

1987

## The Recurring State Judicial Task of Choosing Rules for Groundwater Law: How Occult Still?

Earl Finbar Murphy

*Ohio State University College of Law*

Follow this and additional works at: <https://digitalcommons.unl.edu/nlr>

---

### Recommended Citation

Earl Finbar Murphy, *The Recurring State Judicial Task of Choosing Rules for Groundwater Law: How Occult Still?*, 66 Neb. L. Rev. (1987)  
Available at: <https://digitalcommons.unl.edu/nlr/vol66/iss1/5>

This Article is brought to you for free and open access by the Law, College of at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Nebraska Law Review by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

# The Recurring State Judicial Task of Choosing Rules for Groundwater Law: How Occult Still?

TABLE OF CONTENTS

I. Judicial Choices Relative to Knowledge Concerning Groundwater ..... 120

II. The Mid-Nineteenth Century Choices and the Knowledge Underlying Them ..... 124

III. Twentieth Century Judicial Choices Modifying and Changing the Dominant Mid-Nineteenth Century Preferred Choice ..... 132

IV. Groundwater Problems in the Late Twentieth Century as Both a Free and a Scarce Good..... 135

I. JUDICIAL CHOICES RELATIVE TO KNOWLEDGE  
CONCERNING GROUNDWATER

The legal system’s necessity to choose some regime for ground-water was a condition imposed on decision-makers in the mid-nineteenth century. Since then, this condition of choice has recurred in various jurisdictions. If legislatures could have legislated comprehensively enough, the need might not have recurred so often for changing rules governing the location, the extraction, the protection, and the replenishment of groundwater. But in much of the United States, legislatures have stayed inactive. In this majority of American jurisdictions, therefore, initiative for action has stayed with the courts for the past century and a half.

Mid-nineteenth century jurists are commonly viewed as operators of a formalized legal system.<sup>1</sup> For these jurists, we are assured, law was autonomous. The mid-nineteenth century judges found law and did not actively create it. Jurisprudence for them was mechanical and

---

\* C. William O’Neill Professor of Law and Judicial Administration, College of Law; Courtesy Professor of Natural Resources, College of Agriculture, The Ohio State University.

1. M. HORWITZ, THE TRANSFORMATION OF AMERICAN LAW, 1780-1860258-59 (1977).

their rules were self-defining. All of this is the apparent opposite of a legal system that invites consciously made choices.

Perhaps, in some general, or more likely, ideal-cultural sense, the charge is fair that formalism dominated mid-nineteenth century jurisprudence. In the operative case of the rules for groundwater law, however, the truth lies in the opposite direction. The nineteenth century jurists in deciding the content of groundwater law were active, creative, and nonmechanical. They truly acted as decision-makers in a legal system that did not act autonomously of science, the market, or technology, at least in the instance of groundwater and aquifers.<sup>2</sup>

In Anglo-American law, prior to the nineteenth century, groundwater was one of many natural phenomena affecting human life in a casual way. Wells were important for human activity to be sure; but, then, so were streams, rain barrels, and ponds for trapping surface run-off. The existence of legal rules for streams and run-off water shows that these were anciently important to a far greater degree than groundwater.<sup>3</sup>

Not until entrepreneurs wanted to dewater the ground for mines or quarries, or mechanically pump previously unknown draft volumes for steam conversion, or cooling, or sale, or other consumptive uses, did a natural phenomenon become the human resource of groundwater. At that moment, and no sooner, did the legal system have basic decisions to make among claimants whose conflicts ranged from dumping extracted water as a nuisance to using or preserving groundwater as a thing of actual (or potential) cash value.

The nineteenth century legal system, through its common law judges, was aware that little was known of the location and movement of groundwater at a time when the hydraulic principle—known to the Romans empirically, but long lost—was being scientifically discovered.<sup>4</sup> As their decisions reveal, these common law judges were also aware of the market costs different legal rules could impose; and while older concepts of property blocked the perception of where certain courses of action or certain rules of procedure had to lead, the nineteenth century common law judges knew that their choices con-

---

2. In his discussion of the changing rules on surface streams, *id.* at 34-42, however, Morton Horwitz would probably see this result as a part "of a gradual acceptance of the idea that the ownership of property implies above all the right to develop that property for business purposes," *id.* at 37.

3. *Id.* at 277-79. Note, L. GOODEVE, *THE MODERN LAW OF REALPROPERTY* 5 (1st ed. 1883) (on how the legal definition of "land" includes the "water which covers it."); J. GOULD, *THE LAW OF WATER*, § 46 at 105-03 (on rights in fresh-water streams), §§ 265-67 at 465-68 (on rights relative to run-off water) (1st ed. 1883); Murphy, *English Water Law Doctrines Before 1400*, 1 AM. J.LEG. HIST. 103 (1957).

4. O. HELWEG, *WATER RESOURCES: PLANNING AND MANAGEMENT* 1-3 (1985), speaking generally of the scientific establishment of hydrology, though the Romans empirically knew it as early as the fourth century B.C.

cerning groundwater would contract or expand the property rights of landowners. In brief, common law judges acted on more non-legal knowledge than a formalist theory allowed, as if common law judges had not understood the bounds of their formalism.<sup>5</sup>

The dominant rule chosen for groundwater in the nineteenth century was not the result of a formalistic jurisprudence of self-found rules. Rather, the choice of the absolute dominion rule was consciously made from among several known rules and was picked under the rising pressure of economic and technologic events.

The judges knew that they might have chosen the reasonable use rule, because some courts did. And the judges doing the choosing knew also about what later became the correlative rights doctrine (maybe, too, even prescient about appropriative rights, as well) through the application some would have made of the doctrine of prescriptive uses.<sup>6</sup> The fact that the absolute dominion rule was the one dominantly chosen for so long has simply obscured the range of choice so consciously made by those long-ago judicial decision-makers.

The need for making choices of rules about groundwater kept coming back. Choosing alternatives to the absolute dominion rule, and then refining those choices, kept common law judges busy over the later decades as they continued accumulating knowledge and making choices concerning groundwater law. Later, still, consciousness emerged about the economic consequences, institutional developments, political actions, and societal events these different rules, once chosen, could produce. Also by that time, judicial decision-makers had become more aware of how a switch in the choice of rule could produce a different range of consequences, developments, actions, and events.

This kind of consciousness is available in far greater detail for late-twentieth century decision-makers than may have been the case for their nineteenth century predecessors.<sup>7</sup> Yet, however great the increase in knowledge, the certainty of the rightness of any choice seems just as elusive. Absolute dominion, reasonable use, correlative rights, the appropriation doctrine—which is to be chosen?<sup>8</sup> For any judge, what is the choice? The task seems no easier in the 1980s than it did in the 1840s. We cannot even be sure of how much more self-awareness we now possess compared to those years when the earlier choice-of-

---

5. J. Willard Hurst, through his views about "the possession of options" in the nineteenth century United States, is the source of this rule-of-choice in legal decision-making. J. HURST, *LAW AND THE CONDITIONS OF FREEDOM IN THE NINETEENTH-CENTURY UNITED STATES* 37 (1956).

6. These terms are hereinafter defined and discussed.

7. This comprises "the material content of justice" discussed in jurisprudence, see J. STONE, *HUMAN LAW AND HUMAN JUSTICE* 335-41 (1965).

8. These terms are hereinafter defined and discussed.

law rules for groundwater were made. Choice, of course, requires knowledge if it is to be anything different from a throw of the dice. In the case of groundwater, the mid-nineteenth century knowledge of hydrogeology found the location, movement, and recharge of subterranean water hard to know, a knowledge summarized in one dramatic word as "occult."<sup>9</sup>

To say that groundwater is still an occult subject conjures up the image of the divining rod, the y-shaped stick of hazel in the sensitive hands of a water-witch, dowsing for an underground source of water. But etymologically the word means only something hidden from sight, while traditional medical terminology uses it to mean a condition not detectable by clinical examination.<sup>10</sup>

In the late-twentieth century, hydrogeology knows far more than ever before. Still, though the knowledge is increasing, the precision of that knowledge is far less than the expertise that is needed for exact measurement and allocation of water from an aquifer that simultaneously can be mined, drawn down, and recharged.<sup>11</sup> Even as there are yet unrevealed secrets in the earth, there is also a different kind of knowledge that is even more hidden from view, "occult" in the sense of some condition not amenable to clinical observation.<sup>12</sup>

Institutionally, how ought groundwater be dealt with? On what basis? How is it affected by actors in the market or by persons seeking advantages from the politics of regulating groundwater? How great is our knowledge (that knowledge so "gross" that the "occult" must be eliminated) of how different legal rules allocate the costs and the benefits not only of groundwater itself but of the full range of cash flows surrounding it? Perhaps here is the "occult" condition of groundwater in the late-twentieth century. Maybe this condition of groundwater is even more obdurately "occult" than the process of locating and tracing groundwater was thought to be by the mid-nineteenth century jurists.

Either way, whatever dowsing sticks that are around ought to be used. Certainly, there seem to be dowsers aplenty not only able to tell the world about the physical facts of groundwater, but also able to tell that world what to do about managing groundwater's protection, extraction, distribution, use, and disposal. Unfortunately, just as there

---

9. *Frazier v. Brown*, 12 Ohio St. 294, 311 (1861).

10. WEBSTER'S THIRD NEW INTERNATIONAL DICTIONARY OF THE ENGLISH LANGUAGE UNABRIDGED 1560 (1971) (entry for "occult").

11. HELWEG, *supra* note 4, at 68-74.

12. The disputes over charges, fixed property rights, command regulation, and so forth have continued for decades, see *Environmental Improvement Through Economic Incentives*, x-xi, 2-18 (1977). "The debate goes on in large part because so little is known about the magnitude of the beneficial effects of pollution control policies," A. FREEMAN, *THE BENEFITS OF ENVIRONMENTAL IMPROVEMENT: THEORY AND PRACTICE* 1 (1979). This is only one of many examples of still hidden (at least partially) knowledge.

are dowsers whose hazel sticks go down where no water is ever found, the accuracy of other experts in groundwater management also falls short.<sup>13</sup>

Consequently, just as rules were hard to choose for groundwater law in the mid-nineteenth century, the legal choices remain just as hard to make for the late-twentieth century judicial decision makers. The reasons in the late-twentieth century relate to the nineteenth century's uncertainties of knowledge about groundwater, but, in addition, include uncertainties about economics, social values, and political decisions impacting on groundwater law. These factors are perhaps, even more occult and elusive than knowledge about the location and movement of water below ground.

Yet, this accumulating knowledge, and the argumentation about it, cannot be ignored even by judicial decision-makers. Their responsibility for making choices about the law for groundwater and aquifers probably will continue well into the twenty-first century. Assuredly this necessity of choice will remain with judges unless more comprehensive, as well as more particular, choices are made by legislators. In the constitutional separation of powers, the legislature has the power to impose taxes, to set up administrative apparatus, and to create new estates in real property. For these reasons, the initiative for change properly lies with legislators having the power to enact statutes rather than with judges acting under the common law.<sup>14</sup> Until legislators act, however, judges hold the initiative.

## II. THE MID-NINETEENTH CENTURY CHOICES AND THE KNOWLEDGE UNDERLYING THEM

The middle of the nineteenth century found courts in England and several states of the United States abruptly faced with a matter of first impressions: what rights did anyone have in groundwater? People certainly had dug wells and used springs before that time. Such usages, however, had not produced reported litigation. The increasing demands of the industrial revolution changed the situation. The technology of well construction improved and the science of hydraulics appeared. The ability to use large quantities of water in manufacturing, as well as the skill to dewater large areas of land for mining, had been developed. The consequence was the opportunity to quarrel over the allocation of groundwater by lawyers who owed their new business

---

13. AN ENVIRONMENTAL AGENDA FOR THE FUTURE 55-63 (Cahn ed. 1985) shows the variety of potential conflict in differing recommendations, by first opting for changes in federally financed water projects, *id.* at 58, but then opting also for command regulation for groundwater, *id.* at 62.

14. R. HEALY, AMERICA'S INDUSTRIAL FUTURE: AN ENVIRONMENTAL PERSPECTIVE 30, 44 (1982) (indicating the slowness of decision-making and the time-lag in their implications in this area).

both to the improvement of technology and the growth of the general market.

In retrospect, we know that the Anglo-American judicial system generally opted for the absolute dominion, or English rule, first set forth in *Acton v. Blundell*.<sup>15</sup> There was nothing predetermined about that decision. Other choices were available and found preferable by later courts. The choices, therefore, were varied, contradictory, credible, and difficult for judges who had to make decisions with economic and social consequences important not only for their own time but for scores of years thence.

First of all, the courts initially could have chosen to leave existing uses of water as rights protected fully by the law, subject to change only by contracts among the landowners drawing upon the aquifer or by some prescriptive user among them. In the early-nineteenth century case of *Balston v. Bensted* Lord Ellenborough had done just that. As the facts have it:

As far back as could be recollected, there had been a gush of water from a hole in the plaintiff's close. . . . In 1805, the plaintiff purchased this close, and erected a paper manufactory upon it; for which a copious supply of spring water is essentially requisite. About the same time the defendant, becoming the owner of the adjoining close, opened a stone quarry in it. As the excavations proceeded, considerable quantities of water were found, which interrupted the workmen. A deep drain was afterwards made to carry it off into the river, and the quarry was left dry. But, in the meantime, the water flowing into the plaintiff's [collector] had been gradually decreasing, and subsequently to the making of the drain did not amount to more than an eighth or tenth part of its former quantity. On the idea, therefore, that the defendant had unlawfully diverted the water coming to the spring, this action was brought.<sup>16</sup>

The situation is the standard one of a mining activity that needs to dewater the ground for the extraction of stone, sand, gravel, coal, or ores while other landowners having the ability to access the aquifer are using the water in their surface activities. The conflict is as lively today as in 1805.

Lord Ellenborough was not enticed into speculation upon law. He had only one question: "Lord Ellenborough observed early in the trial that the only question was whether the diminution of the supply of water to the plaintiff's bath [the collector, by then, for the paper manufactory] had been caused by the drain dug by the defendant?" Put that way, the question is rhetorical. The answer was, "that 20 years exclusive enjoyment of water in any particular manner affords a conclusive presumption of right in the party so enjoying it."<sup>17</sup> For the judge, the causation had been clearly made out. The quarry owner

---

15. *Acton v. Blundell*, 12 M. & W. 324, 152 Eng. Rep. 1228 (Exch. 1843).

16. *Balston v. Bensted*, 1 Camp. 463, 464, 170 Eng. Rep. 1022, 1022-23 (1808).

17. *Id.* at 465, 170 Eng. Rep. at 1023.

had to convey the groundwater from his dewatered quarry to the water collector of the paper manufacturer.

If the law had followed Lord Ellenborough, the first drawer on the aquifer (once use had continued for 20 years) would have possessed a prior appropriation to the quantity of water that had supplied his spring or well.<sup>18</sup> The appropriative right thereby created seems odd to a twentieth century lawyer because that alleged appropriation would have rested entirely upon a prescription. This rule assumed that other landowners above the aquifer had sufficient ownership in the aquifer to lose it to the first landowner drawing on the aquifer, and that this ownership did not depend upon the amount actually put to use by the first drawer. Even so, the rule would have been an option for a kind of appropriative right in groundwater.<sup>19</sup> That was one possible choice.

Secondly, the courts could have looked to the rights riparian landowners had in streams and used riparian rights as their model. The English courts had early decided, though for only a brief time, that a well diminishing the flow of a stream violated the rights of riparians on the stream.<sup>20</sup> The English courts had reached this conclusion without regard for Darcy's Law that had established the relationship between water moving in an aquifer and its relationship with surface streams.<sup>21</sup> A far closer assimilation between the rules for the rights of

18. The case was expressly disapproved by *Chasemore v. Richards*, 7 H.L.C. 349, 11 Eng. Rep. 140 (1859) and *Angus & Co. v. Dalton*, 3 Q.B.D. 85 (1877) long after all other courts in the Anglo-American jurisdictions had rejected it.

19. There is a strange, though coincidental, resemblance in *City of Pasadena v. City of Alhambra*, 33 Cal. 2d 908, 207 P.2d 17 (1949). Sir William Blackstone shared a view concerning streams similar to Lord Ellenborough's on groundwater. 2 W. BLACKSTONE, COMMENTARIES \*403. A strong appropriation rights doctrine was always a present, but recessive, element in the Anglo-American common law. Beuscher, *Appropriation Water Law Elements in Riparian Doctrine States*, 10 BUFFALO L. REV. 488 (1961).

20. *Dickinson v. The Grand Junction Canal Co.*, 9 Eng. Law & Eq. Rep. 513 (Exch. 1852). This case, however, could be regarded as a matter of statutory interpretation, which is how counsel seem to have argued, *id.* at 513-19, or as a matter of interpretation of a contract, which Chief Baron Parke stressed in his opinion, *id.* at 522-23. It is the dictum of Baron Parke that is significant here: "As to the abstraction of the water which never did form part of the rivers, but has been prevented from doing so in its natural course by the excavation of the well, whether the water was part of an underground watercourse or percolated through the strata, we are also of the opinion that an action will lie. The mill-owners were entitled to the benefit of the stream, in its natural course, and they are deprived of part of that benefit, if the natural supply of the stream is taken away," *id.* at 521. Again, there is a coincidental resemblance between this and a later American case, *Templeton v. Pecos Valley Artesian Conservancy Dist.*, 65 N.M. 59, 67-68, 332 P.2d 465, 470-71 (1958).

21. Darcy's Law is the basis of modern groundwater hydrology and has far greater significance than this; see the entry "Henri-Philibert-Gaspard Darcy," *Encyclopaedia Britannica*, III *Micropaedia* 377 (1974). Samuel Wiel, a leading American water-law scholar in the early-twentieth century, had by 1928 already called



riparian landowners and landowners above an aquifer was possible as a judicial choice.

Some courts in the mid-twentieth century nearly chose such an identification of the rules for streams and aquifers. They would not have waited until the early twentieth century for California to adopt the correlative rights rule for groundwater.<sup>22</sup> As was pointed out by the resource economist, S.V. Ciriacy-Wantrup, the correlative rights doctrine in groundwater is nothing other than the application of the riparian doctrine for streams to groundwater.<sup>23</sup> "The correlative ground water right exists solely because the percolating ground water in question underlies the land of the holder of the right."<sup>24</sup> Mid-nineteenth century courts also perceived this potential identification of rules.

In 1855, (as a matter of first impression) Vermont was faced with the issue of rights in groundwater. The trial court chose to instruct the jury on a correlative rights theory.

This charge is evidently based upon the ground that there were certain correlative rights existing between these parties, in the use of the water percolating in and under the surface of the earth. The rules of law which govern the use of a stream of water . . . are well settled, and the correlative rights of the adjoining proprietors are clearly defined. Each proprietor of the land has the right . . . to use the stream not inconsistent with a similar right in the proprietors of the land above or below him . . . .<sup>25</sup>

The Vermont Supreme Court, therefore, knew that it could choose a correlative rights rule for groundwater and that such a rule would apply to landowners above aquifers the same allocative rights as were held by riparians under the riparian doctrine governing surface (and subterranean) streams.<sup>26</sup> But Vermont rejected that choice, choosing the absolute dominion doctrine with deliberation.

[I]t is better to leave [subterranean waters, meaning here percolating ground-

---

the relationship in the law between streams and groundwater an "unavoidable connection," Wiel, *Need of Unified Law for Surface and Underground Water*, 2 S. CAL. L. REV. 358, 362 (1929).

22. The second opinion in *Katz v. Walkinshaw*, 141 Cal. 116, 120-37, 74 P. 766, (1903) (opinion of Shaw, J.), committed California to the correlative rights doctrine, while the first opinion would have committed California to the reasonable use doctrine, *id.* at 138-50, 70 P. 663 (1902) (opinion of Temple, J.). Note the concurring opinion which pointed out the difference and rejected the "authority" of the second opinion insofar as it went beyond the first opinion. *Id.* at 137-38, 74 P. at 773 (Angellotti, J., concurring).
23. S. CIRIACY-WANTRUP, *NATURAL RESOURCE ECONOMICS: SELECTED PAPERS* 92 (Bishop & Anderson eds. 1985).
24. *Id.* at 66.
25. *Chatfield v. Wilson*, 28 Vt. 49, 53-54 (1856). For the views of the trial judge, see *id.* at 49-53.
26. *Id.* at 54-55. The court seems to have misread *Balston v. Bensted*, 1 Camp. 463, 170 Eng. Rep. 1022 (1808), and considered it a case involving rights in a surface stream. *Chatfield v. Wilson*, 28 Vt. 49, 56 (1856).

water] to be enjoyed absolutely by the owner of the land, as one of its natural advantages, and in the eye of the law a part of it . . . .<sup>27</sup>

After a thorough canvass of such cases as were available, the Vermont court chose to align Vermont with the absolute dominion doctrine of the English rule. As is the case with all the courts who struggled with the issue at that time, there was a keen awareness that no tradition existed, that no precedent bound, and that what could be found in the law books was persuasive only, rather than any part of an established common law rule. These judges simply thought it "impracticable" to adopt a rule for groundwater similar to the one for riparians owning land along the banks of surface streams. Groundwater to them was too unknowable in its hydrogeologic aspects.

[T]he existence of water under ground, and of its progress while there, are not uniform, and cannot be known with any degree of certainty, nor can its progress be regulated. . . . The secret, changeable, and uncontrollable character of underground water in its operations, is so diverse and uncertain that we cannot well subject it to the regulations of law, nor build upon it a system of rules, as is done in the case of surface streams.<sup>28</sup>

Of course, Vermont might have done something still different than choosing either the absolute dominion or correlative rights rules, or, if the choice of the appropriative right had been brought to the court's attention, the doctrine of prior appropriation. Just half-a-dozen years later New Hampshire was to come up with an additional option for jurisdictions to choose: the reasonable use rule, or as its later popularity in the United States caused it to be called, the American rule for groundwater law.<sup>29</sup> For pragmatic reasons and a preference for low transaction costs, however, nineteenth century American states initially chose the absolute dominion (or English) rule for groundwater law.

The absolute dominion rule was law. The Vermont Supreme Court may have thought it "impracticable" to "define rights" in groundwater so as "to put them on some tangible and practical ground, that the rules concerning them may be applied to common use."<sup>30</sup> But the rule itself is law. The rule's operation gives rise to claims and defenses at law in a manner not entirely dissimilar to the operation of the appropriation doctrine, correlative rights, and reasonable use rules.

In the Ohio case of *Frazier v. Brown*, this legal character of the absolute dominion rule was made plain.<sup>31</sup> The Civil War might have

---

27. *Chatfield v. Wilson*, 28 Vt. 49, 54-55 (1856).

28. *Id.* at 54. "We think the practical uncertainties which must ever attend subterranean waters is reason enough why it should not be attempted to subject them to certain and fixed rules of law . . . ." *Id.*

29. *Bassett v. Salisbury Mfg. Co.*, 43 N.H. 569 (1862).

30. *Chatfield v. Wilson*, 28 Vt. 49, 54 (1856).

31. *Frazier v. Brown*, 12 Ohio St. 294, 304 (1861).

been putting the question of the survival of the Union at issue so as to distract the Ohio court's legal powers of concentration, but Justice Brinkerhoff undertook the kind of comprehensive legal survey that seems to have inspired all the courts of this period in their wrestling with the determination of what rules would govern groundwater. These mid-nineteenth century judges took seriously their duty and power of choice.

The Ohio Supreme Court decided that wells which diminished stream flow gave *no* cause of action to riparians.<sup>32</sup> The court went beyond *Acton v. Blundell* on this point and decided that no prescriptive use could arise from the mere operation of a well for twenty years.<sup>33</sup> Only if the defendant acted from motives of provable "*unmixed* malice, without any object, and, when done, incapable of answering any end, either of ornament, convenience, or profit, connected with the enjoyment and use of his property"<sup>34</sup> *might* the court at some future date decide that this pumper of groundwater had exceeded his rights. Absolute dominion meant absolute to the Ohio Supreme Court.

The Ohio Supreme Court, like the one in Vermont, had thoroughly studied the authorities. It knew of the opinion of the eminent British jurist Sir John Taylor Coleridge who had opted for correlative rights in groundwater and the chance to secure prescriptively in them an appropriative right.<sup>35</sup> As to his first view involving a preference for the correlative rights rule, Coleridge had said:

Why water in a natural course of transit under ground should, as such, be

32. The court noted, on the basis of a report in a legal newspaper, that counsel had called to the court's attention the fact that Baron Parke's dictum in *Dickinson v. The Grand Junction Canal Co.*, 9 Eng. Law & Eq. Rep. 513 (Exch. 1852), had been disapproved by the House of Lords, with Lord Wensleydale (formerly Baron Parke) himself "doubtfully and reluctantly" concurring. *Frazier v. Brown*, 12 Ohio St. 294, 310 (1861).

33. *Frazier v. Brown*, 12 Ohio St. 294, 310-11 (1861). Lord Wensleydale in his opinion in *Chasemore v. Richards*, 7 H.L.C. 349, 381-82, 11 Eng. Rep. 140, 152-53 (1859) does not retreat from his position in *Dickinson v. The Grand Junction Canal Co.*, 9 Eng. Law & Eq. Rep. 513 (Exch. 1852), but concurred on other grounds, *Chasemore v. Richards*, 7 H.L.C. 348, 389, 11 Eng. Rep. 140, 156 (1859) (Lord Wensleydale, concurring).

34. *Frazier v. Brown*, 12 Ohio St. 294, 304 (1861) (emphasis in original). The court made it clear that it disapproved litigation over rights in groundwater and sought a legal rule that would avoid litigation. A seminar was held in Ohio concerning the impact of *Cline v. American Aggregates Corp.*, 15 Ohio St. 3d 384, 474 N.E.2d 324 (1984), attended by hydrogeologists and groundwater law specialists and sponsored by the Ohio Water Management Association, *A REASONABLE SHARE OF WATER* (Woldorf & Black eds. 1986). In anticipation of a change in Ohio groundwater law see the NATIONAL WATER WELL ASSOCIATION FOUNDATION, PROCEEDINGS OF THE OHIO WATER LAW CONFERENCE, Dec. 6, 1983 [n. d. but issued 1984].

35. *Frazier v. Brown* brushes it aside, along with the views of Lord Wensleydale (Baron Parke), as simply being against "the overwhelming current of authority." *Frazier v. Brown*, 12 Ohio St. 294, 310 (1861).

more a subject of individual property than water flowing above ground, is not explained; but passing that by, it seems to have been overlooked, that the water draining from under his neighbour's soil into, as well as that collected in, the neighbour's well, must on the same principle be the neighbor's property; indeed, independently of this, it is well established that water collected in a well is so much taken from the common stock and reduced into possession, and become the subject of property. Now it is certainly a novel principle that by an operation of my own land, I may both excusably abstract, and lawfully convert to my own use, the underground property of my neighbour. The principle to be practical and consistent must go this full length, — it must not merely excuse the abstraction, as the unavoidable consequence of an act lawful in itself, but it must also justify the appropriation of the water abstracted, and actually make what was my neighbour's property my own, by my own deliberate act done against his will, and with a full knowledge of the injury I inflict thereby.<sup>36</sup>

The only persuasion this argument seems to have had on the Ohio Supreme Court was the full acceptance of these consequences rejected by Coleridge. Ohio was prepared to make absolute dominion absolute.

As to his second view, Coleridge addressed what a later age would have considered a proto-appropriation right:

[T]he landowner has a property in the water percolating through and under his land, [but] the question still arises, and is a wholly distinct one, whether such property in the subsoil, of which the water is to be taken a part, may not be subjected by the owner to a servitude . . . . Why may there not be implied, from the [over 20] years' enjoyment, the assent and agreement of the proprietors of the bank above to permit such a transit of the water under their respective lands . . . without which it must be taken [or] there never could have been that usage, on which the right is founded? . . . It is to be remarked too, that such an implication is not inconsistent with the supposition that each landowner may have reserved to himself the right of the reasonable and ordinary use of the water for the enjoyment of his own land and premises: it is only a limitation on the exclusive and unreasonable use, which goes beyond the proportionate wants of the particular property, and which, as I have pointed out, cannot be enjoyed without an encroachment on the equal rights of the surrounding landowners. . . . If the law is so for him [who has only to sink his well deeper, and increase the power of his well's steam engine], it must be the same for each and all of his neighbour's, and his exercise of his so called right might be put an end to to-morrow by any rival association, who would sink deeper than he has done, or use more powerful engines. It would seem a strange state of the law, which sanctioned such uncertainty, such conflict, and such disregard of ancient enjoyment, rather than the reasonable and peaceable exercise by all landowners respectively, of rights which are only irreconcilable when this unreasonable extremity is introduced.<sup>37</sup>

36. *Chasemore v. Richards*, 2 H. & N. 168, 192-93, 157 Eng. Rep. 71, 80 (1857) (Coleridge, J. dissenting).

37. *Id.* at 193-95 (Coleridge J. dissenting). In his opinion on the appeal of this case to the House of Lords, Lord Wensleydale himself would not have followed the views of Sir John Taylor Coleridge or the majority. Lord Wensleydale would have introduced into the English common law certain ideas borrowed from the Roman law (on the basis that a new rule had to be framed in the silence of the common law on groundwater) that would have limited the benefit of groundwater use to the land on which the pumping or the dewatering took place. This would have committed the English common law to the reasonable use rule: "it seems right to

And, once again, Coleridge regarded as an impossible situation what the Ohio Supreme Court was to find most attractive. First, the nineteenth century Ohio jurists believed that any landowner could take as much groundwater from water percolating under the pumper's ground as could be extracted. Secondly, they believed that the power at law of this first extractor was potentially subordinate to whatever technical superiority the other landowners above the aquifer could acquire to draw away from this first user all of the water for their own purposes. Otherwise, there would be "material detriment of the common wealth, with drainage and agriculture, mining, the construction of highways and railroads, with sanitary regulations, building and the general progress of improvement in works of embellishment and utility."<sup>38</sup>

In some of the most often quoted words in the opinion, the position was buttressed further by a characteristic attributed to groundwater that Lord Ellenborough, Sir John Taylor Coleridge, and Lord Wensleydale had not shared. Ohio chose the absolute dominion rule

[b]ecause the existence, origin, movement and course of such waters, and the causes which govern and direct their movements, are so secret, occult, and concealed, that an attempt to administer any set of legal rules in respect to them would be involved in hopeless uncertainty, and would be, therefore, practically impossible.<sup>39</sup>

The expression had a ringing tone. Initially the language was quoted as a justification for absolute dominion in groundwater by the surface landowner. Later, as an expression with an antique air, it was quoted as proof of the rule's obsolescence. Either way, "occult" had its attraction.

---

hold, that he ought to exercise his right in a reasonable manner, with as little injury to his neighbour's rights as may be." *Chasemore v. Richards*, 7 H.L.C. 349, 388, 11 Eng. Rep. 140, 155 (1859). His argument proved premature, though the American (or New Hampshire) rule was to be based upon these concepts. *Bassett v. Salisbury Mfg. Co.*, 43 N.H. 569, 577 (1862).

38. *Frazier v. Brown*, 12 Ohio St. 294, 311 (1861). Half a century later, the New Jersey Supreme Court also addressed precisely this issue. But the New Jersey jurists rejected the absolute dominion rule. The New Jersey judges adopted the reasonable use rule on a line of reasoning that rejected as false the view in *Frazier*. They denied that any rule other than the absolute dominion rule would be "hampering landowners in the development of their property." *Meeker v. City of East Orange*, 77 N.J.L. 623, 637, 74 A. 379 (1909). But that was after American experience with both the absolute dominion and reasonable use rules during that preceding half-century. The New Jersey court knew how hampered or unhampered property owners had been under the New Hampshire, as compared with the English, rule for groundwater.
39. *Frazier v. Brown*, 12 Ohio St. 294, 311 (1861). It must be recognized that this is a more dramatic paraphrase of the Vermont Supreme Court in *Chatfield v. Wilson*, 28 Vt. 49, 54 (1856). "The secret, changeable, and uncontrollable character of underground water . . . is so diverse and uncertain that we cannot well subject it to the regulations of the law . . . ."

### III. TWENTIETH-CENTURY JUDICIAL CHOICES MODIFYING AND CHANGING THE DOMINANT MID-NINETEENTH-CENTURY PREFERRED CHOICE

Ohio had made its decision. The groundwater law in that jurisdiction would be the English absolute dominion rule and not an appropriative or a correlative rights-based concept of some sort. Nor could it be said that the Ohio Supreme Court was ill-served by its expectations concerning litigation and resulting low transaction costs.

The rule did have the advantage of low *legal* transaction costs. From 1861 until 1984, the Ohio Supreme Court had only three cases before it challenging the absolute dominion rule, two of which reaffirmed the Ohio position.<sup>40</sup> It was not until the last day of 1984 that the Ohio Supreme Court unanimously reversed itself and adopted the reasonable use rule, by adopting Section 858 of the Restatement (Second) of Torts as the common law of Ohio on the subject of groundwater law.<sup>41</sup>

The Ohio court in 1984 had no more options before it than its 1861 predecessor. Even an activist court could scarcely choose to institute a system of appropriation rights in groundwater considering the elaborate administrative apparatus needed. However, Ohio could have chosen to stay with the absolute dominion rule.

Texas had stayed with the absolute dominion rule. The bases for the Texas decision were that it had become a rule of property upon which landowners had depended since its adoption in 1904,<sup>42</sup> that it was hard to find in the literature a truly "objective discussion" of the merits of the absolute dominion rule,<sup>43</sup> and that Texas courts had "cited approvingly the language of the Supreme Court of Ohio in *Fra-*

---

40. These two cases are *Elster v. Springfield*, 49 Ohio St. 82, 30 N.E. 274 (1892), and *Logan Gas Co. v. Glasgo*, 122 Ohio St. 126, 170 N.E. 874 (1930). As might be expected, the lower courts also had a paucity of such litigation.

41. *Cline v. American Aggregates Corp.*, 15 Ohio St. 3d 384, 387, 474 N.E.2d 324, 328 (1984). Although the majority opinion of Justice James Celebrezze cites the second, correlative-rights opinion in *Katz v. Walkinshaw*, the reference to the RESTATEMENT, as well as the concurring opinion of Justice Holmes, make clear that Ohio had *not* adopted the correlative rights rule, much less any variant of the appropriation right, as its groundwater law. *Cline v. American Aggregates Corp.*, 15 Ohio St. 3d 384, 387, 474 N.E.2d 324, 328 (1984). Ohio has adopted, instead, the reasonable use (or American or, more appropriately, New Hampshire) rule. The case was remanded to the trial court to find out just what "reasonable" means under the circumstances.

42. *Houston & T.C. Ry. Co. v. East*, 98 Tex. 146, 81 S.W. 279 (1904). The New Hampshire rule on reasonable use was regarded as an aberration and the Ohio case of *Frazier v. Brown*, 12 Ohio St. 294 (1861), was regarded as expressing the best rule for choices. *Houston & T.C. Ry. Co. v. East*, 98 Tex. 146, 149, 81 S.W. 279, 281 (1904).

43. *Friendswood Dev. Co. v. Smith-Southwest Indus. Inc.*, 576 S.W.2d 21 (Tex. 1978).

zier v. Brown.”<sup>44</sup> Further, Texas has refused since that reaffirmation to depart from the absolute dominion rule except as it has been modified by legislation and as the Texas Supreme Court has allowed proof of negligent, as well as malicious, conduct on the part of a landowner in pumping water.<sup>45</sup> Even in 1984, nothing was fore-ordained in the Ohio Supreme Court’s choice, anymore than had been the case in 1861.

The Supreme Court of Ohio also could have chosen the correlative rights rule. This does not require the institution of administrative processes. After all, “a primary goal of water law should be that the legal system conforms to hydrologic fact. . . . This knowledge can establish the cause and effect relationship of the tapping of underground water to the existing water level.”<sup>46</sup> Does this not argue strongly in favor of an allocation of rights in an aquifer on some other basis than (1) a particular pumped volume of water, (2) with the water having been pumped during some extended period of time, and (3) for a water use subsequently to be judicially determined as “reasonable?”

Apparently not. The Ohio judges chose to line up, instead, with the bulk of the states in the eastern United States who have brought themselves under the reasonable use rule for groundwater. At least this is the result until such time as legislative action modifies this determination or, within permissible constitutional limits, prescribes a different kind of legal/institutional management.

The United States, therefore, is left in the late-twentieth century with no single rule for legally dealing with groundwater. The Congress has not adopted a pre-emptive federal statute, although Congress has acted to deal with salt-water intrusion and certain pollution sources penetrating certain aquifers.<sup>47</sup> But allocating water quantitatively as a matter of general jurisdictional rule has been left by Congress to the states; and the states have not opted for a single choice of rule. Today, four potential legal rules exist in the United States for groundwater: the absolute dominion rule, the reasonable use rule, the correlative rights rule, and the appropriative doctrine.

In the nineteenth century, those jurists who were prepared to think about what might have been dubbed an appropriation right in water mixed up the concept with the idea of rights incident to a pre-

---

44. *Id.* at 25.

45. *City of Sherman v. Public Utilities Comm’n.*, 643 S.W.2d 681, 686 (Tex. 1983). As for the Texas modification of the absolute dominion rule, see *Friendswood Dev. Co. v. Smith-Southwest Indus., Inc.*, 576 S.W.2d 21, 29-30 (Tex. 1928).

46. *Cline v. American Aggregates Corp.*, 15 Ohio St. 3d 384, 389, 474 N.E.2d 324, 328 (1984) (Holmes J., concurring).

47. See The Safe Drinking Water Act of 1974, 43 U.S.C. § 300.g-1 (1982); the Comprehensive Environmental Response, Compensation and Liability Act of 1980, 42 U.S.C. § 9601 *et seq.*, amended by 42 U.S.C. 9601 (Supp. III 1985); and the Coastal Zone Management Act of 1972, 16 U.S.C. §§ 1452, 1454(h) (1982), all as subsequently amended.

scriptive user. True appropriation of groundwater, however, would later establish the right on a first-in-time/first-in-right approach, just as had been done for appropriation rights in streams. New Mexico was the state that pioneered this approach in groundwater, independent of any prescriptive theory. Appropriation rules for groundwater came almost eight decades after they had been developed for streams. New Mexico's 1931 pioneer statute served as a model for states later adopting this approach.<sup>48</sup>

Under the absolute dominion rule, the landowner may extract water for any purpose and use it on or off the land above the aquifer of its withdrawal. Under the correlative rights rule, landowners hold proportionate proprietary shares in the aquifer, with the largest landowner having the largest share of the aquifer since he has the largest share of the land above it. Under the reasonable use rule, the groundwater may be used only on the land from beneath which it had been withdrawn, thus limiting the property rights in the aquifer of the overlying property owners.<sup>49</sup>

Of the four rules, the reasonable use rule is the one most constricting to landowners. The reason lies in the limitation of water use to the premises overlying the aquifer for beneficial purposes incidental to the enjoyment of that land.<sup>50</sup> This rule operates in a manner reminiscent of Roman law antecedents.<sup>51</sup> Yet the distinction between the reasonable use and the absolute dominion rule may not be so significant as a means of distinguishing the groundwater rules of American jurisdictions. The distinction applies generally to only the eastern United States. A more comprehensive way to divide the groundwater law of the United States is according to whether a state treats either its surface or groundwater law as coming under the appropriation doctrine. Each so-called doctrine has been called a "primary approach."<sup>52</sup>

The appropriation doctrine establishes temporal priority among

---

48. Trelease, *State Water and State Lines: Commerce in Water Resources*, 56 COLO. L. REV. 347, 356 (1985). The model is "for a system of state-controlled rights to withdraw ground water in limited quantities from the available 'safe yield' of the source. Most appropriations have been acquired for irrigation, and growing cities have found that farmers have laid claim to much of the available water."

49. Rovick, *What Water Quality Lawyers Should Know About Water Law*, 1 NAT'L RESOURCES & ENV'T, 4, 12, 14-15 (1986). For correlative rights, the limitation is the requirement "of sharing *pro rata* among all the owners overlying the aquifer when there is a scarcity of supply." *Id.* at 15.

50. *Id.* at 14-15.

51. See the opinion of Lord Wensleydale in *Chasemore v. Richards*, 7 H.L.C. 349, 11 Eng. Rep. 140 (1859), and the quotations from it, *id.* at 388, 11 Eng. Rep. 140, 155.

52. Sherk, *Eastern Water Law*, 1 NAT'L RESOURCES & ENV'T 4, 7, 53 (1986). "There are two primary approaches [of avoiding a 'tragedy of the commons' when not enough water exists to meet conflicting demands] which reflect two quite different schools of thought." See Murphy, *A Short Course on Water law for the Eastern United States*, 1961 WASH. U.L.Q. 93, 120-23.



water claimants. The non-appropriation approach, preferred by states in the eastern United States regardless of what rule they profess to follow, "is a series of preferences based on specific water uses or water use policies . . . determined either by the state legislatures or by the administrators of state water resources programs in response to specific water shortages."<sup>53</sup> The eastern states gradually are eliminating quantity and use exemptions from non-appropriative allocations of water. In these states, water conservation gives every indication of growing in importance in the future through legislative and agency actions.

In non-appropriation jurisdictions the reasonable use rule in particular opens the way for regulatory allocation when it is interpreted under the Restatement (Second) of Torts, Section 858.<sup>54</sup> Consequently, the common law groundwater rule distinctions in nonappropriation jurisdictions are being incrementally eroded by legislative action. Though refusing to legislate comprehensively, legislators have been nibbling at the edges of their jurisdictions' common law rules.

Perhaps that ought not be surprising, even if these legislative interventions should prove to be inadequate to the current condition of the groundwater resource and human demands or impacts upon it. In 1980 only five states accounted for almost thirty percent of all water withdrawn within the country.<sup>55</sup> Of those five states, the gamut is run among the four rules by Texas, California, Idaho, Illinois, and Florida. Groundwater withdrawal in 1980 was just under twenty percent of the total amount of water withdrawn in the United States.<sup>56</sup> The amount, with its concomitant problems, has been enough to catch the eye of litigants as a matter that could use further judicial attention and, ultimately, changes in groundwater rules. Maybe, one day, the eyes of the legislators will also be attracted to the problems of groundwater.

#### IV. GROUNDWATER PROBLEMS IN THE LATE TWENTIETH CENTURY AS BOTH A FREE AND A SCARCE GOOD

Human attitudes toward water are paradoxical. On the one hand, if the water-user takes water directly as a riparian from a river or as a well-driller from an aquifer, the legal systems in most of the United States, Western Europe and the socialist countries of Eastern Europe

---

53. Sherk, *supra* note 52.

54. *Id.* at 56. He quotes from a related section of the Restatement that sees behavior as "usually unreasonable . . . that destroys the value of pre-existing uses, investment in land and facilities, and enterprises dependent upon water." RESTATEMENT (SECOND) OF TORTS § 850(A)(h) (1979). It is almost a way of bootlegging the appropriation doctrine in its old proposed prescriptive form.

55. W. SOLLEY, WATER USE IN THE UNITED STATES, 1980 2, 6 (U.S. Dep't of the Interior, Geological Survey 1980).

56. *Id.* at 4, with chart.

traditionally regard such self-supply as a "free" draft from nature.<sup>57</sup> On the other hand, there are statutes limiting the use of water to the river basin of origin, or to the land above the aquifer of withdrawal, or, on a grand scale, by such declarations as the 1985 Great Lakes charter which proposes to interdict the diversion of water out of the vast basin of those inland seas.<sup>58</sup>

Under such views, water is simultaneously so available as to be a free good and so precious that it can be assigned no price. Neither attitude is helpful. Water is an element that is too scarce to be a free good and too plentiful to be denied a broad scope for transferability.

Nor can we deny that water is both scarce relative to particular human demands and plentiful in terms of the hydrological cycle for humanity. The availability of water is a means to a wide range of human purposes: the direct use of water for the sustenance of people, plants and animals; and the indirect use of water as a commodity for incorporation into economic production and social activities. Legal systems that insist water be supplied "free" for these ends, or that confine water use to one place, time, or purpose, seriously skew the relationship between utility (perhaps even human need in stark situations) and the water resource otherwise sufficiently available for serving the long-run human use of water.<sup>59</sup>

Water consumers in their conclusions do not differentiate between surface and groundwater as disparate sources. The human use of water, in the absence of a skewing rule, is indifferent to its source. Functionally, as opposed to both law and economics, humanity has not much cared whether large water drafts came from streams, run-off impoundments, or groundwater. Once human technology had moved from direct dependence upon rainfall to a demand for a steady supply from sources indirectly dependent upon rain, only reliability mattered. Whether a stream or an aquifer was the source was thereafter mostly a matter of technological indifference.<sup>60</sup>

Hydrologically, a justification for this attitude does exist. Groundwater is connected to surface flows and cannot be regarded as an isolated phenomenon. River and groundwater basins are rarely disconnected.<sup>61</sup> Transfers between them occur naturally. True fossil

---

57. L. TECLAFF, *WATER LAW IN HISTORICAL PERSPECTIVE* 192 (1985).

58. J. LAITOS, *NATURAL RESOURCES LAW* 556 (1985). *See also* The Water Resources Development Act, Nov. 17, 1986, P.L. 99-662 § 1109.

59. Rogers, *Fresh Water*, in *THE GLOBAL POSSIBLE: RESOURCES, DEVELOPMENT, AND THE NEW CENTURY* 255 (Repetto ed. (1985).

60. N. GRIGG, *WATER RESOURCES PLANNING* 6 (1985). "All the problems [of any alleged water crisis] can be solved with effective planning and management, however, and this is the principal difficulty: how to make the system work to solve water problems." *Id.* at 6. Surface and groundwater theoretically are equally available for any technical solution.

61. Weatherford & Ingram, *Legal-Institutional Limitations on Water Use*, in *WATER*

water is rare, although it may be present even in recharging aquifers and even though aquifers may recharge so slowly that from a human viewpoint the result is the equivalent of mining fossil water.<sup>62</sup>

Concern for groundwater, as a condition with its own special problems, has been relatively recent upon both an American and world scale. As Malcolm Forbes Baldwin has said, "Nearly everything a technological society does on the land can contaminate, reduce, or redirect groundwater to the detriment of . . . groundwater protection. . . . Prevention of groundwater contamination and dewatering and protecting recharge areas requires technological controls and effective monitoring."<sup>63</sup> Since controls and monitoring have to be specially adapted for local hydrogeological conditions of a site-specific character, putting such systems into place will be neither easy nor inexpensive.<sup>64</sup>

With the present projected water demands, groundwater in the future will need legal and economic attention. Only one percent of the world's water is fresh and liquid. The rest is either oceanic or frozen. Of that important one percent, only four percent is surface water while all the rest is groundwater. In the United States, this means that there are between thirty-three and fifty-nine quadrillion gallons of fresh water within one half-mile of the surface of the ground—and note the potentially enormous discrepancy in the estimated calculations. No one can be certain of the amount. No one ought to be indifferent, either, to the potential harm that could be suffered by a large but limited human resource.<sup>65</sup>

Until recently, in too much of the world, groundwater has almost existed outside the legal/institutional structures. The federal government in the United States did not truly come to grips with the groundwater quality problems until the 1980s and still leaves other groundwater problems effectively to the states.<sup>66</sup> Not until January 1978 did the European Economic Community (EEC), refer to the "urgent need for action to protect the groundwater of the Community

---

SCARCITY: IMPACTS ON WESTERN AGRICULTURE 51, 60 (Engelbert & Scheuring eds. 1984).

62. Bowen, *Aspects of Egyptian Hydrogeology*, 11 WATER INT'L 64, 66-67 (1986).

63. Baldwin, *Groundwater Protection and the Land*, 2 AM. LAND RESOURCES ASSOC. BULL. 2 (1986).

64. See generally GROUNDWATER MONITORING HANDBOOK (1985), particularly its emphasis upon the value of individual site-specific case histories.

65. W. GORDON, A CITIZEN'S HANDBOOK ON GROUNDWATER PROTECTION 10-11 (1984). For the whole world, there are an estimated one million cubic miles of freshwater on the surface and sufficiently close to the surface as to be technically currently available for human use.

66. L. MCDUGAL & M. MCDUGAL, PROPERTY, WEALTH, LAND: ALLOCATION, PLANNING AND DEVELOPMENT 867 (2d ed. 1981). "To date, Congress has not taken advantage of its authority to create regional water allocation and planning agencies." *Id.*

from pollution, particularly that caused by certain toxic, persistent, and bioaccumulable substances."<sup>67</sup> In a recent proposed curriculum for training water engineers, only what might be found in implicit assumptions indicates any particular attention is going to be given to the protection of groundwater from any of the threats potentially impacting upon it.<sup>68</sup>

Groundwater is economically, socially, and politically significant. In the United States between 1950 and 1980, withdrawal of groundwater in absolute terms increased two and one half times in volume. The rate of absolute increase slowed down after 1975 and, in relation to surface water, the percentage of groundwater used has remained roughly constant since 1950—about eighteen percent in 1950 and about nineteen percent in 1980.<sup>69</sup>

The importance of groundwater varies, of course, according to region and use. The most important use is for irrigation, with rural water supplies and public drinking water following in lesser volumes. Of much less significance is the use of groundwater for industry. Surface water, however, remains of greater comparative importance even for usages that have the highest absolute employment of groundwater.<sup>70</sup> Regionally, however, groundwater as the basic source of water for the whole area's activity can be crucial.<sup>71</sup>

Increasing knowledge concerning the peculiarities of groundwater, meaning its difference from surface stream flows, accounts for the judicial belief that legal rules can regulate groundwater. Today human

---

67. L. Teclaff, *supra* note 57, 158. The ECE (Economic Commission for Europe) through its Executive Body for the Convention on Long-Range Transboundary Air Pollution has organized a working group on effects on vegetation, soil, and groundwater, but the concerns seem well-subordinated to the effects on human structures, UN/ECE/GEN/N/7, 8 Mr. 1986, 7.

68. Reynolds, *Contribution to the Definition for an Undergraduate Curriculum in Water Engineering*, 11 WATER INT'L 71, 73 (1986).

69. W. SOLLEY, E. CHASE, AND W. MANN, ESTIMATED USE OF WATER IN THE UNITED STATES IN 1980 47, Table 22, and 49, Fig. 11, (Geological Survey Circular 1001 1983).

70. *Id.* at 51, Fig. 13. This may hold true for the expanse of rural water supply worldwide, 2 INTERNATIONAL WATER RESOURCES ASSOCIATION NEWSLETTER 1 (1986).

71. W. SOLLEY, E. CHASE, & W. MANN, *supra* note 68, at 22, Table 2, showing surface and groundwater withdrawals in the United States in 1980 by region. Secretary of the Interior Don Hodel in his introduction to the *Second Annual National Water Summary* (1984) stated that groundwater supplied over 50% of the population of the United States with drinking water thusly: 35% of municipal water supplies comes from groundwater, while 97% of rural drinking water comes from groundwater sources. At the same time, 40% of irrigation water and 26% of water used by industry (excluding thermonuclear power uses) comes from groundwater sources (quoted in Damotharan, "Protecting Our Ground Water Resources: The Challenge," 4 *Hydata*, 6 (1985)). Damotharan states that, between 1955 and 1985, withdrawals of groundwater in the United States increased at an annual average rate of 3%, *id.*, 5.

law can accommodate itself efficiently to physical law in contemporary judicial opinion. Groundwater moves in response to gravity, pressure, and friction and does it slowly, without the turbulence marking surface flows. This knowledge is important both for the protection and rehabilitation of aquifers.<sup>72</sup>

The movement is downhill hydraulically from where the water level in the aquifer is high to where it is lower in a fashion that often does not even approximate the slope of the land surface. The rapidity of the flow is determined by the permeability of the layers composing the aquifer and results in little mixing, unlike the comparatively excellent mixing that occurs in turbulent surface waters.<sup>73</sup> The flow is on "the line of least resistance," so that contaminants flow either to the deepest point of the aquifer from which no further flow is possible or to where the waters of the aquifer interdict some surface spring, stream, or lake.

In that aquifer flow process, contaminants form in the existing groundwater a "plume," steadily diminishing in width from its point of origin until such time as repeated contamination will have adversely affected the whole aquifer.<sup>74</sup> Pumping usually disturbs these natural flow patterns and will draw contamination plumes from all directions toward the cone formed in the aquifer by water extraction. Thus, as the water table rises and falls either as a result of pumpage, or natural recharge, or artificial injection, the aquifer is affected in its quantity and quality, as well as in its function to support land surfaces or to prevent ocean encroachment.<sup>75</sup>

The movement to and within aquifers was the sort of physical activity that the Vermont Supreme Court called "secret" and the Ohio Supreme Court called "occult" in the mid-nineteenth century.<sup>76</sup> Today, the Ohio Supreme Court (like many other late twentieth century jurisdictions acting both judicially and legislatively) thinks it now possible to "establish a cause and effect relationship of the tapping of un-

72. W. GORDON, *supra* note 65, at 6. This is an excellent publication in lay language but with a full coverage of pertinent hydrogeological data. See also the general coverage in TUCSON SYMPOSIUM PROCEEDINGS ON GROUNDWATER CONTAMINATION AND RECLAMATION (Schmidt ed. 1985).

73. W. GORDON, *supra* note 65, at 6-7. The movement of groundwater in an aquifer down the hydraulic gradient is called the laminar flow.

74. *Id.* at 7. "Porosity measures the amount of water that a particular soil or rock can contain and is expressed as a percentage. . . . In fractured rock or carbonate aquifers, almost no dilution takes place, while in unconsolidated deposits dilution is primarily by 'dispersion.'"

75. *Id.* at 4, which defines "water-table" as "an unconfined aquifer . . . contain[ing] water under atmospheric pressure," the "upper surface [being] called the water-table [which] may rise and fall according to the volume of the water stored . . . ." All groundwater is *not* in an aquifer.

76. *Chatfield v. Wilson*, 28 Vt. 49 (1856). *Frazier v. Brown*, 12 Ohio St. 294 (1861). See *supra* note 39 for a comparison of the two quotations.

derground water to the existing water level."<sup>77</sup> Unfortunately, insofar as proof of irrefragable advance of knowledge concerning groundwater from the condition of perfect ignorance to one of perfect knowledge is concerned, the United States Environmental Protection Agency (USEPA) has expressed current doubts. It "contends that monitoring groundwater is more complex than anyone first thought,"<sup>78</sup> meaning what any contemporary scientific or pseudo-scientific pundit "first" thought, since nineteenth century judges had many doubts. Of course, USEPA is also prepared to add in good bureaucratic fashion, "that there is a severe shortage of trained groundwater specialists to do the job."<sup>79</sup>

Progress in hydrogeology has certainly been made. Much progress, however, still needs to be made in order to eliminate the remaining "occult" character concerning even groundwater's physical characteristics. Groundwater's economic, social, and political ramifications remain even more doubtful in their provenance. Ultimately, the easy mid-1980s optimism of Ohio's Supreme Court may not prove justified.<sup>80</sup>

The simplest knowledge to be gained concerning groundwater is the effect of pumping on the aquifer. Where dewatering is the purpose rather than water use, this would seem particularly accessible knowledge. Certainly the Ohio Supreme Court thought so. The court switched the jurisdiction from the absolute dominion rule to the reasonable use rule in a case involving dewatering incidental to the operation of a gravel pit that allegedly had dried up wells tapping the dewatered aquifer.<sup>81</sup> The court implied that hydrogeologic facts could be developed in evidence at trial; but what may seem obvious to the legal mind often poses more complex problems for people like the hydrogeologist.

To establish the relationship between a dewatering operation (or, for that matter, any heavy pumping operation that uses the water for irrigation, or municipal supply, or industrial production), a groundwater flow model needs to be constructed relating drawdowns at the dewatered pit or pumping facility to pumping by existing or potential wells thought to be drawing on the same aquifer.

---

77. *Cline v. American Aggregates Co.*, 15 Ohio St. 3d 384, 474 N.E.2d 324 (1984) (Holmes, J., concurring).

78. 4 *Hydata* 2 (1985).

79. *Id.*

80. *Cline v. American Aggregates Co.*, 15 Ohio St. 3d 384, 474 N.E.2d 324 (1984).

81. *Id.* Both the majority opinion of Justice Celebrezze and the concurring opinion of Justice Holmes operate on this expectation. Since the case had to be remanded to develop the facts, the court could not know if the aquifer being dewatered was the same as the one supplying the dried-up wells and, if it were, whether the pumping by the quarry operator was the cause of the drying-up of the plaintiffs' wells.

The aquifer response model is then embedded in an optimization model. The objective of the optimization model is to minimize the total costs associated with the dewatering system. The decision variables include well pumping rates and well location. The effect of different choices of well spacing on the solutions is examined parametrically. Comparisons of [the] initial model with trial and error solutions [should] indicate [from actual experience] considerable improvement in dewatering effectiveness.<sup>82</sup>

The crucial words in all this technology are "trial and error." The controlling factor is whether the model did or did not work when applied to the aquifer. Even then, the model excludes "the effects of aquifer parameter uncertainty;" and the formulator of the models is inhibited by "the mathematical problem size . . . prohibitive for complete solutions of real problems."<sup>83</sup> Work is being done (many types of models exist and many more will be developed); but the time may not be yet at hand for solving even the task of relating drawdowns to water levels and the ability of other wells to operate successfully despite the drawdown.

The oscillations along the range of choice still continue in groundwater law. England remains an adherent, at least nominally, to the absolute dominion rule for groundwater.<sup>84</sup> Yet, for most major groundwater withdrawals, the British Parliament has created an administratively protected right, based upon a system of licenses, that governs much of the groundwater in the country.<sup>85</sup> In the United States, judicial activism may yet abolish the absolute dominion rule in favor of the reasonable use rule. Even so, the reasonable use rule itself is subject to attack. There are those who want administratively to regulate groundwater through establishing appropriative or correlative rights, while there are those who want to bring groundwater within a defined property rights system that would be legislatively created. Legislative action to consider all these choices seems clearly to require a high priority.

---

82. Lall, "A Model for Optimal Pumped Dewatering of Open Pit Mines," in *Proceedings of a Symposium, Regional and State Water Resources Planning and Management*, American Water Resources Assoc. 297 (Charbonneau & Popkin, eds. 1984).

83. *Id.* at 297. He attributes his difficulties, in part, to "a relatively inefficient formulation" of his models.

84. L. TECLAFF, *supra* note 57, at 146. He says the doctrine in England is "undergoing a steady attrition."

85. England and Wales (United Kingdom) Water Act, 1945, 8 & 9 Geo. VI, ch. 42, permitted the creation of conservation areas within which the Minister of Housing and Local Government could license groundwater withdrawals to protect municipal, industrial, or other water supplies. England and Wales (Water Resources) Act, 1963, 10 Eliz. II, ch. 38, required a license for using water from any source, including "any underground strata," meaning water subjacent to the land surface for anything other than "underground works." Apart from these parliamentary provisions in the United Kingdom, "the occupier of land could . . . use an unlimited amount of groundwater for domestic purposes without a license," L. TECLAFF, *supra* note 57, at 147.

Almost ten years ago, Frank Trelease commented:

American water law is in a period of ferment. . . . All over the nation a new environmental awareness collides with the forces of . . . growth and . . . demand, and a major battleground centers on the field of water use. . . . Economists lambaste both riparian rights and prior appropriation for their shortcomings. . . . Prior appropriation does not seem to be well understood by many people in the eastern states. . . . By the same token, not all western solutions fit eastern problems in glove-like fashion.<sup>86</sup>

As then, the choices are still in the process of being made and the breadth of the range of choices to be made concerning groundwater has widened. The ferment goes on, as it has gone on fairly continuously in groundwater law over the years since at least 1930—or 1903, or 1842, or 1805. Unless some choices are made that show greater success than most current practices, the ferment will continue.<sup>87</sup>

The ferment started in the early-nineteenth century. The process has only appeared, now and then, to have been stopped for any particular jurisdiction by its judicial or legislative choosing of the absolute dominion, reasonable use, correlative rights, or appropriation doctrine rule. The cessation of the need for further choice has been only an illusion.

If even another temporary resolution is to be obtained by legal/institutional decision-makers, groundwater law will require active legislative intervention.<sup>88</sup> Judicial efforts are too subject to easy, incremental, and unpredictable changes.<sup>89</sup> The legislators will know the degree of their success if the field, thereafter, quiets down into humdrum routine.<sup>90</sup>

Physically, economically, and legally, decision-makers still are at the stage where groundwater remains "occult." Humanity's hydrogeologic knowledge today may be the most complete among these three

---

86. WATER LAW: RESOURCE USE AND ENVIRONMENTAL PROTECTION, 15-16 (Trelease ed. 1979). Dewatering aquifers has produced lawsuits since 1805, *Balston v. Bensted*, 1 Camp. 463, 464, 170 Eng. Rep. 1022 (1808).

87. The intensity of the fermentation is reflected in the Draft, *Ohio Groundwater Protection and Management Strategy*, App. III, "Implementation Matrix" (Oct. 1986), setting forth the actions that the state had "targetted," with their time frames, concerning groundwater—and this is not an action-oriented plan, as yet.

88. In the United States, this could be at the state level, though some think federal action would be preferable. Federal action, of course, already has occurred for the protection of some groundwater. The federal courts already have broad equity powers in groundwater matters, see Denworth & Burns, *Moyer's Landfill: Case Study of a Federal Equity Receivership: Prospects for the Continued Use of a Powerful Pollution Clean-up Tool*, 4 TEMPLE ENVTL. L. & TECH. J. 17, 18-21, 25 (1985).

89. J. BYRD, GROUNDWATER PROTECTION: EMERGING ISSUES AND POLICY CHALLENGES, 19, 27-34 (1985).

90. An industry analyst, Larry Mellendorf, says that pricing water below its cost is to accept "an inability to meet tomorrow's demands," Stacey, 8 *Calypso Dispatch* 1, 3 (1986). In the long run, can legislators continue to ignore this, if he is right?



areas. Certainly, the law has shown that it can accommodate both the disciplines of hydrogeology and of economics. Furthermore, basic value choices, at least in the United States, have been made to protect the quality and the sustainability of aquifers. What remains "occult" for the late twentieth century is how best to accomplish these goals as a matter of directed choice.

Legislation, however, is required if there is to be put in place a groundwater law system that would be predictable for investors and litigators alike. The job of protecting groundwater has not been achieved when jurisdictions simply pick and choose among the legal rules of absolute dominion, reasonable use, correlative rights, and appropriation doctrine. That kind of choice has not been sufficient from 1800 to the present. Whatever legal certainty inheres in the other three American groundwater systems, the jurisdiction that relies on "reasonable use" offers a common law rule that possesses precious little certainty.

Maybe any legislative acts concerning groundwater will have to be "occult," also. Still, even so, comprehensive legislative changes concerning legal expectation for groundwater are needed. In the United States, this legislation probably must be enacted at both the federal and state levels. The groundwater resource is too valuable to leave any longer to either the "reason" of the common law judges or the discretionary "fairness" of administrators.<sup>91</sup> At the very least, certainty from such legislation ought to inform the public of how much subsidy or environmental abuse have been present under the traditional groundwater law, or, more properly, laws.<sup>92</sup> At the very best, certainty in legal/institutional processes produced by comprehensive legislation will assure the sustainability and the quality of the groundwater resource.

The time has come, consequently, for yet another generation to make a choice about what will be the law for groundwater. The knowledge for making that choice is far more exact and capable of implementation than has been the case for any generation since Lord Ellenborough first took up the topic at the opening of the nineteenth

---

91. Rubin, *Common Law and Statute Law*, 11 J. OF LEG. STUDIES 205 (1982). His thesis is that, although the common law may still be more preferable than statutory law, the preference "is more a function of the time at which each type of rule dominated the legal system," *id.* at 222. This being so, legislation may be preferable to litigation, with the latter determining and enforcing common law rules. Groundwater law in reasonable use and absolute dominion jurisdictions conforms to allegations of unpredictability. But supporters of a preference for common law rules claim that a greater "efficiency" can be obtained by relying on the common law than by legislation or by administrative rule-making under that legislation. Many doubt the accuracy today of this assertion.

92. McKinnon, *Water to Waste: Irrational Decisionmaking in the American West*, 10 HARV. ENV'T L. REV. 503 (1986).

century.<sup>93</sup>

Maybe legislators will resort to more command regulations, or perhaps they will prefer some sort of property rights in groundwater, either appurtenant or independent. But the need exists for further federal and/or state legislative actions of a kind not available to even the most activist judges. Caution is always advisable; but the knowledge for today's decision is ample, however "occult" it remains in part. What is direly wanted now are legislative actions to locate, allocate, and protect the Nation's groundwater resource.<sup>94</sup>

---

93. *Balston v. Bensted*, 1 Camp. 463, 170 Eng. Rep. 1022 (1808).

94. Another paper, for another time and place, is needed to set forth the legislative choices—potentially far greater than the choices available to judges. Currently, I am working on such a paper setting forth such choices and the merits alleged for them.