaries. The law with respect to intrastate ground water is somewhat uniform but also somewhat in conflict, which sug-

190. See MODEL WATER SHARING AGREEMENTS FOR THE TWENTY-FIRST CENTURY 4 (Stephen E. Draper ed., 2002).

191. CRAIG ANTHONY (TONY) ARNOLD ET AL., WET GROWTH: SHOULD WATER LAW CONTROL LAND USE? 8 (2005).

192. See *U.S. Steel Corp. v. Multistate Tax Comm'n*, 434 U.S. 452, 456, 479 (1977) (holding that an interstate tax organization does not violate Compact Clause of U.S. constitution). State planning and management of natural resources is premised on the state's police power and its purpose of protecting the public health and safety. Local land use planning is premised on municipal power, arising from State constitutional or statutory origins, or the State's statutorily conferred "police power." Inter-jurisdictional planning organizations accomplish regional planning by borrowing these municipal or police power authorities through inter- or multi-jurisdictional agreements. Interstate compacts or lesser agreements can aid in the accomplishment of multi-state regional planning.

gests potential dissention among water rights owners and states when it comes to interstate resources. Generalization regarding uniformity or disparity of the law between the states is probably not very useful, as one must first examine the particular case to evaluate the difficulty of resolving potentially inconsistent state groundwater law.

The traditional view has been that there are only three ways to resolve interstate competition: equitable apportionment, congressional intervention, or interstate compact. But a fourth alternative exists. Do less and thus do more. Act in the present. Be mindful of the future. Let perpetuity take care of itself. Appraise the shared resource with all the precision currently available, but leave room for surprise. Share management where possible, so as to contemplate a common good, if in fact individual opportunity can also be accommodated. Eschew centralization. Let the variety and heterogeneity of groundwater resources suggest the best course, treating them individually. Permit each set of states, as appropriate to the specific aquifer, to ascertain the best approach for that aquifer. Accept the federal interest in both intrastate and interstate groundwater systems and coordinate it with the states' managerial responsibilities. Balance the economic, social, health, aesthetic, and recreational values of water, in the face of growing demand, shortening supply, and now climate change. Such an approach sounds challenging, but less is more.

ARTICLE UPDATE

The following is a brief update on the issues presented in James Davenport's prior work in the *University of Denver Water Law Review*, "Softening the Divides: The Seven Colorado River Basin States' Recommendation to the Secretary of the Interior Regarding Lower Basin Shortage Guidelines and the Operate of Lakes Mead and Powell in Law Reservoir Conditions," found at 10 *University of Denver Water Law Review* 287 (2007).

- *The Editors*

In December 2007, the Secretary of the Interior signed the Record of Decision regarding the Final Environmental Impact Statement for the Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations of Lake Powell and Lake Mead.¹⁹³ The Guidelines, based upon the Preferred Alternative and public input, will

193. Record of Decision – Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operation for Lake Powell and Lake Mead 1 (December 2007), *available at* <http://www.usbr.gov/lc/region/programs/strategies/RecordofDecision.pdf>

remain in effect through 2025.¹⁹⁴ The Secretary will use the Guidelines to: 1) determine the circumstances under which the Secretary would reduce the annual amount of water available for consumptive use from Lake Mead to the Colorado River Lower Division; 2) define the coordinated operation of Lake Powell and Lake Mead to improve the operation of both reservoirs, especially under low reservoir conditions; 3) allow for storage and delivery of conserved Colorado River system and non-system in Lake Mead particularly under drought conditions; and 4) determine those conditions under which the Secretary may declare the availability of surplus water for use within the Lower Division states.¹⁹⁵

194. *Id.* at 4.

195. *Id.* at 7-8.