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Peter N. Davis, Wells and Streams: Relationship at Law, 37 Mo. L. Rev. 189 (1972)

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# MISSOURI LAW REVIEW



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Volume 37

Spring 1972

Number 2

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## WELLS AND STREAMS: RELATIONSHIP AT LAW

PETER N. DAVIS\*

Groundwater constitutes one of the major sources of water for municipalities, irrigators, and rural dwellers. Conflicts between groundwater users are bound to arise from time to time, as is evidenced by a recent Missouri case, *Higday v. Nickolaus*, discussed elsewhere in this issue.<sup>1</sup> Such conflicts may increase in frequency in the future as the demand for groundwater increases. Although a majority of cases will involve allocation of groundwater between users of that class of water, many groundwater diversion cases will involve adverse effects on the flow of water in streams. It is to the latter situation that this article is directed.

Consider a typical case involving the intimate relationship between groundwater and surface watercourses. In the late 1950's, a water utility installed a well on its 10 acre tract in a rural area in New York. Nearby was small pond and swamp which fed a brook that flowed across a neighboring farmer's land. In the past, the brook had apparently never ceased to flow. In 1959, the utility began diverting groundwater from its well to its distribution system some distance away. The brook dried up at that time and never flowed again except during the spring and after heavy rains. The jury apparently believed plaintiff farmer's professional witness' testimony that there was an intimate hydrologic connection between the percolating groundwater supply and the brook; that the base flow of the

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Preliminary research work done by J. Peter DeBraul, attorney for the U.S. Department of Agriculture, and by John Greenman and Chris Koepke, legal research assistants for the Department, has been drawn upon with permission. Some of the research, all analysis of the cases, and the writing of this article were done by the author subsequent to his leaving the Department. The opinions expressed are the author's own and are not necessarily those of the Department.

1. 469 S.W.2d 859 (K.C. Mo. App. 1971). See Thomas, *Water Law-Groundwater Rights in Missouri—A Need for Clarification*, 37 Mo. L. REV. 357 (1972).

brook was provided by flow of groundwater into the stream where the water table intersected the stream; and that defendant utility's well had lowered the water table below the bed of the brook and deprived it of that source of water. On appeal, the supreme court affirmed a verdict for plaintiff farmer. Quoting from earlier cases, the court reached its decision by applying surface watercourse rules to the situation; it held that the well had caused an unlawful interference with a surface watercourse. On the question of the relationship between percolating groundwater, to which one set of rules applies, and surface watercourses, to which a different set of rules applies, the court said:

"That the diversion and diminution of the stream were caused by arresting and collecting the underground waters, which, percolating through the earth, fed the stream, does not affect the question. When the fact was established upon the proofs that the defendant's works and wells had caused, by this subsidence of water, a diversion of the stream's natural flow in its channel, the injury was proved, and the plaintiff's cause of action established."<sup>2</sup>

This language raised more questions than it answered. Will any reduction in the flow of a surface watercourse caused by a groundwater diversion be actionable? Are there any judicial guidelines on when surface watercourse rules should be applied and when percolating groundwater rules should be applied? What precedent is there to support the position taken by the supreme court in the case just discussed? Although the various rules concerning allocation of groundwater have been analyzed extensively in the literature,<sup>3</sup> very little has been written about the allocation rules concerning the hydrologic relationship between percolating groundwater and surface watercourses. This article is intended to fill that void.

### I. MISSOURI CASES

The Missouri courts have been concerned with the relationship between groundwater and surface watercourses more often than one would expect considering the paucity of cases involving groundwater which have been reported in the state.<sup>4</sup> The two Missouri cases which discuss the legal con-

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2. *Stevens v. Spring Valley Water Works & Supply Co.*, 42 Misc. 2d 86, 95, 247 N.Y.S.2d 503, 511 (Sup. Ct. 1964), quoting *Smith v. City of Brooklyn*, 160 N.Y. 357, 361, 54 N.E. 787, 788 (1899).

3. See, e.g., Cross, *Ground Waters in the Southeastern States*, 5 S.C.L.Q. 149 (1952); Ellis, *Water Law in Eastern United States*, 18 J. SOIL & WATER CONSERV. 19 (Jan.-Feb. 1963); Hanks & Hanks, *The Law of Water in New Jersey: Groundwater*, 24 RUTGERS L. REV. 621 (1970); Maloney & Plager, *Florida's Ground Water: Legal Problems in Managing a Precious Resource*, 21 U. MIAMI L. REV. 751 (1967); Comment, *The Law of Underground Water: A Half Century of Huber v. Merhel*, 1953 Wis. L. REV. 491.

4. Out of six cases involving groundwater, two concern the relationship between groundwater and surface watercourses. See *Haynor v. Excelsior Springs Light, Power, Heat & Water Co.*, 129 Mo. App. 691, 108 S.W. 580 (K.C. Ct. App.

sequences illustrate the convolutions the courts throughout the United States have gone through in wrestling with fact situations to which no established doctrine clearly applied. In *Springfield Waterworks Co. v. Jenkins*,<sup>5</sup> the plaintiff water company obtained water for sale in Springfield from a large spring on defendant's land. The spring was located about  $\frac{1}{4}$  mile from the Little Sac River and was separated from the river by a high limestone ridge. Defendant had constructed a dam at the confluence of two other springs which joined to form the river. He had attempted to sell the dam to plaintiff on the theory that the river water either percolated or flowed through underground channels to the spring. Plaintiff refused to buy. Defendant then began a practice of completely stopping the flow of the river for six days a week, storing the water, and flushing all of it into the river on Sundays. He did this during a time of drought for the ostensible purpose of flushing silt and debris from his reservoir. The effect of his practice was to render the flow of water from the spring inadequate to supply plaintiff's customers.

The court found the applicable law to be as follows:

The law in reference to the obstruction or diversion of the flow of water in water courses is well established, and it can make no difference that the current or stream is subterranean, provided it has a well defined and known channel. Subterranean passages for water are common in limestone formations, where streams pass entirely under the surface of the ground, and so continue in definite and obvious channels for greater or less distances. No one has the right to interfere with the natural flow of such a stream. But the law, as applicable to water which filtrates or percolates through the soil or interstices of the rock, is almost the reverse. Such water is regarded as a part of the soil and to which an adjoining proprietor has no absolute or natural right, and to which he can acquire no prescriptive right. It belongs to the owner of the land, and its diversion or appropriation by him for the improvement or benefit of his estate can not be made the basis of a complaint against him by anyone, however grievous the resulting injury may be.<sup>6</sup>

Although the Missouri courts have since rejected the natural flow formula-

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1908); *Springfield Waterworks Co. v. Jenkins*, 62 Mo. App. 74 (St. L. Ct. App. 1895). The other four cases, which will not be discussed further in this article, are: *Reddick v. Pippin*, 421 S.W.2d 225 (Mo. 1967) (pollution of well by percolation of sewage from sewage lagoon); *Shelley v. Ozark Pipe Line Corp.*, 327 Mo. 238, 37 S.W.2d 518 (1931), *rev'g on other grounds* 2 S.W.2d 115 (Spr. Mo. App. 1927) (well and spring pollution from leaking pipeline); *Higday v. Nickolaus*, 469 S.W.2d 859 (K.C. Mo. App. 1971) (proposed lowering of water table by pumping of groundwater from well field); *Ingram v. Great Lakes Pipe Line Co.*, 153 S.W.2d 547 (K.C. Mo. App. 1941) (destruction of aquifer feeding a spring by blasting). Only the *Higday* decision is important among the four so far as development of legal doctrine is concerned.

5. 62 Mo. App. 74 (St. L. Ct. App. 1895).

6. *Id.* at 80.

tion of the riparian doctrine" and the "reasonable use" rule for groundwater allocation,<sup>8</sup> it is clear from the court's language that the choice of rule was not clear. The court found both that the evidence left no doubt that plaintiff's spring depended largely on the flow in the river and that it was not shown whether that water reached the spring by a well-defined channel or by percolation even though the flow pattern of the spring followed that of the river by five or six hours. On these findings, one might expect that the percolating groundwater rule would have been applied and judgment would have gone to defendant. Such a result would have been reinforced by the application of the "reasonable use" groundwater rule, discussed in the case, that a groundwater user may use such water only on his overlying land and therefore does not have any right to sell groundwater off the land which he is entitled to protect. Nonetheless, the court gave judgment to plaintiff because defendant had cut off plaintiff's water supply for malicious motives; that is, to force plaintiff to buy his dam.<sup>9</sup>

Why did the court reach the result it did? It held, in effect, that the presumption that groundwater is percolating water rather than an underground stream had not been overcome. Hence, the riparian rules applicable to underground streams could not be applied. Under the percolating groundwater rule announced, plaintiff had no enforceable rights. Although defendant had acted maliciously, there was no way the court could create a legal relationship between the parties under the water allocation rules existing at the time. But the court created a legal relationship nonetheless. What the court did was to recognize a hydrologic connection between the river and the spring even though at that time scientists had not developed a theory to explain the phenomenon. The court held that the water in the river somehow flowed to and out of the spring:

While it must be conceded that the water from the channel of the "Little Sac" river to the Fulbright spring flows through no perceptible channel, and that the defendants must be regarded as the general owner of the surplus water flowing from their spring, such ownership is not without restrictions against the plaintiff, for it, by reason of its appropriation, has acquired a right thereto which can not be interfered with by a stranger, nor by the defendants, except for some beneficial use of the water or for the betterment of their land. The defendants can not obstruct or divert the water merely for the purpose of injuring the plaintiff.<sup>10</sup>

The court cited an equitable doctrine: "If a man in the exercise of his own rights of property do damage to his neighbor, he is liable, if it might

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7. See *Bollinger v. Henry*, 375 S.W.2d 161 (Mo. 1964).

8. *Higday v. Nickolaus*, 469 S.W.2d 859 (K.C. Mo. App. 1971).

9. *Springfield Waterworks Co. v. Jenkins*, 62 Mo. App. 74, 81-82 (St. L. Ct. App. 1895).

10. *Id.* at 82.

have been avoided by the use of reasonable care."<sup>11</sup> It could not have done so without recognizing the causal relationship created by the hydrologic connection between the river and the spring.

In a later case, the existence of a hydrologic connection between a stream and a well was recognized in an even more ambiguous manner. In *Haynor v. Excelsior Springs Light, Power, Heat & Water Co.*,<sup>12</sup> defendant allowed oil or grease to escape into a creek. It percolated with water to plaintiff's well, located 100 feet from the stream. Basing its reasoning on nuisance, the court said:

[Defendant] had no right to pollute the stream and thereby work an injury to its lower neighbors. The manner in which it threw refuse into the stream could not possibly be of any consequence. Plaintiff's cause of action arose from the fact that defendant used the watercourse as a sewer and that she sustained an injury to her property rights in consequence thereof.<sup>13</sup>

This recognition of proximate cause required an implied recognition of a hydrologic connection between the stream and the well.

These cases do not tell us very much about how the courts will treat similar problems in the future or what rules will be applied. Something beyond an implied recognition of the hydrologic connection between percolating groundwater and surface watercourses is needed if the law is to serve its function of guiding behavior. Two questions must be answered. First, when does a hydrologic connection exist? Second, will surface watercourse, percolating groundwater, or other rules be applied in various types of situations? The courts have had to deal with these problems from time to time. This article will examine the reported decisions in the United States, England and Ireland to determine if any trends have been established in spite of the absence of a clear doctrine in point.

## II. HYDROLOGIC PRINCIPLES

An analysis of the reported cases must be made in the context of the water migration characteristics of the hydrologic cycle. Hydrologists have asserted that the law has failed to recognize the existence of the hydrologic cycle and charge the courts to remedy the deficiency. Specifically, they assert that the law fallaciously recognizes three classes of water—diffused surface water, groundwater, and surface watercourses—and that each has been treated as being independent of the others.<sup>14</sup> To understand that assertion, and its relevance to the question being examined in this article, the hydrologic cycle must be explained.

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11. *Id.*, quoting Charles V. Rankin, 22 Mo. 566, 573 (1856).

12. 129 Mo. App. 691, 108 S.W. 580 (K.C. Ct. App. 1908).

13. *Id.* at 697, 108 S.W. at 582.

14. See, e.g., A. PIPER, INTERPRETATION AND CURRENT STATUS OF GROUND-WATER RIGHTS (U.S. Geo. Survey Circ. No. 432, 1960); H. THOMAS, THE CONSERVA-

## A. Hydrologic Cycle

About 97 percent of the earth's water supply is contained in the oceans. The remaining three percent is fresh water and is located as follows:

Item	Million acre-feet	Percent of total fresh water
Polar ice and glaciers	24,668,000	74.72
Groundwater:		
(1) Fissures to 2500 ft.	3,648,000	11.05
(2) Fissures 2500 ft. to 12,500 ft.	4,565,000	13.83
Lakes	101,000	0.31
Soil Moisture	20,400	0.062
Atmosphere	11,500	0.035
Rivers	933	0.003
Plants and animals	915	0.003
Hydrated earth minerals	336	0.001
<b>Total</b>	<b>33,016,084</b>	<b>100.00</b>

The over three-quarters of the total fresh water supply on earth locked up in ice or at great depth in the earth is not presently available to man for use.<sup>15</sup> Hence, as a theoretical maximum, man has access to less than one percent of the earth's water resources.

The oceans cover more than 70 percent of the earth's surface and absorb the major portion of the sun's radiant energy. About one-half of that energy is used to evaporate sea water. Most of the atmospheric water is obtained by this process.<sup>16</sup> Atmospheric circulation carries the evaporated

TION OF GROUND WATER 243-47 (1951); H. THOMAS, GROUND WATER AND THE LAW (U.S. Geo. Survey Circ. No. 446, 1961); Piper & Thomas, *Hydrology and Water Law: What is Their Future Common Ground?*, in WATER RESOURCES AND THE LAW 7 (1958); Thomas, *Hydrology vs. Water Allocation in the Eastern United States*, in THE LAW OF WATER ALLOCATION IN THE EASTERN UNITED STATES 165, 169-70 (D. Haber & S. Bergen ed. 1958); Bower, *Some Physical, Technological, and Economic Characteristics of Water and Water Resource Systems: Implications for Administration*, 3 NAT. RES. J. 215, 218-19 (1963); Thomas & Leopold, *Ground Water in North America*, 143 SCIENCE 1001 (1964).

15. W. ACKERMANN & G. LOF, TECHNOLOGY IN AMERICAN WATER DEVELOPMENT 11-13 (1959) (percentage figure for soil moisture corrected).

One acre-foot of water equals 43,560 cubic feet or 325,851 gallons. Conceptually, it is one acre of area covered with one foot of water. It is the unit of measure commonly used to designate the quantity of water in reservoirs and other large bodies of water and the quantity supplied by irrigation systems.

16. J. HIRSHLEIFER, J. DEHAVEN & J. MILLIMAN, WATER SUPPLY: ECONOMICS, TECHNOLOGY, AND POLICY 8 (1960); Ackermann, Colman & Ogrosky, *From Ocean to Sky to Land to Ocean*, in WATER: THE YEARBOOK OF AGRICULTURE 41 (1955); Clark, *Plan and Scope of the Work*, in 1 WATERS AND WATER RIGHTS 1, 10-11 (R. Clark ed. 1967).

The sources of atmospheric water are as follows:

Oceans	80,000 cubic miles per year
Lakes and land areas	15,000 cubic miles per year

Ackerman *et al.*, *supra* at 41; Clark, *supra* note 16, at 11.

water to the continents, where it condenses and precipitates to the ground.<sup>17</sup> Although precipitation on the oceans returns directly to the oceanic water supply to recycle again to the atmosphere, precipitation over land, in the form of rain, hail, snow, frost, or dew, splits along four paths:

1. One part, perhaps as much as half, returns to the atmosphere directly by evaporation.
2. A second part, perhaps a sixth, is returned to the atmosphere by transpiration of plants.
3. A third part, perhaps a third, joins streams or glaciers that discharge into the ocean, where it can be returned to the atmosphere.
4. The fourth part, a small but important fraction, enters the ground, but in time returns to the surface, as springs or other groundwater discharge, and from there is returned to the atmosphere.<sup>18</sup>

About 72 percent of the 30 inches of average annual precipitation in the United States, or about 21½ inches, returns to the atmosphere by evaporation or transpiration and is not available for man's use. The remainder, about 8½ inches, is our available source of water.<sup>19</sup> Most of it appears as runoff, either flowing directly over the surface of the land to streams and rivers or percolating into and through the ground to streams and rivers. From there it returns to the oceans to recycle again. Very little becomes trapped in subsurface reservoirs.<sup>20</sup> The operative fact expressed by the concept of the hydrologic cycle is the interrelationship of its different phases and the continuity of migration no matter where water is found.

In the United States as a whole, about 33 to 40 percent of the total runoff, or a little over 3 inches annually, percolates into the ground.<sup>21</sup>

17. Precipitation over the land surfaces of the earth is about 24,000 cubic miles per year. Ackermann *et al.*, *supra* note 16, at 41; Clark, *supra* note 16, at 11.

18. C. HUNT, *PHYSIOGRAPHY OF THE UNITED STATES* 71 (1967). See generally J. Hirshleifer *et al.*, *supra* note 16, at 8; Ackerman *et al.*, *supra* note 16; Linsley, *Hydrology*, in 11 *ENCYCLOPAEDIA BRITANNICA* 959 (1967).

19. J. Hirshleifer *et al.*, *supra* note 16, at 15, citing G. McGUINNESS, *THE WATER SITUATION IN THE UNITED STATES, WITH SPECIAL REFERENCE TO GROUND WATER* 66 (U.S. Geo. Survey Circ. No. 114, 1951); Clark, *supra* note 16, at 13. In Missouri, the average annual precipitation is 40 inches, of which 11 inches is average annual runoff. C. McGUINNESS, *THE ROLE OF GROUND WATER IN THE NATIONAL WATER SITUATION* 457-58 (U.S. Geo. Survey Water Supply Paper No. 1800, 1963).

20. This is especially true in humid areas where total precipitation exceeds evaporation and the distribution of the surplus is widespread. In these areas the surface and underground storage remain near their natural equilibrium levels. Additions to these storages will be balanced by the consequent overflows which eventually appear as flows in surface watercourses reaching the oceans. J. HIRSHLEIFER *et al.*, *supra* note 16, at 19 n.10.

21. *Id.* at 19, citing C. McGUINNESS, *THE WATER SITUATION IN THE UNITED STATES, WITH SPECIAL REFERENCE TO GROUND WATER* 34 (U.S. Geo. Survey Circ. No. 114, 1951). Excluded from this figure is water which returns to the surface by capillary forces and is evaporated, and that which is captured by plants and is transpired.



This water descends through the soil, where some of it is captured by soil particles by molecular attraction. In common parlance, this is the "wetting" of the soil. Amounts of this water which exceed that which can be held by molecular attraction in the "zone of aeration" will descend to the—"zone of saturation"—where water fills the interstices between the soil particles. Beneath the "zone of saturation" will be a stratum of impervious soil or rock through which water cannot pass. Under the force of gravity, water in the "zone of saturation" will flow downhill—at a rate determined by soil permeability and strata gradient—until it either becomes trapped in a groundwater reservoir or reaches the surface and passes into a stream, lake, or ocean. The top of the "zone of saturation" is the water table. Since under natural conditions most groundwater reservoirs remain filled to their equilibrium level, most percolating groundwater must eventually find its way to the surface—where it continues to the ocean.<sup>22</sup>

### B. *Hydrologic Relationship Between Groundwater and Surface Watercourses*

Groundwater will return to the surface at any point where the water table reaches the level of the surface, as at springs, or where it is higher than the level of a stream. Such a stream, which is fed by groundwater flow, is designated an effluent stream.<sup>23</sup> The base flow of most streams, after surface runoff following precipitation has ceased, has as a major component such a groundwater discharge.<sup>24</sup> If the level of a stream is above the water table and the stream bed is permeable (or leaky), water in the stream will percolate into the groundwater supply.<sup>25</sup> Such a stream is designated an influent stream. If the soil is sufficiently permeable, the stream water will percolate out quickly enough to keep the interstices of soil filled and, in effect, create a mound in the water table. If the soil is insufficiently permeable to maintain that condition, stream water will descend through a "zone of aeration" to the water table in the same manner as precipitation does from the surface of the ground. In the former condition, it can be said that there is a direct hydrologic contact between the

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22. See generally C. HUNT, *supra* note 18, at 74-76; Ackermann *et al.*, *supra* note 16, at 46-49; Sayre, *Ground Water*, in 10 ENCYCLOPAEDIA BRITANNICA 949, 950-51 (1967); Thomas, *Underground Sources of Our Water*, in WATER: THE YEARBOOK OF AGRICULTURE 62, 64-74 (1955).

23. C. Hunt, *supra* note 18, at 76, 79; R. LINSLEY, JR., M. KOHLER & J. PAULHUS, *HYDROLOGY FOR ENGINEERS* 123 (1958); Ackermann *et al.*, *supra* note 16, at 49; Bower, *supra* note 14, at 218-19; Clark, *supra* note 16, at 18 n.47, citing C. McGUINNESS, *THE ROLE OF GROUND WATER IN THE NATIONAL WATER SITUATION* 13 (U.S. Geo. Survey Water Supply Paper No. 1800, 1963); Tolman & Stipp, *Analysis of Legal Concepts of Subflow and Percolating Waters*, 21 ORE. L. REV. 113, 115-18 (1942); Wiel, *Need of Unified Law for Surface and Underground Water*, 2 S. CAL. L. REV. 358, 359-64 (1929).

24. Clark, *supra* note 16, at 18 n.47, citing, C. McGUINNESS, *supra* note 23, at 13. The remainder of the base flow comes from lakes and swamps.

25. See authorities cited in note 23, *supra*.

stream and the water table and that rate of flow from one to the other will depend upon the difference of level between them. In the latter condition, there is no direct hydrologic connection and the rate of flow will be independent of the difference in level between them; it will be determined only by the permeability of the soil beneath the stream.<sup>26</sup> But in either condition, there is a hydrologic relationship between the stream and the percolating groundwater supply.

### C. *Effect of Pumping from a Well*

When groundwater is pumped from a well, it must be replaced from the surrounding groundwater supply. The amount of groundwater flowing to the well must equal the amount pumped or the well eventually will run dry. Since water only will flow downhill, a hydraulic gradient must develop around the well steep enough to create the necessary flow to the well. The steepness of the gradient will be determined by the pumping rate and the soil permeability. A large dimple in the water table is created which is designated a "cone of depression."<sup>27</sup> For high capacity wells, these cones of depression can become extremely large and deep; the lowering of the water table two to three miles distant from such a well has been reported.<sup>28</sup> It was the fear of just this effect that prompted the lawsuit in *Higday v. Nickolaus*.<sup>29</sup> Under conditions of bad placement or high pumpage, the cone of depression from one well can lower the water table below the bottoms of nearby wells.<sup>30</sup> This is the situation which has engendered hundreds of lawsuits.

A well can affect the flow of a nearby stream. It can affect an effluent stream, one which is fed by groundwater, in either of two ways. First, it can intercept groundwater which would otherwise percolate to the stream, even though its cone of depression does not reach the stream itself. Second, its cone of depression can reach the stream, lower the water table, and convert the stream from an effluent stream to an influent stream. A well can also affect an existing influent stream, but only if the cone of depression reaches the stream under conditions where the water table otherwise would be in hydraulic contact with it. Under these conditions, the well will steepen the hydraulic gradient and increase the flow from the stream to the groundwater supply. If the water table is not in hydraulic contact with the stream, but passes under it and is separated from it by a "zone of aeration," a lowering of the water table under the stream by a cone of depression will not increase the percolation from the stream. Where the cone of depression does not reach the stream, the well is merely inter-

26. Tolman & Stipp, *supra* note 23, at 117-18.

27. R. LINSLEY, JR. *et al.*, *supra* note 23, at 134-40; Sayre, *supra* note 22, at 951; Tolman & Stipp, *supra* note 23, at 119-20.

28. See *Forbell v. City of New York*, 164 N.Y. 522, 58 N.E. 644 (1900).

29. See note 4, *supra*.

30. R. LINSLEY, JR. *et al.*, *supra* note 23, at 139.

cepting the percolating water after it has left the stream and cannot affect the rate of influent flow.<sup>31</sup>

### III. GROWTH OF GROUNDWATER USAGE

The conflicts between various groundwater users and between groundwater users and surface watercourse users are likely to increase in the future as the demands for water increase. In 1950, groundwater withdrawals in the United States averaged 30 to 35 billion gallons per day, about 17 to 20 percent of total withdrawals from all sources.<sup>32</sup> By 1980, the demand for water will be twice the total of 175 to 200 billion gallons a day used in 1955, and the demand for groundwater probably will make up one-half of this total.<sup>33</sup> This represents a threefold increase in groundwater usage. We are already well along that road. The conflicts between users cannot help but increase and the law must be prepared to deal with them.

### IV. LEGAL CLASSIFICATION OF WATERS

The basic concepts concerning water allocation recognized by the common law seem to be proof of the hydrologists' assertion that various "classes" of water are treated as if they were independent entities.<sup>34</sup> Water allocation rules are divided into three major categories according to the type of water dealt with: surface watercourses, diffused surface water, or groundwater.<sup>35</sup> Treatises and articles on water allocation law make these basic classifications.<sup>36</sup> The rules of water allocation for each class are phrased to apply to conflicts between users of the same class of water and are usually applied by the courts in this manner. A description of the major rules for each class of water will illustrate this proposition.

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31. R. LINSLEY, JR. *et al.*, *supra* note 23, at 139-140; Tolman & Stipp, *supra* note 23, at 119-20.

32. Thomas, *supra* note 22, at 63; The size of groundwater withdrawals and the percentage of total withdrawals from all sources for various purposes in that year were as follows:

Use	Groundwater Withdrawals (1950)	
	Amount (bgd)	Percent of total withdrawals for that purpose from all sources
Rural	3.5	80
Municipal	3.5	25
Industrial	5.5	7
Irrigation	20.0	25

33. *Id.*; C. MCGUINNESS, *supra* note 23, at 83.

34. See authorities cited note 14 *supra*.

35. See, e.g., W. HUTCHINS, *SELECTED PROBLEMS IN THE LAW OF WATER RIGHTS IN THE WEST* 1-2 (U.S. Dep't Agric. Misc. Pub. No. 418, 1942). See also 56 AM. JUR. *WATERS* §§ 3, 6, 65, 101-02 (1947); 6A AMERICAN LAW OF PROPERTY §§ 23.55, .61, .65 (A.J. Casner ed. 1954); 93 C.J.S. *WATERS* §§ 2-3, 86, 112 (1956).

36. Treatises on water law specifically or on property law generally: H. COULSON & U. FORBES, *LAW OF WATERS, SEA, TIDAL, AND INLAND AND LAND DRAINAGE* 220 (6th ed. 1952); J. GOULD, *LAW OF WATERS* 464 (1st ed. 1883); S. WIEL, *WATER RIGHTS IN THE WESTERN STATES* 31 (3d ed. 1911); A. WISDOM, *LAW OF*

## A. Surface Watercourses

### 1. Riparian Rights

There are two major allocation doctrines which apply to water in surface watercourses in the United States. In the humid eastern states, the riparian doctrine holds sway. It states that each proprietor whose land abuts upon a watercourse is entitled to have its waters come down to him unaltered in quantity or quality, subject to the co-equal right of each proprietor to make reasonable uses of the waters. What constitutes a reasonable use is determined by the circumstances of each case. Although it is usually said that only riparian proprietors—those whose lands abut upon the watercourse—are entitled to make use of the waters, under certain circumstances nonriparians may be granted a right to use them.<sup>37</sup> A major characteristic of riparianism is that it defines the relationship between users of water in a surface watercourse. It says nothing about the rights of riparians who are injured by diverters of groundwater which feeds a surface watercourse.

### 2. Prior Appropriation

In the dry western states, rights to water in surface watercourses are determined by the prior appropriation doctrine. This doctrine rests on the maxim "first in time, first in right." The first landowner to establish a right to divert water is the last person to be cut off in time of shortage. When water supplies are inadequate, the most junior right is cut off first; thereafter, rights are cut off in inverse order of seniority until the quantity

RIVERS AND WATERCOURSES 5-8 (1962); W. BURBY, HANDBOOK OF THE LAW OF REAL PROPERTY 48-49, 57, 59-60 (3d ed. 1965); J. CRIBBET, PRINCIPLES OF THE LAW OF PROPERTY 297 (1962); H. TIFFANY, THE LAW OF REAL PROPERTY §§ 380, 386, 388 (3d ed. abr. 1970).

Treatises and articles on the water law of specific states (alphabetically by states):

F. MALONEY, S. PLAGER & F. BALDWIN, JR., WATER LAW AND ADMINISTRATION: THE FLORIDA EXPERIENCE 141-42 (1968); F. MANN, H. ELLIS & N. KRAUSZ, WATER-USE LAW IN ILLINOIS 8 (U. of Ill. Agric. Expt. Sta. Bull. No. 703, 1964); P. GALBREATH, MARYLAND WATER LAW 1-2 (1965); ARENS & HABER, *Michigan Law of Water Allocation*, in THE LAW OF WATER ALLOCATION IN THE EASTERN UNITED STATES 377, 379, 387-88, 393 (D. Haber & S. Bergen ed. 1958); T. LAUER, MISSOURI WATER LAW 3 (1966); Hanks, *Law of Water in New Jersey: Part I*, 22 RUTGERS L. REV. 621, 626 (1968); Ellis, *Some Legal Aspects of Water Use in North Carolina*, in THE LAW OF WATER ALLOCATION IN THE EASTERN UNITED STATES 189, 192 (D. Haber & S. Bergen ed. 1958); Comment, *Water Rights in Tennessee*, 27 TENN. L. REV. 557, 558 (1960); W. HUTCHINS, THE TEXAS LAW OF WATER RIGHTS 515, 558 (1961); Lugar, *Water Law in West Virginia*, 66 W. VA. L. REV. 191, 192 (1964); H. ELLIS, J. BEUSCHER, C. HOWARD & J. DEBRAAL, WATER-USE LAW AND ADMINISTRATION IN WISCONSIN 12-14 (1970).

37. See, e.g., Tyler v. Wilkinson, 24 F. Cas. 472 (No. 14,312) (C.C.D.R.I. 1827); Harris v. Brooks, 225 Ark. 436, 283 S.W.2d 129 (1955); Bollinger v. Henry, 375 S.W.2d 161 (Mo. 1964). Cf. Davis, *Australian and American Water Allocation Systems Compared*, 9 B.C. INDUS. & COM. L. REV. 647, 676-88 (1968); Lauer, *Reflections on Riparianism*, 35 MO. L. REV. 1 (1970).

of water to be diverted again equals the available supply. Rights are established by posting or giving notice of intent to divert, followed by applying the water to a beneficial use within a reasonable time. A beneficial use is defined as an application of water which results in an economic benefit to the appropriator and involves actual physical control over the water by diversion or retention. The appropriative right is not related to ownership of land abutting upon the stream, but on physical appropriation of water; hence, the water may be put to use anywhere and by anyone, whether riparian or nonriparian.<sup>38</sup> Like riparianism, prior appropriation is phrased in terms of the rights of various landowners to use water in surface watercourses. Unlike riparianism, however, the doctrine has been extended in some western states to include sources of water tributary to streams and to supporting groundwater. These extensions of the doctrine are the only clear extension of surface watercourse law to other classes of water and will be discussed later.<sup>39</sup>

### B. Diffused Surface Water

There are three rules which various states have applied to the management of diffused surface water. This is water which flows over the surface of the ground and is not located within the beds and banks of a stream. The law of diffused surface water deals principally with the problem of getting rid of it. The three rules are the "common enemy" rule, the "civil law" rule, and the "reasonable use" rule. The "common enemy" rule states that each landowner may use his land as he sees fit, and that he may change its surface to fight off or control diffused surface water draining onto or off of his land by retention, diversion, repulsion, or altered transmission without liability to his neighbors.<sup>40</sup> The "civil law" rule requires each landowner to accept natural drainage from land lying above his own and prohibits the upper landowner from concentrating or redirecting drainage to lower lands.<sup>41</sup> The "reasonable use" rule allows a landowner to make reasonable uses of his land and to make reasonable

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38. See, e.g., *Irwin v. Phillips*, 5 Cal. 140 (1855); *Coffin v. Left Hand Ditch Co.*, 6 Colo. 443 (1882); *Empire Water & Power Co. v. Cascade Town Co.*, 205 F. 123 (8th Cir. 1913) (applying Colorado law); *Crawford v. Lehi Irrigation Co.*, 10 Utah 2d 165, 350 P.2d 147 (1960). Cf. *Davis, supra* note 37, at 688-97.

39. See text accompanying notes 108-20 *infra*.

40. See, e.g., *Gannon v. Hargadon*, 92 Mass. (10 Allen) 106 (1865); *Casanover v. Villanova Realty Co.*, 209 S.W.2d 556 (St. L. Mo. App. 1948); *Watters v. National Drive-In, Inc.*, 266 Wis. 432, 63 N.W.2d 708 (1954). Cf. *Davis, The Law of Surface Water in Missouri*, 24 Mo. L. REV. 137, 149-50 (1959); *Kinyon & McClure, Interferences with Surface Waters*, 24 MINN. L. REV. 891, 898-904 (1940); *Maloney & Plager, Diffused Surface Water: Scourge or Bounty?* 8 NAT. RES. J. 72, 78-79 (1968).

41. See, e.g., *Peck v. Herrington*, 109 Ill. 611 (1884); *Fennema v. Menninga*, 236 Iowa 543, 19 N.W.2d 689 (1945); *Martin v. Riddle*, 26 Pa. 415 (1856). Cf. *Davis, supra* note 40, at 147-48; *Kinyon & McClure, supra* note 40, at 893-97; *Maloney & Plager, supra* note 40, at 76-77.

alterations in the drainage pattern onto lower lands, with due regard to the co-equal right of the lower landowner also to make reasonable uses of his land. The rights of land use are correlative and interferences with natural drainage patterns must not be unreasonably injurious to other landowners.<sup>42</sup> All three rules are concerned with the relationship between landowners with respect to drainage of diffused surface water off land. The rules do not address themselves to retention of diffused surface water generally,<sup>43</sup> to retention under conditions where flow in a nearby surface watercourse would be reduced,<sup>44</sup> or to diversion to a different watershed where the flow of a watercourse would be increased.<sup>45</sup>

### C. Percolating Groundwater

For the allocation of groundwater, separate rules have been developed for so-called "underground streams,"<sup>46</sup> to which ordinary riparian or prior appropriation principles apply,<sup>47</sup> and for percolating groundwater. There are three major rules controlling the allocation of percolating groundwater which are recognized throughout the United States: "absolute ownership," "reasonable use," and eastern "correlative rights." In addition, several western states have either supplemented these doctrines with the California "correlative rights" or "common pool" doctrine, or have replaced them with prior appropriation allocation.

#### 1. Absolute Ownership Rule

The "absolute ownership" rule is derived from two propositions: (1) percolating groundwater spreads in every direction under the land and

42. See, e.g., *Klutey v. Department of Highways*, 428 S.W.2d 766 (Ky. 1967); *Enderson v. Kelehan*, 226 Minn. 163, 32 N.W.2d 286 (1948); *Franklin v. Durgee*, 71 N.H. 186, 51 A. 911 (1901); *Armstrong v. Francis Corp.*, 20 N.J. 320, 120 A.2d 4 (1956). Cf. *Davis*, *supra* note 40, at 151-52; *Kinyon & McClure*, *supra* note 40, at 904-13; *Maloney & Plager*, *supra* note 40, at 79-81.

43. This problem is discussed in *Dolson*, *Diffused Surface Water and Riparian Rights: Legal Doctrines in Conflict*, 1966 Wis. L. Rev. 58, 59-92; *Kinyon & McClure*, *supra* note 40, at 913-25; *Maloney & Plager*, *supra* note 40, at 107-09.

44. See, e.g., *Rawstron v. Taylor*, 11 Ex. 369, 156 Eng. Rep. 873 (1855); *Taylor v. St. Helens Corp.*, 6 Ch. D. 264 (1877). But see *Oklahoma Water Res. Bd. v. Central Okla. Master Conservancy Dist.*, 464 P.2d 748 (Okla. 1968); *Rugby Joint Water Bd. v. Walters*, [1967] Ch. 397 (1966). This problem is discussed in *Dolson*, *supra* note 43, at 93-102.

45. This problem is discussed in *Maloney & Plager*, *supra* note 40, at 89-92.

46. Several hydrologists have argued that there is no such thing as an underground stream with a defined channel and definite direction except in rare instances. See, e.g., *Piper & Thomas*, *supra* note 14, at 10-11; *Tolman & Stipp*, *supra* note 23, at 121-24, 130-32. The correlation between the hydrologic understanding of groundwater movement and the legal concept of underground streams is an important matter to be investigated, but is beyond the scope of this article.

47. See, e.g., *Hale v. McLea*, 53 Cal. 578 (1879); *Tampa Waterworks Co. v. Cline*, 37 Fla. 586, 20 So. 780 (1896); *Saddler v. Lee*, 66 Ga. 45 (1880); *Jones v. Home Bldg. & Loan Ass'n*, 252 N.C. 626, 114 S.E.2d 638 (1960); *Clinchfield Coal Corp. v. Compton*, 148 Va. 437, 139 S.E. 308 (1927).

it is impossible for a landowner to know what effect any activity on his land or any diversion of groundwater will have until after the fact; and (2) each landowner owns everything lying beneath the surface of his land, to the center of the earth. Therefore, the landowner may make any use of percolating groundwater he chooses, including piping it to non-overlying land or selling it, or may make any use of his land which affects the movement of groundwater, without incurring liability for resulting injury to his neighbor's percolating groundwater supply.<sup>48</sup> The rule seems to be based on the notion that a person should not be held liable for adverse consequences of his activities if he is not in a position to predict or anticipate those consequences in advance. Although the doctrine seems to have had its origin in a concept of essential fairness, the rule has been applied in situations where a landowner knew perfectly well what the results of his activity would be; in other words, the rule has been interpreted as creating a conclusive presumption that a landowner cannot and does not know the movements of percolating groundwater under his land.

## 2. Reasonable Use Rule

The "reasonable use" rule is a modification of the "absolute ownership" rule. In essence, it holds a landowner immune from liability only (1) if he uses percolating groundwater on the land on which the well is located (the overlying land) and the use is reasonable per se, or (2) if the use of the land which affects the movement of percolating groundwater is reasonable per se. In other words, a landowner may not waste percolating groundwater, maliciously divert it, or sell it for use on non-overlying land to the injury of his neighbor's groundwater supply. No comparison of his use of groundwater or land is made with those of his neighbor under this rule.<sup>49</sup> The term "reasonable use," therefore, does not mean what it means in the allocation of water in surface watercourses or of diffused surface water—a correlative or co-equal right of use in several neighboring landowners. Instead, it creates, as does the "absolute ownership" rule, a right

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48. See, e.g., *Behrens v. Scharringhausen*, 22 Ill. App. 2d 326, 161 N.E.2d 44 (1959); *Western Md. R.R. v. Martin*, 110 Md. 554, 73 A. 267 (1909); *Gamer v. Town of Milton*, 346 Mass. 617, 195 N.E.2d 65 (1964); *Frazier v. Brown*, 12 Ohio St. 294 (1861); *Rose v. Socony-Vacuum Corp.*, 54 R.I. 411, 173 A. 627 (1934); *Chatfield v. Wilson*, 28 Vt. 49 (1856); *Huber v. Merkel*, 117 Wis. 355, 94 N.W. 354 (1903); *Acton v. Blundell*, 12 M. & W. 324, 152 Eng. Rep. 1223 (Ex. 1843). See also *Ellis*, *supra* note 3, at 21; *Thomas*, *supra* note 1.

49. *DeBok v. Doak*, 188 Iowa 597, 176 N.W. 631 (1920); *Associated Constr. Stone Co. v. Pewee Valley Sanitarium & Hosp.*, 376 S.W.2d 316 (Ky. 1963); *Chesley v. King*, 74 Me. 164 (1882); *Finley v. Teeter Stone, Inc.*, 251 Md. 428, 248 A.2d 106 (1968); *Bayer v. Nello L. Teer Co.*, 256 N.C. 509, 124 S.E.2d 552 (1962); *Rothrauff v. Sinking Spring Water Co.*, 339 Pa. 129, 14 A.2d 87 (1940); *Wheatley v. Baugh*, 25 Pa. 528 (1855) (this case is usually cited as an absolute ownership decision, but a close reading of its language indicates that interpretation is incorrect). See *Ellis*, *supra* note 3, at 21; *Thomas*, *supra* note 1.

of capture with the best right, in practice, going to the landowner in the hydrologically superior location.<sup>50</sup>

### 3. Western "Correlative Rights" Rule

The "correlative rights" rule as it has developed in the eastern states is quite different from the western rule of the same name. "Correlative rights" in the eastern decisions means that a comparison of uses of the conflicting users of percolating groundwater must be made. "Correlative rights" in western parlance means that when the users over a common aquifer are "mining" the percolating groundwater—when the aggregate annual pumpage exceeds the annual natural recharge—all users must cut back their pumping proportionately according to their allotted rights until pumping equals recharge. The western doctrine does not allocate groundwater diversion rights as between various users; it requires proportional reductions in the exercise of those rights acquired under other doctrines to prevent depletion of the groundwater resource.<sup>51</sup> The western rule is, in reality, a "common pool" doctrine similar to that developed for the oil and gas industry and is a resource conservation concept. It is unfortunate that the western and eastern doctrines have the same name, since they have no conceptual relationship.<sup>52</sup>

### 4. Eastern Correlative Rights Rule

The eastern "correlative rights" rule allows each landowner to make reasonable uses of percolating groundwater on his overlying land and to make reasonable uses of land that affect the movement of that groundwater. What is a reasonable use is decided by comparing the uses made by the conflicting users for the purposes of determining liability and of affording relief. In other words, each landowner's right is a co-equal usufructuary right and, therefore, correlative.<sup>53</sup> It is the only doctrine

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50. There is great confusion about the distinction between the "reasonable use" rule and the eastern "correlative rights" rule. A note in this issue makes a careful examination of the cases following these two rules and suggests a clarification. See Thomas, *supra* note 1. See also Hanks & Hanks, *supra* note 3, at 639-42.

51. See, e.g., *City of Pasadena v. City of Alhambra*, 33 Cal. 2d 908, 207 P.2d 17 (1949); *Katz v. Walkinshaw*, 141 Cal. 116, 74 P. 766 (1903); *Glover v. Utah Oil Ref. Co.*, 62 Utah 174, 218 P. 955 (1923); *Horne v. Utah Oil Ref. Co.*, 59 Utah 279, 202 P. 815 (1921). See also Hanks & Hanks, *supra* note 3, at 637-39.

52. On this distinction, see F. MALONEY *et al.*, *supra* note 36, at 157-58; Hanks & Hanks, *supra* note 3, at 644 n.96; McHendrie, *The Law of Underground Water*, 13 ROCKY MOUNTAIN L. REV. 1, 5-7 (1940). See also *Yeo v. Tweedy*, 34 N.M. 611, 618-23, 286 P. 970, 973-75 (1929).

53. See, e.g., *Jones v. Oz-Ark-Val Poultry Co.*, 228 Ark. 76, 306 S.W.2d 111 (1957); *MacArtor v. Graylyn Crest III Swim Club, Inc.*, 41 Del. Ch. 26, 187 A.2d 417 (Sup. Ct. 1963); *Koch v. Wick*, 87 So. 2d 47 (Fla. 1956); *Higday v. Nickolaus*, 469 S.W.2d 859 (K.C. Mo. App. 1971); *Bassett v. Salisbury Mfg. Co.*, 43 N.H. 569 (1862). The court in *Higday* indicated that it was adopting the "reasonable use"



governing the allocation of percolating groundwater which permits and requires a comparison of the equities of conflicting uses. In this fundamental characteristic it is identical to the reasonable use doctrines governing surface watercourses and diffused surface water.

All three major percolating groundwater rules followed in the eastern states, and the California "correlative rights" or "common pool" rule, have one common characteristic. They all control the relationship between users of percolating groundwater from a single aquifer or connected aquifers. They do not address themselves to possible conflicts between a user of percolating groundwater and a user of a hydrologically related surface watercourse.

### 5. Prior Appropriation

The last rule concerning the allocation of percolating groundwater which must be mentioned is prior appropriation. In many states in the West, either by case decision or statute, the principles of the prior appropriation doctrine developed for surface watercourses have been applied independently to percolating groundwater in single or connected aquifers. There are no differences in concept or application, but the hidden nature of the water source does complicate the problems of proof connected with proceedings under the doctrine.<sup>54</sup> Although the prior appropriation system for surface watercourses and percolating groundwater are independent of each other, when groundwater is proven to be tributary to a stream or to be part of its subflow or subsurface support, the groundwater will be administered under the prior appropriation system applicable to the surface stream rather than that applying to neighboring groundwater aquifers. This is the principal instance where the courts clearly have recognized the hydrologic connection between percolating groundwater and surface watercourses.

## V. LEGAL RECOGNITION OF THE HYDROLOGIC INTERRELATIONSHIP BETWEEN PERCOLATING GROUNDWATER AND SURFACE WATERCOURSES

Discussions of the legal interrelationship between groundwater and surface watercourses rarely occur in general discussions of water law. There have been few articles and discussions in point, except with respect to

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rule and rejecting the California "correlative rights" rule. But in reality it was adopting the eastern "correlative rights" rule, since it compared its rule to the "reasonable use" rule applicable to surface watercourses. *Higday v. Nickolaus, supra*, at 866-67, 869-70. This confusion between label and definition is discussed at length in a note in this issue. See Thomas, *supra* note 1.

54. Adoption by case decision: *e.g.*, *Justesen v. Olsen*, 86 Utah 158, 40 P.2d 802 (1935); *Wrathall v. Johnson*, 86 Utah 50, 40 P.2d 755 (1935). Adoption by statute: *e.g.*, *Yeo v. Tweedy*, 34 N.M. 611, 286 P. 970 (1929); *Knight v. Grimes*, 80 S.D. 517, 127 N.W.2d 708 (1964). See Clark, *Ground Water Legislation in the Light of Experience in the Western States*, 22 MONT. L. REV. 42 (1960); and numerous other articles on the groundwater legislation of particular western states.

groundwater tributary to or supportive of surface watercourses governed by prior appropriation.<sup>55</sup> None of them makes a substantial analysis of the cases. This part will discuss the eastern and western cases in point.

The author has made an exhaustive search to find every case involving a conflict between groundwater users and surface watercourse users in the 31 states east of and including the tier along the western bank of the Mississippi River. In addition, he believes he has found most of these cases in the 17 western states.<sup>56</sup> Percolating groundwater/surface watercourse cases are listed in the Appendix. The basic questions to be answered in the analyses which follow are whether the courts recognize the hydrologic relationship between percolating groundwater and surface watercourses; whether this recognition, if it occurs, affects the result; and what principles, if any, the courts apply to this relationship.

### A. Analysis of the Cases

With rare exception, the courts in the eastern states have not dealt formally with the hydrologic relationship between percolating groundwater and surface watercourses. Instead, they have usually made their decisions by choosing to follow either percolating groundwater rules or surface watercourse rules. The purpose of the following analyses is to determine when the courts choose to follow one set of rules and when to follow the other. In the western states, the situation is much different. There the courts usually explicitly follow surface watercourse rules when either groundwater flow tributary to a stream or subflow or subsurface support of a stream is involved.

#### 1. Hydrologic Conditions in the Cases

As an introduction to the analyses, it is useful as background to know what types of cases have been dealt with. The hydrologic conditions existing in the cases are as follows:

Table 1

#### *Hydrologic Conditions Existing in Cases<sup>57</sup>*

- |  |   |
|--|---|
| I. Influent streams (water leaves stream to groundwater)     |   |
| A. Diversion from stream lowers groundwater level and yield. |   |
| eastern cases:   | 3 |
| western cases:   | 2 |

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55. Prior appropriation law is discussed in: Moses, *The Correlation of Surface and Underground Water Rights*, 27 OKLA. B.A.J. 2095 (1956); Moses, *Basic Groundwater Problems*, 14 ROCKY MT. MIN. L. INSTIT. 501, 518-22 (1968); Tolman & Stipp, *supra* note 23; Wiel, *supra* note 23. The only discussion of common law principles is Hanks & Hanks, *The Law of Water in New Jersey: Groundwater*, 24 RUTGERS L. REV. 621, 642-46 (1970).

56. So far as the author is aware, there are no cases from Alaska or Hawaii.

57. See APPENDIX for case names.

- B. Reduction in reservoir level lowers water table.
    - eastern cases: 1
    - western cases: 0
  - C. Raised reservoir level raises water table.
    - eastern cases: 11
    - western cases: 0
  - D. Pumping or groundwater drainage draws water from stream and reduces stream flow.
    - eastern cases: 8
    - western cases: 8
    - English cases: 3
  - E. Stream pollution degrades groundwater.
    - eastern cases: 1
    - western cases: 0
- II. Effluent streams (water enters stream from groundwater)
- A. Pumping or groundwater drainage reduces additions to stream and reduces its flow.
    - eastern cases: 16
    - western cases: 26
    - English cases: 8
  - B. Pumping or groundwater drainage lowers water table and reservoir level.
    - eastern cases: 2
    - western cases: 0
  - C. Raised reservoir level obstructs groundwater drainage and raises water table.
    - eastern cases: 4
    - western cases: 0
  - D. Diversion from stream draws more flow from groundwater and reduces well or drainage yield.
    - eastern cases: 1
    - western cases: 0
  - E. Groundwater pollution degrades stream.
    - eastern cases: 4
    - western cases: 0

Most cases fall into one of two types: those where groundwater pumping or diversions have reduced stream flow (69),<sup>58</sup> and those where a reservoir has flooded land by inducing or obstructing percolation (15).<sup>59</sup> Only six cases involved a stream diversion affecting the groundwater supply,<sup>60</sup> only five involved pollution,<sup>61</sup> and only three involved the lowering of related

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58. *Id.*, categories I.D. and II.A.

59. *Id.*, categories I.C. and II.C.

60. *Id.*, categories I.A. and II.D.

61. *Id.*, categories I.E. and II.E.

reservoir and water table levels.<sup>62</sup> The concentration on certain types of fact situations in the cases may have produced a similar concentration in the rules followed.

## 2. Legal Rules Followed in the Cases

The various legal rules followed in the cases are as follows. A comparison of the rules with the hydrologic conditions will be made later.

Table 2

*Legal Rules Followed in Cases*<sup>63</sup>

1. Percolating groundwater rules followed.	
a. Absolute ownership.	
eastern states—cases:	16
—jurisdictions:	9
western states—cases:	2
—jurisdictions:	2
English cases:	8
b. Reasonable use.	
eastern states—cases:	5
—jurisdictions:	2
western states—cases:	1
—jurisdictions:	1
c. Correlative rights.	
eastern states—cases:	3
—jurisdictions:	2
western states—cases:	0
—jurisdictions:	0
d. Common pool (California “correlative rights”).	
eastern states—cases:	0
—jurisdictions:	0
western states—cases:	1
—jurisdictions:	1
2. Surface watercourse rules followed.	
a. Riparian rights.	
i. Natural flow doctrine.	
eastern states—cases:	10
—jurisdictions:	5

62. *Id.*, categories I.B. and II.B.

63. See APPENDIX for case names.

western states—cases:	3
—jurisdictions:	1
English cases:	2
ii. Reasonable use doctrine.	
eastern states—cases:	1
—jurisdictions:	1
western states—cases:	3
—jurisdictions:	2
b. Prior appropriation.	
eastern states—cases:	0
—jurisdictions:	0
western states—cases:	31
—jurisdictions:	7
3. Other special rules followed.	
a. Trespass—flooding compensation.	
eastern states—cases:	8
—jurisdictions:	4
western states—cases:	0
—jurisdictions:	0
b. Induced underground current.	
eastern states—cases:	5
—jurisdictions:	2
western states—cases:	0
—jurisdictions:	0
English cases:	1
c. Nuisance	
eastern states—cases:	4
—jurisdictions:	2
western states—cases:	0
—jurisdictions:	0
d. Negligence	
eastern states—cases:	1
—jurisdictions:	1
western states—cases:	0
—jurisdictions:	0
e. Natural mine drainage	
eastern states—cases:	2
—jurisdictions:	1
western states—cases:	0
—jurisdictions:	0

## f. Other

eastern states—cases:	2
—jurisdictions:	1
western states—cases:	0
—jurisdictions:	0
English cases:	1

What is immediately apparent from this breakdown of the decisions is that most of the western cases are decided according to the prior appropriation doctrine applicable to surface watercourses.<sup>64</sup> There are 31 of these decisions compared to only four decisions decided under some rule pertaining to percolating groundwater. In addition, there were six other cases decided under one of the other rules pertaining to surface watercourses. Without going further, this suggests that the western courts do recognize the hydrologic connection between percolating groundwater and surface watercourses and treat the groundwater as part of the watercourse when a stream is affected. By contrast, the eastern cases are more evenly split. Cases following percolating groundwater rules number 24 (reinforced by eight English decisions), while only 11 follow surface watercourse rules (plus two English decisions). This would seem to suggest that the eastern courts favor the well owner, while the western courts favor the stream user, but the former conclusion requires further consideration in light of the 18 cases (plus one English case) following various special rules seemingly recognizing the hydrologic relationship.

## 3. Legal Rule vs. Hydrologic Condition

The next table indicates the relationship between the legal rule followed and the hydrologic condition existing in each case. Its purpose is to show the distribution of the large number of cases following prior appropriation and absolute ownership rules. The table makes clear that one-half the cases are concerned with a single hydrologic problem, the reduction in stream flow caused by pumping from wells or diverting groundwater which drains into a stream. One-half of these cases (23) are western and were decided on the basis of prior appropriation—which gives preference to the stream diverter in most cases. The other one-half are mostly eastern cases, 75 percent of which (21) were decided on the basis of the absolute ownership rule or reasonable use (groundwater) rule—which favors the well owner. The other large group of cases involved the raising of the water table by constructing or raising a reservoir, and nearly all (14 out of 16) were decided by rules which would grant compensation to the flooded landowner.

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64. See cases cited *Id.* categories I.A.2.b., I.D.2.b., and II.A.2.b.

*Table 3*  
*Legal Rule vs. Hydrologic Condition*<sup>65</sup>

<i>Hydrologic Condition</i>  <i>Legal Rule</i>	<i>Influent Stream</i>					<i>Effluent Stream</i>					<i>Total</i>
	<i>Diversion from stream depletes g.w.</i>	<i>Reservoir lowers water table</i>	<i>Reservoir raises water table</i>	<i>Pumping draws water from stream</i>	<i>Stream pollutes groundwater</i>	<i>Pumping reduces stream flow</i>	<i>Pumping lowers reservoir</i>	<i>Reservoir blocks groundwater</i>	<i>Diversion from stream lowers g.w.</i>	<i>Groundwater pollutes stream</i>	
<i>Groundwater</i>											
Abs. Own.	2	—	—	1	—	18	—	2	1	1	25
Reas. Use	2	—	—	—	—	3	1	—	—	—	6
Corr. Rts.	—	—	2	—	—	—	—	1	—	—	3
Comm. Pool	1	—	—	—	—	—	—	—	—	—	1
<b>Total</b>	<b>5</b>	<b>—</b>	<b>2</b>	<b>1</b>	<b>—</b>	<b>21</b>	<b>1</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>35</b>
<i>Surf. Watercourse</i>											
Nat. Flow	1	—	1	5	—	6	1	—	—	1	15
Reas. Use	1	—	—	2	—	1	—	—	—	—	4
Prior App.	1	—	—	7	—	23	—	—	—	—	31
<b>Total</b>	<b>3</b>	<b>—</b>	<b>1</b>	<b>14</b>	<b>—</b>	<b>30</b>	<b>1</b>	<b>—</b>	<b>—</b>	<b>1</b>	<b>50</b>
<i>Other Special Rules</i>											
Trespass	—	—	7	—	—	—	—	1	—	—	8
Undergrd. Curr.	—	—	—	6	—	—	—	—	—	—	6
Nuisance	—	—	1	—	1	—	—	—	—	2	4
Negligence	—	1	1	—	—	—	—	—	—	—	2
Nat. Mine Drain.	—	—	—	—	—	—	—	—	—	2	2
Other	—	—	—	—	—	3	—	—	—	—	3
<b>Total</b>	<b>—</b>	<b>1</b>	<b>9</b>	<b>6</b>	<b>1</b>	<b>3</b>	<b>—</b>	<b>1</b>	<b>—</b>	<b>4</b>	<b>25</b>
<b>Grand Total</b>	<b>8</b>	<b>1</b>	<b>12</b>	<b>21</b>	<b>1</b>	<b>54</b>	<b>2</b>	<b>4</b>	<b>1</b>	<b>6</b>	<b>110</b>

#### 4. Decisions in the Cases

The distribution of cases shown in the last table suggests that there may be a tendency toward certain results in various fact situations. Table 4, following, indicates the relationship between the hydrologic conditions, whether the plaintiff was a stream or groundwater user, and who won in each case. At the bottom of the table is summarized the decision reached

65. The figures in this table do not correspond exactly to those in Table 1 because a few cases are counted twice here. They are higher than the corresponding figures in Tables 4-7 because of the inclusion of dicta.

and the determination whether the stream user or groundwater user was the injuring party. Table 5 further summarizes the results of Table 4 by showing the relationship between the hydrologic condition and whether the stream user or the groundwater user won each case. It also shows the relationship between who won each case and who was the injuring party. This information was used to construct Table 6.

It will be noted from Tables 4 and 5 that certain hydrologic conditions are marked with an asterisk (\*). Those are conditions in which the stream user has used the water in such a way as to injure a neighboring ground-

Table 4  
Hydrologic Condition vs. Decision in Case

Decision in Case	Stream User is Plaintiff						Groundwater User is Plaintiff					
	wins			loses			wins			loses		
Hydrologic Condition	East	West	Eng.	East	West	Eng.	East	West	Eng.	East	West	Eng.
<i>Influent Stream</i>												
*Diversion from stream depletes g.w.	—	1	—	—	—	—	2	1	—	1	—	—
*Reservoir lowers water table	—	—	—	—	—	—	—	—	—	1	—	—
*Reservoir raises water table	—	—	—	—	—	—	10	—	—	2	—	—
Pumping draws water from stream	8	6	2	—	1	1	—	1	—	—	—	—
*Stream pollutes groundwater	—	—	—	—	—	—	—	—	—	1	—	—
<i>Effluent Stream</i>												
Pumping reduces stream flow	6	14	1	7	2	7	—	1	—	—	9	—
Pumping lowers reservoir	2	—	—	—	—	—	—	—	—	—	—	—
*Reservoir blocks groundwater	—	—	—	—	—	—	1	—	—	3	—	—
*Diversion from stream lowers g.w.	—	—	—	—	—	—	1	—	—	—	—	—
Groundwater pollutes stream	2	—	—	2	—	—	—	—	—	—	—	—
<i>Stream User injures Groundwater User (entries marked *)</i>												
	—	1	—	—	—	—	14	1	—	8	—	—
<i>Groundwater User injures Stream User (unstarred entries)</i>												
	18	20	3	9	3	8	—	2	—	—	9	—



water user. The unmarked hydrologic conditions involve the reverse situation—where the groundwater user has done something which has injured a stream user. Tables 6 and 7 reanalyze the cases according to these two groups of hydrologic conditions. Table 6 indicates the relationship between the determination whether the stream or groundwater user wins in each of those two groups of hydrologic conditions, and the rule followed in making that determination. Table 7 summarizes the analysis of Table 6 by indicating both whether the stream user or groundwater user is the preferred user under each rule and whether the injuring or injured party is the preferred party under each rule. That is the information which answers the question: is there a trend in the cases recognizing or refusing

*Table 5*  
*Hydrologic Condition vs. Decision in Case—Summary*

<i>Decision in Case</i> <i>Hydrologic Condition</i>	<i>Stream User Wins</i>			<i>Groundwater User Wins</i>		
	East	West	Eng.	East	West	Eng.
<i>Influent Stream</i>						
*Diversion from stream depletes g.w.	1	1	—	2	1	—
*Reservoir lowers water table	1	—	—	—	—	—
*Reservoir raises water table	2	—	—	10	—	—
Pumping draws water from stream	8	6	2	—	2	1
*Stream pollutes groundwater	1	—	—	—	—	—
<i>Effluent Stream</i>						
Pumping reduces stream flow	6	23	1	7	3	7
Pumping lowers reservoir	2	—	—	—	—	—
*Reservoir blocks groundwater	3	—	—	1	—	—
*Diversion from stream lowers g.w.	—	—	—	1	—	—
Groundwater pollutes stream	2	—	—	2	—	—
<i>Stream User injures Groundwater User</i> (entries marked *)	8	1	—	14	1	—
<i>Groundwater User injures Stream User</i>	18	29	3	9	5	8

to recognize the hydrologic connection between percolating groundwater and surface watercourses?<sup>66</sup>

Table 6  
Legal Rule vs. Decision in Case

Legal Rule	Stream User injures Groundwater User						Groundwater User injures Stream User					
	Stream User wins			Groundwater User wins			Groundwater User wins			Stream User wins		
	East	West	Eng.	East	West	Eng.	East	West	Eng.	East	West	Eng.
<i>Groundwater</i>												
Abs. Own.	4	—	—	—	—	—	5	—	8	—	—	—
Reas. Use	—	—	—	1	1	—	2	—	—	1	—	—
Corr. Rts.	1	—	—	2	—	—	—	—	—	—	—	—
Comm. Pool	—	—	—	—	—	—	—	—	—	—	—	—
Total	5	—	—	3	1	—	7	—	8	1	—	—
<i>Surface Watercourse</i>												
Nat. Flow	—	—	—	2	—	—	—	—	—	6	3	2
Reas. Use	—	—	—	—	1	—	—	1	—	1	1	—
Prior App.	—	1	—	—	—	—	—	4	—	—	26	—
Total	—	1	—	2	1	—	—	5	—	7	30	2
<i>Other Special Rule</i>												
Trespass	1	—	—	7	—	—	—	—	—	—	—	—
Undergrd. Curr.	—	—	—	—	—	—	—	—	—	6	—	—
Nuisance	1	—	—	1	—	—	—	—	—	2	—	—
Negligence	1	—	—	1	—	—	—	—	—	—	—	—
Nat. Mine Drain.	—	—	—	—	—	—	2	—	—	—	—	—
Other	—	—	—	—	—	—	—	—	—	2	—	1
Total	3	—	—	9	—	—	2	—	—	10	—	1
<i>Grand Total</i>	8	1	—	14	2	—	9	5	8	18	30	3

a. Western Cases

It is clear at once from Tables 6 and 7 that the law of the western states recognizes the hydrologic connection between percolating groundwater and surface watercourses. The tables indicate that most of the western cases involve a groundwater user affecting water use by a stream user

66. A simple analysis of determining whether the plaintiff is a stream user or groundwater user and whether he won or lost does not give as good results. The reason is that there are several cases where the plaintiff is the injuring party and is seeking to quiet title. The decisions in those cases would fall in with the cases where the plaintiff is the injured party, when they should be added with the decisions where the defendant is the injuring party. The analysis in Tables 6 and 7 accomplishes this result.

Table 7  
*Legal Rule vs. Decision in Case—Summary*

Legal Rule	Preferred User						Preferred Party					
	Stream User			Groundwater User			Injuring Party			Injured Party		
	East	West	Eng.	East	West	Eng.	East	West	Eng.	East	West	Eng.
<b>Groundwater</b>												
Abs. Own.	4	—	—	5	—	8	9	—	8	—	—	—
Reas. Use	1	—	—	3	1	—	2	—	—	2	1	—
Corr. Rts.	1	—	—	2	—	—	1	—	—	2	—	—
Comm. Pool	—	—	—	—	—	—	—	—	—	—	—	—
<b>Total</b>	6	—	—	10	1	8	12	—	8	4	1	—
<b>Surface Watercourse</b>												
Nat. Flow	6	3	2	2	—	—	—	—	—	8	3	2
Reas. Use	1	1	—	—	2	—	—	1	—	1	2	—
Prior App.	—	27	—	—	4	—	—	5	—	—	26	—
<b>Total</b>	7	31	2	2	6	—	—	6	—	9	31	2
<b>Other Special Rule</b>												
Trespass	1	—	—	7	—	—	1	—	—	7	—	—
Undergrd. Curr.	6	—	—	—	—	—	—	—	—	6	—	—
Nuisance	3	—	—	1	—	—	1	—	—	3	—	—
Negligence	1	—	—	1	—	—	1	—	—	1	—	—
Nat. Mine Drain.	—	—	—	2	—	—	2	—	—	—	—	—
Other	2	—	1	—	—	—	—	—	—	2	—	1
<b>Total</b>	13	—	1	11	—	—	5	—	—	19	—	1
<b>Grand Total</b>	26	31	3	23	7	8	17	6	8	32	32	3

(35 cases). Of these, 30 were decided under the prior appropriation doctrine, 3 under the natural flow doctrine of riparian rights and 2 under the reasonable use doctrine of riparian rights. Of the total of 35 cases, 30 were decided in favor of the injured stream user,<sup>67</sup> and only 5 in favor of the injuring groundwater user.<sup>68</sup> Table 3 indicates that all of the 30 prior appropria-

67. In favor of the injured stream user:

1. Prior appropriation: See all cases cited in APPENDIX, categories I.D.2.b. and II.A.2.b., except as listed below.

2. Natural flow: *City of Los Angeles v. Hunter*, 156 Cal. 603, 105 P. 755 (1909); *Verdugo Canon Water Co. v. Verdugo*, 152 Cal. 655, 93 P. 1021 (1908); *McClintock v. Hudson*, 141 Cal. 275, 74 P. 849 (1903).

3. Reasonable use: *Tulare Irrigation Dist. v. Lindsay-Strathmore Irrigation Dist.*, 3 Cal. 2d 489, 45 P.2d 972 (1935).

68. In favor of injuring groundwater user:

1. Prior appropriation: *Fellhauer v. People*, 167 Colo. 320, 447 P.2d 986 (1968); *Leonard v. Shatzer*, 11 Mont. 422, 28 P. 457 (1892); *Little Cottonwood Water Co. v. Sandy City*, 123 Utah 242, 258 P.2d 440 (1953);

tion decisions involved groundwater pumping which depleted stream flow (23 under effluent stream conditions, 7 under influent stream conditions). Although it is clear that the western cases recognize the hydrologic connection and apply surface watercourse law to tributary and supporting percolating groundwater,<sup>69</sup> there are very few cases deciding whether the hydrologic connection should be recognized when a stream user injures a groundwater user—for example, by pumping water from an influent stream. Both western cases recognize the connection, although one gives relief to the groundwater user<sup>70</sup> and the other does not.<sup>71</sup> The strong authority recognizing the hydrologic connection in the effluent stream cases favors the stream diverter. This would be the usual result in the west because the waters in streams usually were appropriated before irrigators turned to groundwater supplies. There would not be many situations where the groundwater diversion right would predate the stream diversion right. The same circumstances should favor the stream user in the influent stream situation under prior appropriation law. In the one case in point, he is favored.<sup>72</sup> But what if the circumstances are not usual and the groundwater use is prior in time, or the stream diversion takes place under riparian law rather than prior appropriation law in a dual doctrine state such as California? In the one case in point, the hydrologic connection is recognized. The court treated the groundwater percolating out of and parallel to the stream as part of a continuum to which correlative rights and duties attach.<sup>73</sup> The five cases which favor the groundwater diverter in the effluent stream situation, contrary to the expected result, are not decided on the basis of refusing to recognize the hydrologic connection as a matter of law.<sup>74</sup> In each, the stream user was unable to prove that the diverted groundwater was tributary to or supportive of the stream flow. Therefore, every western case which the author has found involving a relationship between percolating groundwater and surface watercourses has

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Mountain Lake Mining Co. v. Midway Irrigation Co., 47 Utah 346, 149 P. 929 (1915) (query).

2. Reasonable use: Metropolitan Util. Dist. v. Merritt Beach Co., 179 Neb. 783, 140 N.W.2d 626 (1966).

69. See discussion of the doctrine supporting this view in text accompanying notes 108-20 *infra*.

70. This case is listed in Tables 6 and 7 as two cases. Miller v. Bay Cities Water Co., 157 Cal. 256, 107 P. 115 (1910), found for the groundwater user in the alternative under the reasonable use rule for percolating groundwater or the reasonable use doctrine of riparian rights. The court found that the groundwater user was prior in time and that he depended on percolating flow derived from a nearby river.

71. Maricopa County Municipal Water Conserv. Dist. No. 1 v. Southwest Cotton Co., 39 Ariz. 65, 4 P.2d 369 (1931), found for the stream user under the prior appropriation doctrine because he was entitled to divert stream water under his antecedent diversion right even though it depleted the supply of water percolating from the stream to a well.

72. See note 71 *supra*.

73. See Miller v. Bay Cities Water Co., 157 Cal. 256, 107 P. 115 (1910).

74. See cases cited note 68 *supra*.

recognized the hydrologic connection as a matter of law. None of them insists upon maintaining the fiction that percolating groundwater and surface watercourses are independent unrelated sources of water.

#### b. Eastern Cases

The cases in the eastern states are not definitive and uniform in result. In terms of raw figures, the stream user was favored in about one-half the cases (26 to 23), compared with an overwhelming preference for the stream user in the western states (31 cases to 7). However, in the eastern states a large majority of decisions did favor the injured party (32 to 17), and recognized the hydrologic connection between percolating groundwater and surface watercourses. By contrast, the injured party was overwhelmingly favored in the western cases (32 to 6). But an examination of the doctrines followed and the hydrologic conditions existing in the cases shows great variation in result. More probing analysis of the cases is needed.

Most of the eastern cases involve two types of situations: (1) groundwater pumping reduces stream flow or lowers reservoir level; and (2) raising the level of a reservoir raises the water table. There are 23 cases of the first type<sup>75</sup> and 16 of the second type.<sup>76</sup> Eleven of the 16 reservoir heightening cases favored the injured landowner or groundwater user who was subjected to a raised water table and soggy ground. However, 7 of those 11 decisions were based on a trespass theory.<sup>77</sup> An eighth trespass decision found for the stream user because the causal connection between the reservoir and the soggy ground was not established.<sup>78</sup> The remaining

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75. The breakdown of the groundwater pumping cases is as follows:

Influent stream:	
Pumping draws water from stream	8
Effluent stream:	
Pumping reduces stream flow	13
Pumping lowers reservoir	2
	<hr/>
Total	23

All of the English cases fall into this category. There are 11 such cases. See Table 5 *supra*.

76. The breakdown of the reservoir heightening cases is as follows:

Influent stream:	
Reservoir raises water table	12
Effluent stream:	
Reservoir blocks groundwater	4
	<hr/>
Total	16

There are no English cases of this type. See Table 5 *supra*.

77. *Belkus v. City of Brockton*, 282 Mass. 285, 184 N.E. 812 (1933); *Wilson v. City of New Bedford*, 108 Mass. 261 (1871); *Fuller v. Chicopee Mfg. Co.*, 82 Mass. (16 Gray) 46 (1860); *Monson & Brimfield Mfg. Co. v. Fuller*, 32 Mass. (15 Pick.) 554 (1834); *Robb v. State*, 174 Misc. 180, 20 N.Y.S.2d 204 (Ct. Cl. 1940); *Odell v. Nyack Waterworks Co.*, 91 Hun 283, 36 N.Y.S. 206 (Sup. Ct. 1895); *Barberton v. Miksch*, 12 Ohio L. Abs. 245 (Ct. App. 1932), *aff'd*, 128 Ohio St. 169, 190 N.E. 387 (1934).

78. *Tennessee Elec. Power Co. v. Van Dobson*, 14 Tenn. App. 54 (1932).

eight cases, four of which were decided in favor of the injured landowner or groundwater user, were decided under a number of different doctrines.

Decisions favoring the injured party were decided as follows:

Correlative rights rule of groundwater	27 <sup>9</sup>
Natural flow doctrine of riparian rights	18 <sup>0</sup>
Nuisance	18 <sup>1</sup>

Decisions favoring the injuring reservoir owner were decided as follows:

Absolute ownership rule of groundwater	28 <sup>2</sup>
Correlative rights rule of groundwater	18 <sup>3</sup>
Negligence	18 <sup>4</sup>

Since two of the four cases favoring the reservoir owner were based on the absence of facts establishing liability even though the hydrologic connection was recognized,<sup>85</sup> only the two absolute ownership decisions can be said to involve a refusal by the courts to recognize the hydrologic connection involved in the reservoir heightening situation as a matter of law. Therefore, it is evident that the courts have been willing to impose liability for the injurious heightening of the water table because of raising the level of a reservoir in most cases (14 out of 16), and will be willing to do so in the future under appropriate circumstances. However, the opposite result seems likely in states still following the absolute ownership doctrine.

The groundwater pumping cases are more evenly divided. A total of sixteen eastern cases have favored the injured stream user while only seven have favored the injuring groundwater user. The sixteen cases favoring the injured stream user were decided as follows:

Reasonable use rule of groundwater	18 <sup>6</sup>
Natural flow doctrine of riparian rights	68 <sup>7</sup>

79. *Cason v. Florida Power Co.*, 74 Fla. 1, 76 So. 535 (1917); *Bassett v. Salisbury Mfg. Co.*, 43 N.H. 569 (1862). See also note 83 *infra* (the case discussed therein supports the legal position taken here).

80. *Pixley v. Clark*, 35 N.Y. 520 (1866).

81. *Welliver v. Irondale Elec. Light, Heat & Power Co.*, 38 Pa. Super. 26 (1909).

82. *White River Chair Co. v. Connecticut River Power Co.*, 105 Vt. 24, 162 A. 859 (1932); *Harwood v. Benton & Jones*, 32 Vt. 724 (1860).

83. *Moore v. Berlin Mills Co.*, 74 N.H. 305, 67 A. 578 (1907). The use by the reservoir owner was found to be reasonable with respect to the use of the land by the injured owner. Hence, this case supports the other correlative rights cases recognizing the hydrologic connection between the raised reservoir and the wet ground. See cases cited note 79 *supra*.

84. *Mowday v. Moore*, 133 Pa. 598, 19 A. 626 (1890). The reservoir owner was found to be non-negligent here.

85. See cases cited notes 83-84 *supra*.

86. *Stevens v. Spring Valley Water Works & Supply Co.*, 42 Misc. 2d 86, 247 N.Y.S.2d 503 (Sup. Ct. 1964).

87. *Collens v. New Canaan Water Co.*, 155 Conn. 477, 234 A.2d 825 (1967); *Harper Hollingsworth & Darby Co. v. Mountain Water Co.*, 65 N.J.Eq. 479, 56 A. 297 (Ch. 1903); *Smith v. City of Brooklyn*, 32 App. Div. 257, 52 N.Y.S. 983 (1898), *aff'd*, 160 N.Y. 357, 54 N.E. 787 (1899); *Covert v. City of Brooklyn*, 6 App. Div. 73, 39 N.Y.S. 744 (1896); *Covert v. Valentine*, 66 Hun 32, 21 N.Y.S. 219

Reasonable use doctrine of riparian rights	1 <sup>88</sup>
Induced underground current	6 <sup>89</sup>
Other	2 <sup>90</sup>

The seven cases favoring the injuring groundwater user were decided as follows:

Absolute ownership rule of groundwater	5 <sup>91</sup>
Reasonable use rule of groundwater	2 <sup>92</sup>

It is clear from these breakdowns that the choice of rule affects the result. If a surface watercourse rule is applied—which requires recognition of the hydrologic connection between percolating groundwater and surface streams—the injured stream user will be favored in the groundwater diversion situation. However, if the English absolute ownership rule is followed, impliedly the hydrologic connection must be denied as a matter of law, and the injuring groundwater user will be favored.<sup>93</sup> The criteria the

(Sup. Ct. 1892), *rev'd on other grounds*, 141 N.Y. 521, 36 N.E. 597 (1894); *Warder & Barnett v. Springfield*, 9 Ohio Dec. Reprint 855 (C.P. 1887). Cf. *Merrick Water Co. v. City of Brooklyn*, 32 App. Div. 454, 53 N.Y.S. 10 (1898) (dictum).

88. *Fire Dist. No. 1 v. Graniteville Spring Water Co.*, 103 Vt. 89, 152 A. 42 (1930).

89. *Hollingsworth & Vose Co. v. Foxborough Water-Supply Co.*, 165 Mass. 186, 42 N.E. 574 (1896); *Proprietors of Mills v. Braintree Water Supply Co.*, 149 Mass. 478, 21 N.E. 761 (1889); *Aetna Mills v. Brookline*, 127 Mass. 69 (1879); *Aetna Mills v. Waltham*, 126 Mass. 422 (1879); *Van Wycklen v. City of Brooklyn*, 118 N.Y. 424, 24 N.E. 179 (1890); *Smith v. City of Brooklyn*, 18 App. Div. 340, 46 N.Y.S. 141 (1897). Query: Were the following natural flow cases impliedly decided under the induced underground current theory? *Collens v. New Canaan Water Co.*, 155 Conn. 477, 234 A.2d 825 (1967); *Harper Hollingsworth & Darby Co. v. Mountain Water Co.*, 65 N.J.Eq. 479, 56 A. 297 (Ch. 1903); *Smith v. City of Brooklyn*, 32 App. Div. 257, 52 N.Y.S. 933 (1898), *aff'd*, 160 N.Y. 357, 54 N.E. 787 (1899); *Warder & Barnett v. Springfield*, 9 Ohio Dec. Reprint 855 (C.P. 1887).

90. In excess of statutory authority: *Spaulding v. Plainville*, 218 Mass. 321, 105 N.E. 1006 (1914); *Hart v. Jamaica Pond Aqueduct Corp.*, 133 Mass. 488 (1882). The courts make clear (in dicta) in both cases that had the water companies had appropriate powers to use groundwater, no relief would have been afforded to the injured stream users for reduction in stream flow. Hence, these two cases support the absolute ownership cases cited note 91 *infra*.

91. *Hartford Rayon Corp. v. Cromwell Water Co.*, 126 Conn. 194, 10 A.2d 587 (1940); *Stoner v. Patten*, 124 Ga. 754, 52 S.E. 894 (1906) (interlocutory appeal), 132 Ga. 178, 63 S.E. 897 (1909); *Nourse v. Andrews*, 200 Ky. 467, 255 S.W. 84 (1923); *Chelsea Dye House & Laundry Co. v. Commonwealth*, 164 Mass. 350, 41 N.E. 649 (1895); *Ellis v. Duncan*, 21 Barb. 230 (N.Y. Sup. Ct. 1855).

92. *Friedland v. State*, 35 App. Div. 2d 755, 314 N.Y.S.2d 935 (1970); *Merrick Water Co. v. City of Brooklyn*, 32 App. Div. 454, 53 N.Y.S. 10 (1898) (followed the reasonable use rule only because the casual connection between the stream's drying up and the groundwater diversion was not established).

93. That is the result under the great majority of English cases. Eight of all English decisions involving groundwater diversion of flow otherwise reaching a surface watercourse were decided in favor of the injuring groundwater user under the absolute ownership rule. *English v. Metropolitan Water Bd.*, [1907] 1 K.B. 588; *Chasemore v. Richards*, 2 H. & N. 168, 157 Eng. Rep. 71 (Ex. 1857), *aff'd*, 7 H.L. Cas. 349, 11 Eng. Rep. 140 (1859); *Broadbent v. Ramsbotham*, 11 Ex. 602, 156 Eng. Rep. 971 (1856); *Rugby Joint Water Bd. v. Walters*, [1967]

courts use for choosing which rule they will follow will be discussed in the next section.<sup>94</sup>

Fifteen of the 23 groundwater diversion cases were decided under the rules just discussed and involve the basic choice of rule problem. The remaining eight cases were decided in favor of the injured stream user under doctrines of limited applicability. Six were decided under a doctrine which imposes liability for the consequences of creating a very large cone of depression by high capacity pumps. This is the import of the language of those six cases.<sup>95</sup> In addition, each of the cases involved transporting the diverted groundwater for use on non-overlying land. All of the high capacity pumping cases the author has found, including those concerning conflicting groundwater users,<sup>96</sup> involve this factual element. It is probably

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Ch. 397 (1966); Bleachers' Ass'n Ltd. v. Chapel-en-le-Frith Rural Dist. Council, [1933] Ch. 356 (1932); Bradford Corp. v. Ferrand, [1902] 2 Ch. 655.

However, two cases held for the injured stream user under the natural flow doctrine of riparian rights. Both cases involved a statutory right to divert water for a navigation canal and this may have affected the decisions, although it was not mentioned in either as a basis for decision. Dickinson v. Grand Junction Canal Co., 7 Ex. 282, 155 Eng. Rep. 953 (1852); Grand Junction Canal Co. v. Shugar, L.R. 6 Ch. 483 (C.A. 1871). One case held for the injured stream user under the absolute prescription theory based on long use. Balston v. Bensted, 1 Camp. 463, 170 Eng. Rep. 1022 (N.P. 1808). This theory was expressly disapproved in Chasemore v. Richards, *supra*.

One of the absolute ownership cases suggested in dictum that if an induced underground current could be proven, the injured stream user would be protected. English v. Metropolitan Water Bd., *supra* at 701-02.

94. See text accompanying notes 121-39 *supra*.

95. See cases cited note 89 *supra*.

96. See, e.g., Bernard v. City of St. Louis, 220 Mich. 159, 189 N.W. 891 (1922) (decided under the reasonable use rule of groundwater); Schenk v. City of Ann Arbor, 196 Mich. 75, 163 N.W. 109 (1917) (same); Erickson v. Crookston Waterworks, Power & Light Co., 100 Minn. 481, 111 N.W. 391 (1907) (remanding; decided under the reasonable use rule of groundwater), 105 Minn. 182, 117 N.W. 435 (1908) (decided under the correlative rights rule); Meeker v. City of East Orange, 77 N.J.L. 623, 74 A. 379 (Ct. Err. & App. 1909) (decided under the reasonable use rule of groundwater); Hathorn v. Natural Carbonic Gas Co., 194 N.Y. 326, 87 N.E. 504 (1909) (decided under the reasonable use rule of groundwater, but high capacity pumping for use on non-overlying land emphasized); Forbell v. City of New York, 164 N.Y. 522, 58 N.E. 644 (1900) (induced underground current exception to absolute ownership rule); Willis v. City of New York, 69 Misc. 510, 127 N.Y.S. 699 (Sup. Ct. 1910) (same); Hathorn v. Dr. Strong's Saratoga Springs Sanitarium, 55 Misc. 445, 106 N.Y.S. 553 (Sup. Ct. 1907) (same); Westphel v. City of New York, 34 Misc. 684, 70 N.Y.S. 1021 (Sup. Ct. 1901), *aff'd*, 177 N.Y. 140, 69 N.E. 369 (1904) (same); Rouse v. City of Kinston, 188 N.C. 1, 123 S.E. 482 (1924) (decided under the reasonable use rule of groundwater); Hatfield Township v. Lansdale Municipal Authority, 403 Pa. 113, 168 A.2d 333 (1961) (same); Rothrauff v. Sinking Spring Water Co., 339 Pa. 129, 14 A.2d 87 (1940) (same); Stone v. Providence Gas & Water Co., 13 Pa. Dist. 557 (Dist. Ct. 1904) (same). *Contra*, e.g., Crane v. Borough of Essex Fells, 67 N.J. Super. 83, 169 A.2d 845 (Sup. Ct. 1961), *aff'd*, 36 N.J. 544, 178 A.2d 196 (1962) (decided upon comparative convenience grounds); Menne v. City of Fond du Lac, 273 Wis. 341, 77 N.W. 2d 703 (1956) (decided under absolute ownership rule). Another case, whose ratio decidendi was subsequently overruled, also held *contra*: Ocean Grove Camp-Meeting Ass'n v. Asbury Park, 40 N.J.Eq. 447, 3 A. 168 (Ch. 1885) (decided under absolute ownership rule, which was discarded by Meeker v. City of East Orange, *supra*).



a prerequisite to the imposition of the rule. The other two cases were decided on grounds extraneous to groundwater allocation law.<sup>97</sup> If the eight cases turning upon doctrines of limited applicability are removed from the computation, the eastern courts are nearly evenly divided on whether to favor the injured stream user or the injuring groundwater user in the groundwater diversion situation (nine to six in favor of the injured stream user). The choice of rule becomes extremely significant.

There remain the cases where a stream diversion affects the groundwater supply, and the pollution cases. There are five stream diversion cases in the eastern states. The decisions are evenly split, the injured groundwater user being favored three to two. In the two decisions favoring the injuring stream user, the groundwater user was denied relief under the absolute ownership rule of groundwater.<sup>98</sup> Three decisions favored the injured groundwater user. One apparently was based on the natural flow doctrine of riparian rights. This case expressly recognized the hydrologic connection between the surface watercourse and the groundwater percolating from it, and extended surface watercourse rules to the groundwater.<sup>99</sup> The second decision was based on negligence, but said in dictum that in the absence of negligence the absolute ownership rule would be followed.<sup>100</sup> The remaining case is anomalous. The *Springfield Waterworks* case discussed at the beginning of this article ostensibly is based on the reasonable use rule of groundwater. Nonetheless, it grants relief to the diverter of groundwater who was selling the water for use on non-overlying land. Under the doctrine adopted in the case, the groundwater diverter should not be entitled to relief. However, a large element of malicious interference with the groundwater supply was involved and apparently was determinative of the decision.<sup>101</sup> Since two of the three decisions favoring the injured groundwater user were based on special circumstances, it seems likely that in the usual situation, at least in absolute ownership states, the injured groundwater user would not be entitled to relief for injury to his groundwater supply caused by a diversion of stream water. The courts in the absolute ownership states are likely to treat the groundwater user identically whether his water supply is injured by a neighboring groundwater diversion or a neighboring stream diversion; he is entitled to capture and use only that precolating groundwater which happens to reach his property. Nonetheless there is the indication that the courts, if they were to take a more hydrologically sound position, might grant relief under one of the surface watercourse rules as they have done in some cases where a

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97. See note 90 *supra*.

98. *In re Miami Conservancy Dist.*, 25 Ohio N.P. (n.s.) 325 (C.P. 1924); *Heninger v. McGinnis*, 131 Va. 70, 108 S.E. 671 (1921). See *Gamer v. Town of Milton*, 346 Mass. 617, 195 N.E.2d 65 (1964) (dictum).

99. *Craig v. Shippensburg Borough*, 7 Pa. Super. 526 (1898).

100. *Gamer v. Town of Milton*, 346 Mass. 617, 195 N.E.2d 65 (1964).

101. *Springfield Waterworks Co. v. Jenkins*, 62 Mo. App. 74 (St. L. Ct. App. 1895). See discussion in text accompanying notes 5-11 *supra*.

groundwater diversion adversely affected a surface watercourse. Again, the crucial question is the choice of rule.

The pollution cases fall into two categories: where polluted stream water percolates into and degrades the quality of groundwater; and where polluted groundwater percolates into and degrades the quality of stream water. Two cases grant relief and three do not. Both cases granting relief are based on nuisance doctrine, and were decided in Pennsylvania.<sup>102</sup> They constitute a recognized limitation on the mine drainage rule postulated by two of the three decisions which deny relief.<sup>103</sup> That limitation—that the general rule allowing acid mine wastes to be drained without liability<sup>104</sup> is followed only if the drainage occurs under the force of gravity and unaided by mechanical devices and if the use of the land is a natural one—is well recognized in Pennsylvania law.<sup>105</sup> The remaining case, the only non-Pennsylvania case in the group, is the *Haynor* decision discussed at the beginning of this article. Like the Pennsylvania cases favoring the injured party, it follows nuisance doctrine. But it denied relief and required a new trial because it was not clear that the well from which the injured groundwater user took his water was on his own land.<sup>106</sup> But it is clear that the case should be classified as one which recognizes the hydrologic connection in the pollution situation. This leaves only the two Pennsylvania decisions, and they have been limited by later decisions and they follow a rule which has been thoroughly discredited in other jurisdictions.<sup>107</sup>

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102. *Pennsylvania R.R. v. Sagamore Coal Co.*, 281 Pa. 233, 126 A. 386 (1924) (public nuisance); *Rarick v. Smith*, 17 Pa. County Ct. 627 (1896) (private nuisance).

103. *Pennsylvania Coal Co. v. Sanderson*, 113 Pa. 126, 6 A. 453 (1886); *Mountain Water Supply Co. v. Sagamore Coal Co.*, 3 Pa. D. & C. 187 (C.P. 1922).

104. See cases cited note 103 *supra*; *Eidemiller v. Keystone Coal & Coke Co.*, 15 Pa. D. & C. 759 (C.P. 1930); *DiGiacinto v. New Jersey Zinc Co.*, 27 Leh. L.J. 307 (Pa. C.P. 1957).

105. See cases cited note 103 *supra*; *DiGiacinto v. New Jersey Zinc Co.*, 26 Leh. L.J. 247 (Pa. C.P. 1955).

106. *Haynor v. Excelsior Springs Light, Power, Heat & Water Co.*, 129 Mo. App. 691, 108 S.W. 580 (K.C. Ct. App. 1908). See discussion in text accompanying notes 12-13 *supra*.

107. The following cases have expressly criticized *Sanderson*: *Drake v. Lady Ensley Coal, Iron & Ry.*, 102 Ala. 501, 507, 14 So. 749, 751 (1894); *Bunker Hill & Sullivan Mining & Concent. Co. v. Polak*, 7 F.2d 583, 585 (9th Cir.), *cert. denied*, 269 U.S. 581 (1925) (decided under Cal. law); *Niagara Oil Co. v. Ogle*, 177 Ind. 292, 296, 98 N.E. 60, 62 (1912); *Parker v. American Woolen Co.*, 195 Mass. 591, 602-03, 81 N.E. 468, 470-71 (1907); *Beach v. Sterling Iron & Zinc Co.*, 54 N.J.Eq. 65, 73, 33 A. 286, 288 (Ch. 1895), *aff'd sub nom. Sterling Iron & Zinc Co. v. Sparks Mfg. Co.*, 55 N.J.Eq. 824, 38 A. 426 (Ct. Err. & App. 1897); *Strobel v. Kerr Salt Co.*, 164 N.Y. 303, 319, 58 N.E. 142, 146-47 (1900); *Straight v. Hover*, 79 Ohio St. 263, 277, 87 N.E. 174, 175-76 (1909); *H. B. Bowling Coal Co. v. Ruffner*, 117 Tenn. 180, 196, 100 S.W. 116, 120-22 (1907); *Teel v. Rio Bravo Oil Co.*, 47 Tex. Civ. App. 153, 161, 104 S.W. 420, 423-24 (1st Dist. 1907); *Panther Coal Co. v. Looney*, 185 Va. 758, 764, 40 S.E.2d 293, 300-01 (1946); *Arminius Chem. Co. v. Landrum*, 113 Va. 7, 14, 73 S.E. 459, 463-65 (1912); *State v. Southern Coal & Transp. Co.*, 71 W. Va. 470, 475, 76 S.E. 970, 972 (1912); *John Young & Co. v. Bankier Distillery Co.*, [1893] A.C. 691, 701-03. See also the critique in 2 H. FARNHAM, *LAW OF WATERS AND WATER RIGHTS* § 518b (1904).

Hence, it appears that the courts are as willing to recognize the hydrologic connection between percolating groundwater and surface watercourses and grant relief where appropriate in the pollution situation as they are in the reservoir heightening situation. The choice of rule problem arises principally in flow diversion situations.

### B. Choice of Rule

#### 1. Recognition of the Hydrologic Connection in the West

In the western states, the courts always recognize the hydrologic connection between percolating groundwater and surface watercourses when it exists.<sup>108</sup> The cases in several western states hold that when percolating groundwater is tributary to, supportive of, or part of the subflow of a surface watercourse, surface watercourse rules are applied to that percolating groundwater. In the usual situation, where the stream user has made a diversion prior in time to a diversion by a groundwater user, and prior appropriation rules are applicable, the stream user is preferred.

##### a. Subflow

Twelve cases hold that percolating groundwater which is supportive of or part of the subflow of a surface watercourse must be treated as part of the water in the watercourse.<sup>109</sup> The rationale for this view was put forth expansively in *Miller v. Bay Cities Water Co.*,<sup>110</sup> a California case which applied the reasonable use doctrine of riparian rights to subflow. Defendant proposed to divert the flow of a river to a public water supply system outside the watershed of the river. Plaintiff feared that the flow percolating from the river to his orchards would dry up and no longer be available to his irrigation pumps. Finding that both the reasonable use doctrine of riparian rights and the reasonable use rule of groundwater would not permit respective diversions outside the watershed and off overlying land, the court said:

This being so, we perceive no reason why the same rule should not be applied as between owners of land overlying a substratum

108. See discussion in text accompanying notes 67-74.

109. *Maricopa County Municipal Water Conserv. Dist. No. 1 v. Southwest Cotton Co.*, 39 Ariz. 65, 4 P.2d 369 (1931); *Tulare Irrigation Dist. v. Lindsay-Strathmore Irrigation Dist.*, 3 Cal. 2d 489, 45 P.2d 972 (1935); *Miller v. Bay Cities Water Co.*, 157 Cal. 256, 107 P. 115 (1910); *City of Los Angeles v. Hunter*, 156 Cal. 603, 105 P. 755 (1909); *Verdugo Canon Water Co. v. Verdugo*, 152 Cal. 655, 93 P. 1021 (1908); *Montecito Valley Water Co. v. City of Santa Barbara*, 144 Cal. 578, 77 P. 1113 (1904); *City of Los Angeles v. Pomeroy*, 124 Cal. 597, 57 P. 585 (1899); *Lemm v. Rutherford*, 76 Cal. App. 455, 245 P. 225 (Dist. Ct. App. 1926); *City of Colorado Springs v. Bender*, 148 Colo. 458, 366 P.2d 552 (1961); *Metropolitan Util. Dist. v. Merritt Beach Co.*, 179 Neb. 783, 140 N.W.2d 626 (1966); *Carlsbad Irrigation Dist. v. Ford*, 46 N.M. 335, 128 P.2d 1047 (1942); *Howcroft v. Union & Jordan Irrigation Co.*, 25 Utah 311, 71 P. 487 (1903).

110. 157 Cal. 256, 107 P. 115 (1910).

of water directly connected with either the surface or subsurface flow of the stream, and deriving practically its exclusive supply from that source. The theory upon which the right of a riparian owner to be protected in the use of the waters of a stream to which his lands are riparian is that, nature having given these lands the benefit of the flow, and the natural advantage of its use on the lands, one riparian owner may not divert these waters to lands not riparian, to the injury of another riparian owner who can use them. As far as the owner of lands overlying a gravel stratum is concerned, it makes no difference in his rights, as against an appropriator of the water, from what source the supply of water comes which directly supplies his water-bearing stratum—whether from a stream or a saturated plane or other body of water which by natural flow or percolation, either surface or subterranean, clearly supplies his underground stratum. It would present an anomalous condition of the law were it the rule that while a riparian owner may prevent an appropriator from diverting to his injury the waters of the stream for use beyond the watershed, and one owner of land overlying a common stratum of percolating water may restrain another owner similarly situated from making a like diversion, the owner of land whose underlying stratum of water is directly and clearly supplied by percolation from the waters of the stream, and who will be greatly injured by a diversion, is not entitled to prevent it. There is no reason or any difference in the rule between the classes and none should exist.<sup>111</sup>

*Miller* was decided on the rationale that if a person cannot divert water away from the watershed or overlying land because of injury to other users of the same class of water, then he should not be permitted to do so when the injury is to a user of a different class of water. The recognition of the hydrologic connection between classes of water is basic to the decision.

The objection to diversion of water outside the watershed or off the overlying land does not exist in prior appropriation jurisdictions; that doctrine permits such diversions. Nonetheless, *Miller* has been cited in many prior appropriation decisions holding that subflow is to be regarded as part of the surface watercourse. It is the recognition of the hydrologic connection between them that appeals to these courts. Among them is the Arizona court which handed down *Maricopa County Municipal Water Conservation Dist. No. 1 v. Southwest Cotton Co.* Defendant was diverting river flow under a claim of prior appropriation which plaintiff asserted was defective. Plaintiff was diverting groundwater which he claimed was subflow of the river. He asserted that this diversion constituted a diversion of river water prior in time to defendant's and was entitled to injunctive protection. Before determining which party had the prior claim, the court found that plaintiff had a cause of action because the subflow was part of the river:

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111. *Id.* at 278-80, 107 P. at 124-25.

The underflow, subflow, or undercurrent, . . . of a surface stream may be defined as those waters which slowly find their way through the sand and gravel constituting the bed of the stream, or the lands under or immediately adjacent to the stream, and are themselves a part of the surface stream. . . .

As the names given to this class of waters indicate, physically they constitute a part of the surface stream itself, and are simply incidental thereto, and also in the main depend on the surface streams to which they are incident for the greater part of their water supply. . . .

If the bed of a stream is not solid rock, but gravel or earth, water will always be found many feet beneath its surface, and there may and probably will be corresponding to the flow on the surface a current beneath it. Not only does it move along the course of the river, but it percolates from its banks from side to side, and the more abundant the surface water the further will it reach in its percolations on each side. But, considered as strictly a part of the stream, the test is always the same: Does drawing off the subsurface water tend to diminish appreciably and directly the flow of the surface stream? If it does, it is subflow, and subject to the same rules of appropriation as the surface stream itself; if it does not, then, although it may originally come from the waters of such stream, it is not, strictly speaking, a part thereof, but is subject to the rules applying to percolating waters.<sup>112</sup>

Although the accuracy of the description of the hydrologic condition has been criticized, the test appears to be a good one.<sup>113</sup>

112. *Maricopa County Municipal Water Conserv. Dist. No. 1 v. Southwest Cotton Co.*, 39 Ariz. 65, 96-97, 4 P.2d 369, 380-81 (1931).

113. Tolman & Stipp, *Analysis of Legal Concepts of Subflow and Percolating Water*, 21 ORE. L. REV. 113, 133 (1942). They state:

The waters of subflow are specifically qualified as being "a part of the surface stream." Effluent subflow or influent subflow, with ground-water mound in contact with surface flow, comply with this qualification. Obviously, effluent subflow, which is feeding the stream, may be considered to constitute a part of surface flow. An effluent ground-water body "supports" the surface stream, in that it contributes to surface flow.

A ground-water mound built up to surface stream level also might be considered a part of the surface stream, in so far as it is in contact with surface flow. A well that taps such a mound may abstract water directly from surface flow. However, where an influent seepage column occurs between surface flow and the water table, it is evident that subflow cannot be considered a part of the surface stream. In any case it cannot be said that a ground-water mound "supports" the surface stream, either in the sense that it furnishes a physical support or that it contributes to the supply of surface flow. On the contrary, the surface stream supplies all of the water of the mound.

The authors consider effluent flow into a stream to be subflow. That type of flow is what the courts generally refer to as "tributary flow," which will be discussed shortly. But the authors are correct in pointing out that "subflow" as used by the courts should only apply to the hydrologic condition where the mound in the water table is in physical contact with the stream. If it lies below the bed of the stream, an influent seepage column will exist and no matter how much

## b. Tributary Flow

Twenty-five western cases hold that percolating groundwater which is tributary to a surface watercourse must be treated like surface tributary watercourses or other surface sources of water. To protect the appropriative rights of persons diverting water from surface watercourses, all sources of water which reach such watercourses are subject to the appropriators' rights. Although virtually all of the decisions subjecting tributary percolating groundwater flow to the rights of stream users are based on the logic of the prior appropriation doctrine,<sup>114</sup> one decision applies the doctrine to percolating groundwater tributary to stream water to which mere riparian rights attached.<sup>115</sup> Several reasons have been advanced in the cases to justify attaching surface watercourse rights to tributary percolating groundwater. Many cases baldly state that this is the rule without providing further explanation.<sup>116</sup> A few courts have been troubled by the argument supporting the absolute ownership rule of groundwater that a landowner should not be held liable for interference with groundwater or surface streams fed

the water table and the mound is lowered, the amount of water percolating from the stream will not be increased. Hence, the test formulated by the Arizona court—that abstraction of groundwater should cause a corresponding decrease in stream flow or level—is an appropriate one.

114. *Cohen v. La Canada Land & Water Co.*, 142 Cal. 437, 76 P. 47 (1904); *Fellhauer v. People*, 167 Colo. 320, 447 P.2d 986 (1968) (dictum); *Safranek v. Town of Limon*, 123 Colo. 330, 228 P.2d 975 (1951); *Schluter v. Burlington Ditch, Reservoir & Land Co.*, 117 Colo. 284, 188 P.2d 253 (1947); *Dalpez v. Nix*, 96 Colo. 540, 45 P.2d 176 (1935); *Leadville Mine Dev. Co. v. Anderson*, 91 Colo. 536, 17 P.2d 303 (1932); *Nevius v. Smith*, 86 Colo. 178, 279 P. 44 (1929); *Ft. Morgan Reservoir & Irrigation Co. v. McCune*, 71 Colo. 256, 206 P. 393 (1922); *Clark v. Ashley*, 34 Colo. 285, 82 P. 588 (1905); *Bruening v. Dorr*, 23 Colo. 195, 47 P. 290 (1896); *Ogilvy Irrigating & Land Co. v. Insinger*, 19 Colo. App. 380, 75 P. 598 (1904); *Leonard v. Shatzer*, 11 Mont. 422, 28 P. 457 (1892) (dictum); *Strait v. Brown*, 16 Nev. 317 (1881); *Langenegger v. Carlsbad Irrigation Dist.*, 82 N.M. 411, 483 P.2d 297 (1971); *City of Albuquerque v. Reynolds*, 71 N.M. 428, 379 P.2d 73 (1962); *Templeton v. Pecos Valley Artesian Conservancy Dist.*, 65 N.M. 59, 332 P.2d 465 (1958); *Little Cottonwood Water Co. v. Sandy City*, 123 Utah 242, 258 P.2d 440 (1953) (dictum); *Silver King Consol. Mining Co. v. Sutton*, 85 Utah 297, 39 P.2d 682 (1934); *Bastian v. Nebeker*, 49 Utah 390, 163 P. 1092 (1916) (dictum); *Mountain Lake Mining Co. v. Midway Irrigation Co.*, 47 Utah 346, 149 P. 929 (1915); *Herriman Irrigation Co. v. Keel*, 25 Utah 96, 69 P. 719 (1902); *Herriman Irrigation Co. v. Butterfield Mining Co.*, 19 Utah 453, 57 P. 537 (1899); *Midway Irrigation Co. v. Snake Creek Mining & Tunnel Co.*, 271 F. 157 (8th Cir. 1921), *aff'd*, 260 U.S. 596 (1923) (decided under Utah law).

115. *McClintock v. Hudson*, 141 Cal. 275, 74 P. 849 (1903).

116. *Silver King Consol. Mining Co. v. Sutton*, 85 Utah 297, 306, 39 P.2d 682, 686 (1934), is representative of these cases:

Appropriators of the waters of natural springs and streams, by virtue of their appropriations, acquire an interest or right in and to the waters which feed or supply such springs or streams, even though percolating in privately owned ground, where the lands supplying such waters were part of the public domain at the time of appropriation by such prior users.

Most cases stating the bare rule are not so solicitous of the groundwater rights of patentees from the federal government with respect to surface incidents to appropriative rights acquired after patent.

by groundwater when the landowner had no way of knowing in advance the course or direction of flow of groundwater, or what the consequences of diverting it would be. Nonetheless, they impose liability for such interferences because they feel the need to protect appropriative rights in a water-scarce environment is greater.<sup>117</sup> Elaborating on this concept, and drawing upon an analogy to surface tributaries to the main stream, the Colorado court has said:

"There is no law anywhere to support the contention that if these waters are naturally tributary to the river, still they may be taken by a new claimant to the damage and injury of prior appropriators upon that stream, simply because he captures and diverts them before they actually get into the river channel. If such act of capture and diversion can be upheld as lawful and proper, by the same reasoning a new claimant could divert the waters of a surface tributary, if he only be spry enough to capture and divert them before they actually reach and mingle with the waters of the main stream."<sup>118</sup>

To put it another way, the same court said in another case:

"It is probably safe to say that it is a matter of no moment whether water reaches a certain point by percolation through the soil, by a subterranean channel, or by an obvious surface channel. If by any of these natural methods it reaches the point, and is there appropriated in accordance with law, the appropriator has a property in it which cannot be divested by the wrongful diversion by another, nor can there be any substantial diminution. To hold otherwise would be to concede to superior owners of land the right to all sources of supply that go to create a stream, regardless of the rights of those who previously acquired the right to the use of the water from the stream below."<sup>119</sup>

The Colorado cases proceeded from that beginning to develop the presumption that all percolating groundwater eventually will find its way to a surface watercourse and, therefore, will be regarded as tributary flow unless there is evidence that the percolating groundwater is not tributary

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117. In *Strait v. Brown*, 16 Nev. 317 (1881), the court took this position. Since it was the first case in point in the west, it was very influential:

It would be a mere pretense of protection of the rights acquired by the earlier appropriators of the waters of a creek to say that later appropriators could lawfully acquire rights to the springs which constitute the source of the creek simply because the means by which the waters are conveyed from the springs to the creek are subterranean and not well understood. *Id.* at 324.

See also *Clark v. Ashley*, 34 Colo. 285, 290, 82 P. 588, 589 (1905); *Bruening v. Dorr*, 23 Colo. 195, 202, 47 P. 290, 293 (1896).

118. *Dalpez v. Nix*, 96 Colo. 540, 547, 45 P.2d 176, 179 (1935), quoting *Comstock v. Ramsey*, 55 Colo. 244, 255, 133 P. 1107, 1111 (1913).

119. *Ogilvy Irrigating & Land Co. v. Insinger*, 19 Colo. App. 380, 386-87, 75 P. 598, 600 (1904), quoting *McClellan v. Hurdle*, 3 Colo. App. 430, 434, 33 P. 280, 282 (1893).

to any surface watercourse.<sup>120</sup> The tributary flow rule is a general one and applies to other sources of water besides percolating groundwater. It is not based on the absence of logical distinction between interferences between users of the same class of water on one hand and interferences between users of different classes of water on the other, as some subflow cases are rationalized. Nor is it expressly based on an extended analysis of the hydrologic relationship between percolating groundwater and surface watercourses, as other subflow cases are. Nonetheless, the recognition of the relationship is just as central to the tributary flow doctrine as to the subflow doctrine. The extension of appropriative rights to all sources of surface watercourse flow could not be made without that recognition.

## 2. Conflicting Authority in the East

The eastern cases involving a hydrologic connection between percolating groundwater and surface watercourses fall into four groups: groundwater diversion cases, stream diversion cases, pollution cases, and reservoir heightening cases. Six of the groundwater diversion cases were decided in favor of the injured stream user under a high capacity well exception to the absolute ownership of groundwater which favors the injuring groundwater user. The remainder were split, with about half favoring the injured stream user under surface watercourse rules (principally the natural flow doctrine), and half favoring the injuring groundwater user under percolating groundwater rules (principally the absolute ownership rule). The smaller number of stream diversion cases were split along similar lines. The pollution cases do not fit into any general category like those above, although it does seem that nuisance law may favor the injured user. The reservoir heightening cases fall into two groups. Seven favored the landowner injured by a raised water table under a trespass theory, a doctrine peculiar to that situation. Eight of the nine remaining cases were split along the lines mentioned above.<sup>121</sup> When the cases decided upon doctrines of special applicability are set aside, it is evident that the courts are evenly split on whether to follow surface watercourse rules or percolating groundwater rules. An examination of the reasons expressed by the courts for choosing a particular rule aids in understanding why the courts have chosen one set of rules or the other. But these reasons do not help determine whether one set of rules is to be preferred over the other.

### a. Reasons for Following Percolating Groundwater Rules

The absolute ownership and reasonable use rules of groundwater, followed by most states, hold a groundwater user free from liability for

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120. *Safranek v. Town of Limon*, 123 Colo. 330, 335, 228 P.2d 975, 977 (1951), quoting *McHendrie, The Law of Underground Water*, 13 ROCKY MT. L. REV. 1, 11 (1940).

121. See discussion in text accompanying notes 75-107 *supra*.



the injurious consequences of his activities permitted by the rule. This stems from the concept that percolating groundwater is a part of the soil itself, like any other mineral buried in the ground.<sup>122</sup> However, since percolating groundwater is described as a migratory substance oozing or filtering through the ground, these rules in actuality amount to rules of capture similar to those known in oil and gas law. The important distinction of these rules from eastern surface watercourse rules and the correlative rights rule of groundwater is that they do not create usufructuary rights, but, rather, a right to reduce to possession akin to the law of wild animals. Unlike the latter rules, which treat water as a common resource available for private use, the absolute ownership and reasonable use rules of groundwater treat groundwater as a privately owned resource. Since there is no trespassory or nuisance invasion of neighboring lands in the capture of groundwater, there can be no liability imposed for the injurious consequences arising from that capture.

While the concept of groundwater totally ignores the true hydrologic characteristics of groundwater movement, it may be sound as a matter of policy. The first case to set forth the absolute ownership rule, *Acton v. Blundell*, stated the difficulties a landowner faces very well:

[I]n the case of a well sunk by a proprietor in his own land, the water which feeds it from a neighboring soil does not flow openly in the sight of the neighboring proprietor, but through the hidden veins of the earth beneath its surface; no man can tell what changes these underground sources have undergone in the progress of time: it may well be, that it is only yesterday's date, that they first took the course and direction which enabled them to supply the well: again, no proprietor knows what portion of water is taken from beneath his own soil: how much he gives originally, or how much he transmits only, or how much he receives: on the contrary, until the well is sunk, and the water collected by draining into it, there cannot properly be said, with reference to the well, to be any flow of water at all. In the case, therefore, of the well, there can be no ground for implying any mutual consent or agreement, for ages past, between the owners of the several lands beneath which the underground springs may exist, which is one of the foundations on which the law as to running streams is supposed to be built; nor, for the same reason, can any trace of a positive law be inferred from long-continued acquiescence and submission, whilst the very existence of the underground springs or of the well may be unknown to the proprietors of the soil.<sup>123</sup>

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122. See, e.g., *Nourse v. Andrews*, 200 Ky. 467, 471-72, 255 S.W. 84, 86 (1923); *Springfield Waterworks Co. v. Jenkins*, 62 Mo. App. 74, 80 (St. L. Ct. App. 1895); *White River Chair Co. v. Connecticut River Power Co.*, 105 Vt. 24, 48, 162 A. 859, 869 (1932); *Acton v. Blundell*, 12 M. & W. 324, 353-54, 152 Eng. Rep. 1223, 1235 (Ex. 1843).

123. *Acton v. Blundell*, 12 M. & W. 324, 350-351, 152 Eng. Rep. 1223, 1233-34 (Ex. 1843). See also *White River Chair Co. v. Connecticut River Power Co.*, 105 Vt. 24, 48, 162 A. 859, 869 (1932).

This rationale set the tone for most of the percolating groundwater decisions which followed. The courts, therefore, are concerned that if correlative rights and duties are imposed upon users of percolating groundwater, the users will incur liability for injurious consequences they could not foresee or guard against.<sup>124</sup> Such a rule would have an inhibiting effect on land development.<sup>125</sup> To enable a man to make use of available groundwater and to develop his land, no liability should be imposed for the injurious consequences arising from a land-owner's non-malicious use of groundwater or of his land.<sup>126</sup>

The absolute ownership rule, and the reasonable use rule of groundwater which developed from it, were formulated when there was no scientific explanation of or prediction for the movement of underground water.<sup>127</sup> Because of this, it is very understandable why the courts adopted the rules they did; if the flow of percolating groundwater and the consequences of its diversion could not be predicted, the courts were loath to impose a rule presupposing predictive capability.

124. *Ellis v. Duncan*, 21 Barb. 230, 234 (N.Y. Sup. Ct. 1855), stated:

The owners of the surface soil are not generally aware of their existence, and cannot be supposed to have voluntarily acquiesced in any appropriation of them. When they purchase they are ignorant of any obstacle to the free use of their property *ab center ad calum*; and to arrest some valuable improvement, such as digging a well or cellar, draining the land, taking valuable stones from a quarry, or leveling the ground for building or agricultural purposes, because it would cause some consequential, unforeseen and possibly irremediable damage to another, would seem to be unreasonable and unjust.

See also *Bradford Corp. v. Ferrand*, [1902] 2 Ch. 655, 663-64.

125. *Ellis v. Duncan*, 21 Barb. 230, 234 (N.Y. Sup. Ct. 1855), stated:

If the principle that the man who interrupts a sub-surface stream, to the prejudice of his neighbor, commits a wrong for which the law will give redress is sound, no one will be safe in purchasing land adjoining or near a private stream of water, as he may be restrained forever from making some valuable, and frequently, from the progressiveness of the age, necessary improvements.

Although the court used the words "sub-surface stream," the case concerns the interruption of percolating groundwater and it is clear this is what the court was referring to. See also *Chasemore v. Richards*, 7 H.L. Cas. 349, 386-87, 11 Eng. Rep. 140, 155 (1859) (opinion of Lord Wensleydale); *Ewart v. Belfast Poor-Law Guardians*, 9 L.R. Ir. 172, 206 (Ch. 1881).

126. In *Chasemore v. Richards*, 7 H.L. Cas. 349, 387, 11 Eng. Rep. 140, 155 (1859), Lord Wensleydale stated:

[A]s the great interests of society require that the cultivation of every man's land should be encouraged, and its natural advantages made fully available, the owner must be permitted to dig in his own soil, and, in so doing, he can very rarely avoid interfering with the subterraneous waters flowing or percolating in his neighbour's land.

See also *Bradford Corp. v. Ferrand*, [1902] 2 Ch. 655, 664.

127. The science of hydrology was formulated as late as 1923 and the current theory of groundwater movement was first studied extensively about 1940. See O. MEINZER, *THE OCCURRENCE OF GROUND WATER IN THE UNITED STATES* (U.S. Geo. Survey Water Supply Paper No. 489, 1923); O. MEINZER, *OUTLINE OF GROUND WATER HYDROLOGY, WITH DEFINITIONS* (U.S. Geo. Survey Water Supply Paper No. 494, 1923); Hubbert, *The Theory of Ground-water Motion*, 48 J. GEOL. 785 (1940).

### b. Adoption of Correlative Rights Rule

A few courts were not stymied by the absence of knowledge about the movements of percolating groundwater. As early as 1863, the New Hampshire courts applied to percolating groundwater the same rules that applied to surface watercourses. In *Bassett v. Salisbury Manufacturing Co.*, a reservoir heightening case, the court, after describing the reasons for the absolute ownership rule, stated:

It seems to us inconsistent to hold that ordinarily you may not drain a water-course by digging away the bank, which is your land, and yet to sustain a doctrine which would allow you to dig so near it as to draw off all its water by percolation. In either case you deal directly with your own merely; but in the former you are forbidden, only because by so doing you take what is not absolutely your own; because you drain a water course. . . . In the other case exactly the same reason exists for not doing a similar act, producing precisely the same effects, that constitute the only objection in the former, and therefore the law of the cases should be the same; and it would seem to follow that ordinarily you may not drain a water-course dry by means of percolation into your pits. Although the law does not generally allow one directly to deprive the land-owners below of the natural advantages of a common water-course, yet this doctrine, as held in some of the cases, would sometimes permit this mischief indirectly, by allowing all the sources of supply to be cut off from the stream. . . .

[T]he regulations now settled by the law of water-courses were established, not because of any peculiarity in the origin of water in streams, but because of the good or harm that may result from its management or use. Therefore, so far as a similarity of benefits and injuries exists, there should be a similarity in the rules of law applied.<sup>128</sup>

This is the same type of reasoning the California court expressed in *Miller*. The court, therefore, applied the same correlative rights to users of percolating groundwater as already applied to users of surface watercourses.<sup>129</sup>

Not only should similar rules apply to similar situations—where the acts, consequences, and sometimes even the water are the same—but the assumption that the movement of percolating groundwater is unknown, an assumption central to the absolute ownership rule, sometimes is false. As Justice Coleridge pointed out in dissent in the English Court of Exchequer case of *Chasemore v. Richards*:

The course by which the diverted water here percolates, is not indeed seen, nor has it any one channel defined by visible banks, but its direction is as well known as if it ran in such a channel on

128. *Bassett v. Salisbury Mfg. Co.*, 43 N.H. 569, 573-76 (1862).

129. *Id.* at 577-78. See also *Gason v. Florida Power Co.*, 74 Fla. 1, 7, 76 So. 535, 536 (1917) (another reservoir heightening case).

the surface, and is regulated by as ancient and well known and as varying a law as the descent of any superficial stream. Further, the act of diversion cannot be considered an act done in ignorance; the plaintiff's ancient right the defendant must be taken to have known, and that the uninterrupted percolation of water to the stream was necessary to the full enjoyment of it; he has diverted that percolation by a combination of continued acts, of which the arbitrator finds "the natural effect to be reasonably expected," was to produce the injurious consequences actually experienced.<sup>130</sup>

Although *Chasemore v. Richards* involved diversion of groundwater percolating downhill to feed a stream powering a mill, Coleridge's observations could apply to any situation where the movement of percolating groundwater was in fact known or a matter of local repute.

### c. Reasons for Following Surface Watercourse Rules

The cases decided upon the natural flow doctrine of riparian rights have taken up the same logic as expressed in *Bassett*. Most of these cases involved either virtual diversion of stream water from streamside wells<sup>131</sup> or high capacity pumping.<sup>132</sup> A public water supply system was the usual diverter in both situations. Typical of the courts' attitudes in these cases is the following statement:

No man can rightfully dig a channel from a running stream, and thus divert the waters thereof to the injury of a lower proprietor. What he cannot do directly, he cannot do indirectly.<sup>133</sup>

An English decision casts the same idea into more general terms, which apply to any groundwater diversion which adversely affects stream flow:

You have a right to all the water which you can draw from the different sources which may percolate underground; but that has no bearing at all on what you may do with regard to water which is in a defined channel, and which you are not to touch. If you cannot get at the underground water without touching the water in a defined surface channel, I think you cannot get at it at all. You are not by your operations, or by any act of yours, to diminish the water which runs in this defined channel, because that is not only

130. *Chasemore v. Richards*, 2 H. & N. 168, 191-92, 157 Eng. Rep. 71, 79-80 (Ex. 1857) (dissenting opinion of Coleridge, J.).

131. *Collens v. New Canaan Water Co.*, 155 Conn. 477, 234 A.2d 825 (1967); *Harper Hollingsworth & Darby Co. v. Mountain Water Co.*, 65 N.J.Eq. 479, 56 A. 297 (Ch. 1903); *Warder & Barnett v. Springfield*, 9 Ohio Dec. Reprint 855 (C.P. 1887).

132. *Smith v. City of Brooklyn*, 32 App. Div. 257, 52 N.Y.S. 983 (1898), *aff'd*, 160 N.Y. 357, 54 N.E. 787 (1899).

133. *Warder & Barnett v. Springfield*, 9 Ohio Dec. Reprint 855, 859 (C.P. 1887). *See also* *Collens v. New Canaan Water Co.*, 155 Conn. 477, 487, 234 A.2d 825, 831 (1967); *Smith v. City of Brooklyn*, 160 N.Y. 357, 360-61, 54 N.E. 787, 788 (1899); *Pixley v. Clark*, 35 N.Y. 520, 529 (1866).

for yourself, but for your neighbors also, who can have a clear right to use it, and have it come to them unimpaired in quality and undiminished in quantity.<sup>134</sup>

The same position is taken by the cases which impose liability on virtual diversions of stream water by streamside wells, under the induced underground current theory.<sup>135</sup>

#### d. Discussion

Most of the natural flow decisions, including all of those just discussed, involved diversions of groundwater which were described as being subterfuges for prohibited stream diversions. The hydrologic connection between percolating groundwater and surface watercourses is inescapable in that situation and cannot be denied without substantial injustice. These cases do not help us with the more general relationship between percolating groundwater and surface watercourses, which can take many different forms and involve many different relationships between landowners and water users. There are no natural flow cases which can shed light on this more general relationship. Although the language from *Bassett v. Salisbury Manufacturing Co.* (the correlative rights case discussed previously) is useful, as precedent applying to the general situation it is weak. It deals with the reservoir heightening situation. Most of these cases grant relief to the injured landowner, many under a trespass theory.<sup>136</sup> The result in *Bassett* is not unexpected or unusual. But the correlative rights theory which it spawned has been followed up by other jurisdictions in ordinary groundwater allocation situations.<sup>137</sup> The rationales expressed in these latter cases apply equally well where a hydrologic connection between percolating groundwater and surface watercourses exists.<sup>138</sup> The attitude expressed by the court in *Smith v. City of Brooklyn*, a groundwater diversion case, although decided on the basis of the reasonable use rule of groundwater because the groundwater was being transported to non-overlying land, seems the appropriate one to take:

There is certainly an inconsistency in the rule which gives to an

134. *Grand Junction Canal Co. v. Shugar*, L.R. 6 Ch. 483, 487-88 (C.A. 1871).

135. See, e.g., *Hollingsworth & Vose Co. v. Foxborough Water Supply Dist.*, 165 Mass. 186, 188, 42 N.E. 574 (1896); *Proprietors of Mills v. Braintree Water Supply Co.*, 149 Mass. 478, 484, 21 N.E. 761, 762 (1889); *Aetna Mills v. Brookline*, 127 Mass. 69, 71 (1879).

136. See cases cited note 77 *supra*.

137. See cases cited note 53 *supra*.

138. See, e.g., *Nashville, C. & St. L. Ry. v. Rickert*, 19 Tenn. App. 446, 457, 89 S.W.2d 889, 896 (1936) (dictum), where the court stated:

[T]he modern rule and "The better rule is that the rights of each owner being similar, and their enjoyment dependent on the action of other landowners, their right must be correlative and subject to the maxim that one must so use his own as not to injure another, so that each landowner is restricted to a reasonable exercise of his own rights and a reasonable use of his own property, in view of the similar rights of others." [27 R.C.L. *Waters* § 93, at 1174 (1920).]

owner of land the usufruct of a stream which exists as a right *ex natura*, and yet vests in another, in his search after underground water, the right to destroy the stream absolutely. There is no difference in the injury inflicted, if the stream be taken, whether it be brought about by drawing the water from the stream itself, or cutting off the supply . . . We think [the right in a stream] is not . . . limited [to the present particles of water], that the right is in and to the stream as a distinct entity, and that, where its source is known and its channel defined, an adjoining owner has ordinarily no right so to use his property as to work a destruction of the stream.<sup>139</sup>

This is the concept which the western courts have adopted uniformly. The language in *Miller* is especially appropriate because its logic squares with reality. It should be considered for widespread application in the eastern states.

#### e. Applicability of Various Rules Today

Most eastern cases involving a hydrologic connection between percolating groundwater and surface watercourses are decided under either of two groups of doctrines. The one-half decided in favor of the injuring user followed the absolute ownership rule, which does not impose liability for a non-malicious interference with groundwater, or the reasonable use rule of groundwater, which allows non-malicious interference provided the use of water is on the diverter's own overlying land. Most of the other half of the cases were decided in favor of the injured user under either of the riparian rights doctrines, which protect the integrity of surface watercourses. Most of these involved the special situations of streamside wells. Therefore, it would appear that in the general situation, where an ordinary well (not a high-capacity well where a special rule may apply) reduces the amount of water flowing in a stream or where a stream diversion depletes groundwater supplies, the courts probably will deny relief under the absolute ownership or reasonable use rules of groundwater. Most states follow one or the other of those two rules.

Absolute ownership is followed in Connecticut, the District of Columbia, Georgia, Illinois, Indiana, Massachusetts, Mississippi, Rhode Island, Vermont, and Wisconsin.<sup>140</sup> The reasonable use rule of groundwater is followed in Alabama, Iowa, Kentucky, Maine, Maryland, Michigan, New

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139. *Smith v. City of Brooklyn*, 18 App. Div. 340, 349, 46 N.Y.S. 141, 147 (1897).

140. *See, e.g.*, *Roath v. Driscoll*, 20 Conn. 532 (1850); *New York Continental Filtration Co. v. Jones*, 37 App. D.C. 511 (Ct. App. 1911); *City of Atlanta v. Hudgins*, 193 Ga. 618, 19 S.E.2d 508 (1942); *Behrens v. Scharringhausen*, 22 Ill. App. 2d 326, 161 N.E.2d 44 (1959); *Gagnon v. French Lick Springs Hotel Co.*, 163 Ind. 687, 72 N.E. 849 (1904); *Gamer v. Town of Milton*, 346 Mass. 617, 195 N.E.2d 65 (1964); *Clarke County v. Mississippi Lumber Co.*, 80 Miss. 535, 31 So. 905 (1902); *Rose v. Socony-Vacuum Corp.*, 54 R.I. 411, 173 A. 627 (1934); *White River Chair Co. v. Connecticut River Power Co.*, 105 Vt. 24, 162 A. 859

Jersey, New York, North Carolina, Ohio, Pennsylvania, and West Virginia.<sup>141</sup> Only a few states have adopted the correlative rights rules, which consider the right to use groundwater a usufructuary rather than proprietary right and recognize the hydrologic connection between percolating groundwater and surface watercourses. These states are Arkansas, Delaware, Florida, Minnesota, Missouri, New Hampshire, and Tennessee.<sup>142</sup>

Only in the correlative rights states is it likely that the western attitude toward the recognition of the hydrologic connection between percolating groundwater and surface watercourses will be implemented. In most of the eastern states, groundwater allocation rules, developed in an era when percolating groundwater movement was not understood, still hold sway—even though the theory of groundwater movement has been developed and testing methods have been created to locate and map such movements.

## VI. CONCLUSION

It is time for the courts in the eastern states to take off their blinders and update their groundwater allocation rules to correspond with present-day knowledge and techniques. The theory of groundwater movement has been developed and has been proven to be accurate.<sup>143</sup> Methods for determining the direction and volume of percolating groundwater flow are well developed. Since information about groundwater movement can now be made available by routine methods, the assumption that it is unknown can no longer justify the absolute ownership and reasonable use rules of groundwater. However, the contention that the groundwater user should not be subject to liability when he cannot predict in advance the injurious consequences of groundwater use still has validity. The reason is that the tests necessary to determine groundwater movements and injurious con-

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(1932); *Huber v. Merkel*, 117 Wis. 355, 94 N.W. 354 (1903). The Illinois and Indiana decisions cited above suggest a change to the reasonable use rule may be in the offing.

141. *Sloss-Sheffield Steel & Iron Co. v. Wilkes*, 231 Ala. 511, 165 So. 764 (1936); *DeBok v. Doak*, 188 Iowa 597, 176 N.W. 631 (1920); *Associated Contract. Stone Co. v. Pewee Valley Sanitarium & Hosp.*, 376 S.W.2d 316 (Ky. 1963); *Chesley v. King*, 74 Me. 164 (1882); *Finley v. Teeter Stone, Inc.*, 251 Md. 603, 248 A.2d 106 (1968); *Bernard v. City of St. Louis*, 220 Mich. 159, 189 N.W. 891 (1922); *Crane v. Borough of Essex Fells*, 67 N.J. Super. 83, 169 A.2d 845 (Ch. 1961); *Dunbar v. Sweeney*, 230 N.Y. 609, 130 N.E. 913 (1921); *Bayer v. Nello L. Teer Co.*, 256 N.C. 509, 124 S.E.2d 552 (1962); *Logan Gas Co. v. Glasgo*, 122 Ohio St. 126, 170 N.E. 874 (1930); *Township of Hatfield v. Lansdale Municipal Authority*, 403 Pa. 113, 168 A.2d 333 (1961); *Drummond v. White Oak Fuel Co.*, 104 W. Va. 368, 140 S.E. 57 (1927).

142. *Jones v. Oz-Ark-Val Poultry Co.*, 228 Ark. 76, 306 S.W.2d 111 (1957); *MacArtor v. Graylyn Crest III Swim Club, Inc.*, 40 Del. Ch. 53, 173 A.2d 344 (Ch. 1962) (remanding), 41 Del. Ch. 26, 187 A.2d 417 (1963); *Koch v. Wick*, 87 So. 2d 47 (Fla. 1956); *Erickson v. Crockston Waterworks Power & Light Co.*, 105 Minn. 182, 117 N.W. 435 (1908); *Higday v. Nickolaus*, 469 S.W.2d 859 (K.C. Mo. App. 1971); *Moore v. Berlin Mills Co.*, 74 N.H. 305, 67 A. 578 (1907); *Nashville, C. & St. L. Ry. v. Rickert*, 19 Tenn. App. 446, 89 S.W.2d 889 (1936).

143. See note 127 *supra*.

sequences are expensive.<sup>144</sup> It would seem unjust to impose liability on a landowner who cannot afford to make these tests, when he has not made them, by charging him with constructive knowledge of what he would have learned. But it also seems ludicrous to presume that a landowner does not know the results of such tests when, in fact, he has made them. There are decisions of this kind,<sup>145</sup> and some courts have wisely balked at denying relief in this situation.<sup>146</sup> The high-capacity well pumping situation is typical. No competent man is going to put in an extremely expensive large well, for municipal purposes for example, unless he has first made hydrologic tests to determine whether there is enough groundwater available to feed the well. This was true in *Higday* and was one of the major factors inducing the court to adopt the correlative rights rule and grant relief to the neighboring landowners who might lose their groundwater supply.<sup>147</sup>

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144. The two methods that have been developed to measure groundwater movement are clearly expensive. The first method involves putting in a pattern of test wells. Groundwater is pumped from one of the centrally located wells at a constant rate and the fall in the water table in the other observation wells is measured at intervals in time. The correlation of the pumping rate and the fall in the water table at the various observation wells, which reveals the dimensions of the cone of depression, allows computation of the effective transmissibility of the aquifer and its coefficient of storage, and reveals the hydrogeologic boundaries, impermeable discontinuities and potential recharge boundaries of the aquifer. The second method involves the injection into groundwater of a slug of tracer, often a fluorescent dye, which is carried along with the moving groundwater to observation wells below. Within the limits imposed by the diffusion, dispersion, dilution and absorption of the tracer, this method allows the determination of the direction and rate of flow of groundwater. See, e.g., Todd, *Groundwater*, in HANDBOOK OF APPLIED HYDROLOGY 13:12-13:27 (Ven Te Chow, ed. 1964). See also R. KAZMANN, MODERN HYDROLOGY 153-58 (1965); R. WARD, PRINCIPLES OF HYDROLOGY 276-84 (1967).

145. See, e.g., *Frazier v. Brown*, 12 Ohio St. 294 (1861) (the headnote to the contrary notwithstanding); *Huber v. Merkel*, 117 Wis. 355, 94 N.W. 354 (1903); *Chasemore v. Richards*, 2 H. & N. 168, 157 Eng. Rep. 71 (Ex. 1857), *aff'd*, 7 H.L. Cas. 349, 11 Eng. Rep. 140 (1859); *Broadbent v. Ramsbotham*, 11 Ex. 602, 156 Eng. Rep. 971 (1856); *Rugby Joint Water Bd. v. Walters*, [1967] Ch. 397 (1966); *M'Nab v. Robertson*, [1897] A.C. 129 (Scot. 1896).

146. See, e.g., *Dickinson v. Grand Junction Canal Co.*, 7 Ex. 282, 155 Eng. Rep. 953 (1852), a streamside well case, where the court said:

In the present case, the water is proved to have been taken from the river after it formed part of its stream, not by the reasonable use of it by another riparian proprietor, but by the digging of a well, which is clearly a diversion; and an action will lie at common law against the Company for the injury which has resulted from that unauthorized act to the known right of the mill-owners. If, indeed, it had appeared that the Company were ignorant, and could not by any degree of care have ascertained, before making the well, that it would have the effect of abstracting the water, and when they discovered that it did, could not have repaired the mischief, it might have raised a question whether the action was maintainable. . . .

*Id.* at 301, 155 Eng. Rep. 961.

See also *Bleachers' Ass'n, Ltd. v. Chapel-en-le-Frith Rural Dist. Council*, [1933] Ch. 356, 363-64 (1932).

147. In *Higday v. Nickolaus*, 469 S.W.2d 859 (K.C. Mo. App. 1971), the court said:

[R]espondent City's decision to turn to the McBaine Bottom as the source



It is also the factor that has prompted some courts to formulate a high-capacity well exception to the absolute ownership rule.<sup>148</sup> A landowner who has made hydrologic tests should be charged with the knowledge gained from those tests, and should be held liable for unreasonable adverse consequences inflicted upon his neighbors' groundwater supplies.

The author believes that eastern groundwater allocation rules should be modified to reflect the current state of knowledge and the expense of hydrologic testing. There should be two rules, one applying to high-capacity wells and the other applying to small wells. High capacity wells should be defined as those wells that a reasonable man would not install without first making hydrologic tests to determine the availability of adequate groundwater supplies, or obtaining information previously developed by others yielding substantially the same results as new tests. With respect to such wells, the landowner should be charged with the knowledge the tests revealed about groundwater movement and effects on neighboring users of groundwater and stream water or, if the tests are not made, what they would have revealed. He should be held liable for any unreasonable injurious consequences which could have been predicted from the test results under the correlative rights rule of groundwater or some similar rule requiring a comparison of the reasonableness of conflicting uses.

With respect to small wells, a different rule should apply. Small wells are those wells a reasonable man would be expected to install without making the substantial and expensive hydrologic tests necessary to determine groundwater movement. The landowner should be charged only with knowledge about groundwater movement of local repute, information actually known by him, or previously developed information which he could consult that a reasonable man would be expected to search out. He should be held liable for unreasonable injurious consequences which could have been predicted from that smaller body of information, and not for other injurious consequences. It is unjust to require a landowner to make

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of its water supply was made only after careful scientific analysis confirmed that this land was particularly adaptable for water production. At the time the City acquired the well and water treatment sites, it had full knowledge of the dimensions of the underlying aquifer, the volume of groundwater it contained, the daily rate of recharge, the direction and rate of flow, the normal water level and, at the rate of capture contemplated by the City, the level to which the groundwater would be lowered. The City cannot be permitted to escape liability by appeals to a doctrine which assumes that the very information the City has acted upon was not available to it. *Id.* at 869.

148. See, e.g., *Forbell v. City of New York*, 164 N.Y. 522, 58 N.E. 644 (1900), where the court said:

Before the defendant constructed its wells and pumping stations it ascertained, at least to a business certainty, that such was the percolation and underground flow or situation of the water in its own and the plaintiff's land that it could by these wells and appliances cause or compel the water in the plaintiff's land to flow into its own wells, and thus could deprive the plaintiff of his natural supply of underground water. *Id.* at 524, 58 N.E. at 645.

expensive hydrologic tests which are not justified by the size of the well or the volume of water proposed to be diverted. The small well rule satisfies the concerns which gave rise to the absolute ownership and reasonable use rules of groundwater, without stretching the assumptions underlying those rules to illogical limits.

The rules suggested here correlate well with the existing rules applicable to underground streams. Courts apply watercourse rules to underground streams that are known and have a course and direction discernible from the surface of the ground. If such streams are unknown, or if their course and direction can be ascertained only by excavation, the courts traditionally have refused to apply surface watercourse rules and instead treat the streams as percolating groundwater.<sup>149</sup> The author suggests that the same test be applied to underground streams as to percolating groundwater. If a diverter of an underground stream knows of its existence, course, and direction, or has made hydrologic tests and has obtained that information, he should be held liable for unreasonable injurious consequences arising from the diversion.<sup>150</sup> If he has diverted an underground stream in great enough quantities so that he should have made hydrologic tests, but did not, he should be held liable on the basis of the facts the tests would have revealed. But he should not be held liable for unreasonable injurious consequences arising from diversions where he had not made tests, would not be expected to make tests, and lacked actual knowledge of the existence, course, and direction of an underground stream. Such a rule would involve only a slight variation and extension of liability from the present position of the law.

The high capacity well and small well rules suggested here do not necessarily require the imposition of a limitation requiring use of the diverted water on overlying land. Such a limitation probably makes sense, at least for substantial diversions, but could be regarded as one element of comparative reasonableness instead of an independent constraint.

As the body of knowledge about groundwater movement grows and

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149. See, e.g., cases cited note 47 *supra*.

150. The court in *Bleachers' Ass'n, Ltd. v. Chapel-en-le-Frith Rural Dist. Council*, [1933] Ch. 356 (1932), suggested that a landowner made aware of the existence of an underground stream by excavations cannot make further interferences with the stream with impunity:

The point of law [in *Bradford Corp. v. Ferrand*, [1902] 2 Ch. 655] was I think confined to the case where the existence and course of the defined channel is not known at the date of the issue of the writ and cannot be ascertained except by excavation subsequent to its issue, because once it is established that there is a defined underground channel and that its course can be ascertained with reasonable certainty, the rights of the lower riparian owner are crystallized and any fresh act of interference or abstraction which—*ex hypothesi* must be done with knowledge of those rights—must then be actionable; in other words the liability for abstraction or interference must depend on the knowledge of the actor at the time the act complained of is committed and not on the manner in which that knowledge has been obtained. *Id.* at 363-64.

as the techniques for measuring it decrease in cost, the two rules would automatically shift the dividing line between high capacity wells and small wells to require more landowners to make hydrologic tests and to be subjected to liability under a comparative reasonableness test. At the same time the rules afford some protection to the innocent small user whose diversions in the usual situation are likely to be innocuous to his neighbors.<sup>151</sup>

The rules suggested here would be equally applicable to situations involving the hydrologic connection between percolating groundwater and surface watercourses. They would remedy the illogic accepted by many eastern courts that percolating groundwater, diffused surface water and surface watercourses constitute independent classes of water. In the case of substantial diversions, which cause most of the major interferences with uses of water by others, they would recognize the hydrologic cycle the western courts have recognized for many years. They would also provide relief for major interferences without burdening the small groundwater diverter with unpredictable liabilities, and would put an end to the absolute ownership rule, which has become an absurdity in the law with the passage of time and the growth of hydrologic technology.

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151. Because of their possible pervasive effects, the author does not believe the small well rule he proposes should protect any discharger of wastes into groundwater aquifers. Discharge of wastes into any body of water, surface or underground, should be subject to liability under a comparative reasonableness test that emphasizes protection of water quality and strongly discourages the degradation of domestic water supplies or creation of nuisances.

## APPENDIX

CASES DISCUSSING HYDROLOGIC RELATIONSHIP BETWEEN  
PERCOLATING GROUNDWATER AND SURFACE WATERCOURSES

(Cases marked \* acknowledge the hydrologic connection.)

## I. INFLUENT STREAM

(water leaves stream)

A. *Diversion From Stream Lowers Groundwater Level and Yield*

## 1. Percolating Groundwater Rules Followed

## a. Absolute Ownership

\**Maricopa County Municipal Water Conservation Dist. No. 1 v. Southwest Cotton Co.*, 39 Ariz. 65, 4 P.2d 369 (1931) (re: percolating groundwater not part of subflow of surface stream; diversion from stream reduced yield of nearby well); *Heninger v. McGinnis*, 131 Va. 70, 108 S.E. 671 (1921) (diversion from spring whose water flowed in a stream to a marsh dried up springs below the marsh).

## b. Reasonable Use

\**Miller v. Bay Cities Water Co.*, 157 Cal. 256, 107 P. 115 (1910) (proposed diversion from river alleged would dry up aquifer parallel to and fed by river); *Springfield Waterworks Co. v. Jenkins*, 62 Mo. App. 74 (St. L. Ct. App. 1895) (stopping flow of river at dam dried up spring).

## c. Correlative Rights

None.

## d. Common Pool

\**Maricopa County Municipal Water Conservation Dist. No. 1 v. Southwest Cotton Co.*, 39 Ariz. 65, 4 P.2d 369 (1931).

## 2. Surface Watercourse Rules Followed

## a. Riparian Rights

## i. Natural Flow Doctrine

\**Craig v. Shippensburg Borough*, 7 Pa. Super. 526 (1898) (obstruction of stream by reservoir dried up spring near stream below dam).

## ii. Reasonable Use Doctrine

\**Miller v. Bay Cities Water Co.*, 157 Cal. 256, 107 P. 115 (1910).

## b. Prior Appropriation

\**Maricopa County Municipal Water Conservation Dist. No. 1 v. Southwest Cotton Co.*, 39 Ariz. 65, 4 P.2d 369 (1931) (re: subflow of stream).

## 3. Other Special Rules Followed

None.

B. *Reduction in Reservoir Level Lowers Water Table*

## 1. Percolating Groundwater Rules Followed

## a. Absolute Ownership

*In re Miami Conservancy Dist.*, 25 Ohio N.P. (n.s.) 325 (C.P. 1924) (river level lowered by dredging bed dried up well).

## b. Reasonable Use

None.

## c. Correlative Rights

None.

## d. Common Pool

None.

## 2. Surface Watercourse Rules Followed

## a. Riparian Rights

## i. Natural Flow Doctrine

None.

## ii. Reasonable Use Doctrine

None.

## b. Prior Appropriation

None.

3. Other Special Rules Followed  
None.

C. *Raised Reservoir Level Raises Water Table*

1. Percolating Groundwater Rules Followed

a. Absolute Ownership

None.

b. Reasonable Use

None.

c. Correlative Rights

\*Cason v. Florida Power Co., 74 Fla. 1, 76 So. 535 (1917) (reservoir raised water table and made land unusable for any purpose); \*Moore v. Berlin Mills Co., 74 N.H. 305, 67 A. 578 (1907).

d. Common Pool

None.

2. Surface Watercourse Rules Followed

a. Riparian Rights

i. Natural Flow Doctrine

\*Pixley v. Clark, 35 N.Y. Ct. App. 520 (1866) (mill dam raised water table and made land unfit for cultivation).

ii. Reasonable Use Doctrine

None.

b. Prior Appropriation

None.

3. Other Special Rules Followed

a. Trespass—Flooding Compensation

\*Belkus v. City of Brockton, 282 Mass. 285, 184 N.E. 812 (1933) (obstruction in stream raised water table and flooded cellar); \*Wilson v. City of New Bedford, 108 Mass. 261 (1871) (reservoir raised water table, flooded cellar, and water-logged soil 1000 feet away); \*Fuller v. Chicopee Mfg. Co., 82 Mass. (16 Gray) 46 (1860) (reservoir raised water table and flooded a well); \*Monson & Brimfield Mfg. Co. v. Fuller, 32 Mass. (15 Pick.) 554 (1834) (reservoir raised water table and reduced productivity of meadow); \*Odell v. Nyack Waterworks Co., 91 Hun 283, 36 N.Y.S. 206 (Sup. Ct. 1895) (reservoir raised water table and collapsed well); \*Robb v. State, 174 Misc. 180, 20 N.Y.S.2d 204 (Ct. Cl. 1940) (navigation canal raised water table and flooded quarry); \*Barborton v. Miksch, 12 Ohio L. Abs. 245 (Ct. App. 1932), *aff'd*, 128 Ohio St. 169, 190 N.E. 387 (1934) (reservoir raised water table and made land too wet for cultivation).

b. Nuisance

\*Welliver v. Irondale Elec. Light, Heat & Power Co., 38 Pa. Super. 26 (1909) (mill race raised water table).

c. Negligence

\*Mowday v. Moore, 133 Pa. 598, 19 A. 626 (1890) (mill race raised water table and flooded cellar).

D. *Pumping or Groundwater Drainage Draws Water from Stream and Reduces Stream Flow*

1. Percolating Groundwater Rules Followed

a. Absolute Ownership

\*English v. Metropolitan Water Bd., [1907] 1 K.B. 588 (re: subsurface support, but not directly induced abstraction; streamside well lowered water table and nearly dried up stream, destroying a fish breeding business).

b. Reasonable Use

None.

c. Correlative Rights

None.

d. Common Pool

None.

## 2. Surface Watercourse Rules

## a. Riparian Rights

## i. Natural Flow Doctrine

Harper Hollingsworth & Darby Co. v. Mountain Water Co., 65 N.J. Eq. 479, 56 A. 297 (Ch. 1903) (streamside well reduced flow in mill race); \*Covert v. City of Brooklyn, 6 App. Div. 73, 39 N.Y.S. 744 (1896) (construction trench across stream bed diverted stream flow by percolation); \*Covert v. Valentine, 66 Hun 32, 21 N.Y.S. 219 (Sup. Ct. 1892), *rev'd on other grounds*, 141 N.Y. 421, 36 N.E. 297 (1894) (same); \*Dickinson v. Grand Junction Canal Co., 7 Ex. 282, 155 Eng. Rep. 953 (1852) (well sucked water from river); \*Grand Junction Canal Co. v. Shugar, L.R. 6 Ch. App. 382 (1871) (drain lowered water table and level of pond).

## ii. Reasonable Use

\*Tulare Irrigation Dist. v. Lindsay-Strathmore Irrigation Dist., 3 Cal. 2d 489, 45 P.2d 972 (1935) (re: subflow of river; proposed wells would induce seepage from rivers and reduce their flows); \*Metropolitan Util. Dist. v. Merritt Beach Co., 179 Neb. 783, 140 N.W.2d 626 (1966) (re: subflow of river; proposed well field would reduce flow in river).

## b. Prior Appropriation

Tulare Irrigation Dist. v. Lindsay-Strathmore Irrigation Dist., 3 Cal. 2d 489, 45 P.2d 972 (1935); \*Montecito Valley Water Co. v. City of Santa Barbara, 144 Cal. 578, 77 P. 1113 (1904) (re: subsurface support of stream; underground collection tunnel draws water from stream); \*Lemm v. Rutherford, 76 Cal. App. 455, 245 P. 225 (1926); \*Model Land & Irrigation Co. v. Hoehne Ditch Co., 70 Colo. 484, 202 P. 712 (1921) (re: induced diversions from streams; streamside collection gallery diverts surface and underground flow of river); \*Langenegger v. Carlsbad Irrigation Dist., 82 N.M. 411, 483 P.2d 297 (1971) (application for license to substitute groundwater diversion for river diversion rendered ineffective by reduced river flows caused by well pumping); Carlsbad Irrigation Dist. v. Ford, 46 N.M. 335, 128 P.2d 1047 (1942) (wells divert river flow); \*Little Cottonwood Water Co. v. Sandy City, 123 Utah 242, 258 P.2d 440 (1953) (dictum re: tributary flow of stream; well allegedly diverted river flow).

## 3. Other Special Rules Followed

## a. Induced Underground Current

\*Hollingsworth & Vose Co. v. Foxborough Water-Supply Co., 165 Mass. 186, 42 N.E. 574 (1896) (wells lowered level of artificial pond); \*Proprietors of Mills v. Braintree Water Supply Co., 149 Mass. 478, 21 N.E. 761 (1889) (streamside filter gallery reduced flow in river from pond to mill); \*Aetna Mills v. Brookline, 127 Mass. 69 (1879) (streamside filter basin reduced mill water flow); \*Aetna Mills v. Waltham, 126 Mass. 422 (1879) (same); \*Van Wycklen v. City of Brooklyn, 118 N.Y. 424, 24 N.E. 179 (1890) (by implication) (streamside well system reduced flow in stream to well); \*English v. Metropolitan Water Bd., [1907] 1 K.B. 588 (dictum) (streamside well lowered water table and nearly dried up stream, destroying a fish breeding business).

E. *Stream Pollution Degrades Groundwater*

## 1. Percolating Groundwater Rules Followed

## a. Absolute Ownership

None.

## b. Reasonable Use

None.

## c. Correlative Rights

None.

## d. Common Pool

None.

## 2. Surface Watercourse Rules Followed

## a. Riparian Rights

## i. Natural Flow Doctrine

None.

ii. Reasonable Use Doctrine

None.

b. Prior Appropriation

None.

3. Other Special Rules Followed

c. Nuisance

\*Haynor v. Excelsior Springs Light, Power, Heat & Water Co., 129 Mo. App. 691, 108 S.W. 580 (K.C. Ct. App. 1908) (oil and grease escaping into stream polluted well).

II. EFFLUENT STREAM

(water enters stream)

A. Pumping or Groundwater Drainage Reduces Additions to Stream and Reduces Its Flow

1. Percolating Groundwater Rules Followed

a. Absolute Ownership

Hartford Rayon Corp. v. Cromwell Water Co., 126 Conn. 194, 10 A. 2d 587 (1940) (proposed wells would intercept mill water flow in stream); Stoner v. Patten, 124 Ga. 754, 52 S.E. 894 (1906) (interlocutory appeal), 132 Ga. 178, 63 S.E. 897 (1909) (diverted spring caused loss of stream flow); Nourse v. Andrews, 200 Ky. 467, 255 S.W. 84 (1923) (proposed diversion of spring would reduce river flow); Spaulding v. Plainville, 218 Mass. 321, 105 N.E. 1006 (1914) (dictum) (well field reduced flow to millpond); Chelsea Dye House & Laundry Co. v. Commonwealth, 164 Mass. 350, 41 N.E. 649 (1895) (sewer line severed aquifer feeding stream); Hart v. Jamaica Pond Aqueduct Corp., 133 Mass. 488 (1882) (dictum) (well lowered pond level); Van Wycklen v. City of Brooklyn, 118 N.Y. 424, 24 N.E. 179 (1890) (dictum re: interception of percolating groundwater); Covert v. Valentine, 66 Hun 32, 21 N.Y.S. 219 (Sup. Ct. 1892), *rev'd on other grounds*, 141 N.Y. 521, 36 N.E. 597 (1894) (dictum re: interception of percolating groundwater); \*Herriman Irrigation Co. v. Keel, 25 Utah 96, 69 P. 719 (1902) (well dried up stream); Fire Dist. No. 1 v. Graniteville Spring Water Co., 103 Vt. 89, 152 A. 42 (1930) (wells cause reduction in stream flow to reservoir); Chasemore v. Richards, 2 H. & N. 168, 157 Eng. Rep. 71 (Ex. 1857), *aff'd*, 7 H.L. Cas. 349, 11 Eng. Rep. 140 (1859) (well caused reduction in stream flow to mill); Broadbent v. Ramsbotham, 11 Ex. 602, 156 Eng. Rep. 971 (1856) (drain caused reduction in stream flow to mill); Rugby Joint Water Bd. v. Walters, [1967] Ch. 397 (1966) (groundwater diversion reduced flow in river); Bleacher's Ass'n Ltd. v. Chapel-en-le-Frith Rural Dist. Council, [1933] Ch. 356 (1932) (proposed groundwater diversion would reduce stream flow from spring to factory); Bradford Corp. v. Ferrand, [1902] 2 Ch. 655 (wells caused a reduction in stream flow from a spring to a city and to mills); Ewart v. Belfast Poor-Law Guardians, 9 L.R. Ir. 172 (Ch. 1881) (drain caused reduction in stream flow from spring to mill); M'Nab v. Robertson, [1897] A.C. 129 (Scot. 1896) (marsh drains intercepted groundwater percolating to pond).

b. Reasonable Use

Freidland v. State, 35 App. Div. 2d 755, 314 N.Y.S.2d 935 (1970) (highway drainage ditches dried up pond); Covert v. City of Brooklyn, 6 App. Div. 73, 39 N.Y.S. 744 (1896) (dictum re: interception of percolating groundwater); \*Stevens v. Spring Valley Water Works & Supply Co., 42 Misc. 2d 86, 247 N.Y.S.2d 503 (Sup. Ct. 1964) (diversion of groundwater dried up stream).

c. Correlative Rights

None.

d. Common Pool

None.

2. Surface Watercourse Rules Followed

a. Riparian Rights

i. Natural Flow Doctrine

\*City of Los Angeles v. Hunter, 156 Cal. 603, 105 P. 755 (1909) (re: flow

tributary to stream; wells reduced stream flow); \*Verdugo Canon Water Co. v. Verdugo, 152 Cal. 655, 93 P. 1021 (1908) (re: sub-surface support; wells reduced stream flow); \*McClintock v. Hudson, 141 Cal. 275, 74 P. 849 (1903) (ground-water diversion reduced stream flow); \*Merrick Water Co. v. City of Brooklyn, 32 App. Div. 454, 53 N.Y.S. 10 (1898) (dictum; wells allegedly dried up stream); \*Smith v. City of Brooklyn, 32 App. Div. 257, 52 N.Y.S. 983 (1898), *aff'd*, 160 N.Y. 357, 54 N.E. 787 (1899) (well field dried up ponds); \*Warder & Barnett v. Springfield, 9 Ohio Dec. Reprint 855 (C.P. 1887) (proposed filtering gallery would reduce stream flow to mill).

ii. Reasonable Use Doctrine

Fire Dist. No. 1 v. Graniteville Spring Water Co., 103 Vt. 89, 152 A. 42 (1930) (dictum re: diversion of water in spring).

b. Prior Appropriation

\*Cohen v. La Canada Land & Water Co., 142 Cal. 437, 76 P. 47 (1904) (re: flow tributary to stream; tunnel intercepted water feeding spring-fed stream); \*Fellhauer v. People, 167 Colo. 320, 447 P.2d 986 (1968) (dictum re: flow tributary to stream; attorney-general action to enjoin pumping from alluvium of river); \*City of Colorado Springs v. Bender, 148 Colo. 458, 366 P.2d 552 (1961) (re: tributary subflow of stream; wells reduced stream flow); \*Schluter v. Burlington Ditch, Reservoir & Land Co., 117 Colo. 284, 188 P.2d 253 (1947) (re: flow tributary to stream; action to quiet title to seepage water alleged to be tributary to stream); \*Dalpez v. Nix, 96 Colo. 540, 45 P.2d 176 (1935) (re: flow tributary to stream; adjudication of seepage water alleged to be tributary to stream); \*Leadville Mine Dev. Co. v. Anderson, 91 Colo. 536, 17 P.2d 303 (1932) (re: flow tributary to stream; drainage from mine tunnel alleged to be tributary to stream); \*Nevius v. Smith, 86 Colo. 178, 279 P. 44 (1929) (re: flow tributary to stream; proposed diversion of groundwater would reduce flow in stream); \*Ft. Morgan Reservoir & Irrigation Co. v. McCune, 71 Colo. 256, 206 P. 393 (1922) (re: flow tributary to stream; challenge to state agency order allowing interception of percolating groundwater alleged to be tributary to stream); \*Clark v. Ashley, 34 Colo. 285, 82 P. 588 (1905) (re: flow tributary to stream; spring water diversion reduced flow in stream); \*Bruening v. Dorr, 23 Colo. 195, 47 P. 290 (1896) (re: flow tributary to stream; springwater diversion reduced flow in stream); \*Ogilvy Irrigating & Land Co. v. Insinger, 19 Colo. App. 380, 75 P. 598 (1904) (re: flow tributary to stream; interception of drainage waters reduced flow in stream); \*Leonard v. Shatzer, 11 Mont. 422, 28 P. 457 (1892) (dictum re: flow tributary to stream; diversion of spring water alleged to be tributary to stream); \*Strait v. Brown, 16 Nev. 317 (1881) (re: flow tributary to stream; spring water diversion reduced stream flow); \*City of Albuquerque v. Reynolds, 71 N.M. 428, 379 P.2d 73 (1962) (re: flow tributary to stream; application to divert groundwater allegedly not part of base flow of river); \*Templeton v. Pecos Valley Artesian Conservancy Dist., 65 N.M., 59, 332 P.2d 465 (1958) (re: flow tributary to stream; application to change diversion point from river to wells pumping from aquifer allegedly feeding river); \*Midway Irrigation Co. v. Snake Creek Mining & Tunnel Co., 271 F. 157 (8th Cir. 1921), *aff'd*, \*260 U.S. 596 (1923) (applying Utah law and counted twice in the tables because of different discussion on appeal) (re: flow tributary to stream; action to quiet title from drainage tunnel allegedly tributary to stream); \*Silver King Consol. Mining Co. v. Sutton, 85 Utah 297, 39 P.2d 682 (1934) (re: flow tributary to stream where groundwater was located on public domain at time of stream water appropriation; action to quiet title to mine drainage water allegedly tributary to stream); \*Bastian v. Nebeker, 49 Utah 390, 163 P. 1092 (1916) (dictum re: flow tributary to stream; well field alleged to have reduced flow in spring-fed stream); \*Mountain Lake Mining Co. v. Midway Irrigation Co., 47 Utah 346, 149 P. 929 (1915) (re: flow tributary to stream; action to quiet title to mine drainage alleged to have formerly fed stream); \*Howcroft v. Union & Jordon Irrigation Co., 25 Utah 311, 71 P. 487 (1903) (re: subflow of stream; proposed diversion of seepage water would reduce stream flow); \*Herriman Irrigation Co. v. Keel, 25 Utah 96, 69 P. 719 (1902) (re: identifiable flow tributary to stream; mining tunnel intercepted groundwater feeding stream); \*Herriman Irrigation



Co. v. Butterfield Mining Co., 19 Utah. 453, 57 P. 537 (1899) (re: flow tributary to stream; mining tunnel intercepted groundwater feeding stream).

3. Other Special Rules Followed

a. Prescription

\*Balston v. Bensted, 1 Camp. 463, 170 Eng. Rep. 1022 (N.P. 1808) (obsolete doctrine based on long use; quarry drainage cut off spring-fed stream).

b. Ultra Vires Act

Spaulding v. Plainville, 218 Mass. 321, 105 N.E. 1006 (1914); Hart v. Jamaica Pond Aqueduct Corp., 133 Mass. 488 (1882).

B. *Pumping or Groundwater Drainage Lowers Water Table and Reservoir Level*

1. Percolating Groundwater Rules Followed

a. Absolute Ownership

None.

b. Reasonable Use

\*Smith v. City of Brooklyn, 18 App. Div. 340, 46 N.Y.S. 141 (1897) (well field dried up pond).

c. Correlative Rights

None.

d. Common Pool

None.

2. Surface Watercourse Rules Followed

a. Riparian Rights

i. Natural Flow Doctrine

\*Collens v. New Canaan Water Co., 115 Conn. 477, 234 A.2d 825 (1967) (wells adjacent to streamside lagoon lower river level and interfere with fishing, swimming and boating).

ii. Reasonable Use Doctrine

None.

b. Prior Appropriation

None.

3. Other Special Rules Followed

None.

C. *Raised Reservoir Level Obstructs Groundwater Drainage and Raises Water Table*

1. Percolating Groundwater Rules Followed

a. Absolute Ownership

White River Chair Co. v. Connecticut River Power Co., 105 Vt. 24, 162 A. 859 (1932) (new reservoir flooded land by percolation); Harwood v. Benton & Jones, 32 Vt. 724 (1860) (raising of reservoir level raised water table and flooded land by percolation).

b. Reasonable Use

None.

c. Correlative Rights

\*Bassett v. Salisbury Mfg. Co., 43 N.H. 569 (1862) (dam raised water table).

d. Common Pool

None.

2. Surface Watercourse Rules Followed

a. Riparian Rights

i. Natural Flow Doctrine

None.

ii. Reasonable Use Doctrine

None.

b. Prior Appropriation

None.

3. Other Special Rules Followed

a. Trespass—Flooding Compensation

Tennessee Elec. Power Co. v. Van Dobson, 14 Tenn. App. 54 (1932) (dictum; reservoir made land too wet for cultivation).

*D. Diversion from Stream Draws More Flow from Groundwater and Reduces Well or Drainage Yield*

1. Percolating Groundwater Rules Followed

a. Absolute Ownership

\**Gamer v. Town of Milton*, 346 Mass. 617, 195 N.E.2d 65 (1964) (lowering of quarry pond lowered water table; house foundation cracked from soil compaction).

b. Reasonable Use

None.

c. Correlative Rights

None.

d. Common Pool

None.

2. Surface Watercourse Rules Followed

a. Riparian Rights

i. Natural Flow Doctrine

None.

ii. Reasonable Use Doctrine

None.

b. Prior Appropriation

None.

3. Other Special Rules Followed

*E. Groundwater Pollution Degrades Stream*

1. Percolating Groundwater Rules Followed

a. Absolute Ownership

*Rarick v. Smith*, 17 Pa. County Ct. 627 (1896) (dictum; industrial wastes discharged into sinkhole polluted stream).

b. Reasonable Use

None.

c. Correlative Rights

None.

d. Common Pool

None.

2. Surface Watercourse Rules Followed

a. Riparian Rights

i. Natural Flow Doctrine

\**Pennsylvania Coal Co. v. Sanderson*, 113 Pa. 126, 6 A. 453 (1886) (dictum; acid mine wastes drained from tunnel were diverted into stream, polluting it).

ii. Reasonable Use Doctrine

None.

b. Prior Appropriation

None.

3. Other Special Rules Followed

a. Nuisance

\**Pennsylvania R.R. v. Sagamore Coal Co.*, 281 Pa. 233, 126 A. 386 (1924) (acid mine wastes percolating from spoil heap polluted reservoir used for public water supply and locomotive water supply); \**Rarick v. Smith*, 17 Pa. County Ct. 627 (1896) (re: non-natural use of land).

b. Natural Mine Drainage

\**Pennsylvania Coal Co. v. Sanderson*, 113 Pa. 126, 6 A. 453 (1886); \**Mountain Water Supply Co. v. Sagamore Coal Co.*, 3 Pa. D. & C. 187 (C.P. 1922) (same facts as *Pennsylvania R.R. v. Sagamore Coal Co.*).