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## GROUND WATER IN NEBRASKA

Lester Danielson\*

All the rivers run into the sea;  
yet the sea is not full; unto the  
place from whence the rivers come,  
thither they return again.

Ecclesiastes, c. 1, ver. 7

We read that in many states the nation's most precious resource—water—is running short. In some areas the water table has fallen because of prolonged and wide-spread drouths; but in many places excessive extractions—prolonged withdrawals in excess of ground-water recharge—for agriculture, industry, and all the many other requirements of complex modern life, have been the cause.<sup>1</sup> Happily, there presently appears to be no substantial evidence which suggests that the ground-water shortage which imperils so many communities will plague Nebraska. On the contrary, there is evidence which indicates that progress through the use of ground water may be greater than was recently considered possible. One expert, for example, estimates that 2,500,000 acres of the South-Central Plain<sup>2</sup> may some day be irrigated from adequate supplies of well water, if annual consumption is limited to one acre foot of water for each acre of land irrigated.<sup>3</sup> It is recognized, however, that there are areas of the state where large withdrawals of ground water for irrigation may produce shortages and thus develop critical areas.<sup>4</sup>

It is the purpose of this article, then, to discuss the theories which may underlie ground-water legislation in Nebraska.

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<sup>1</sup> In California's Santa Clara Valley, for example, withdrawals of ground water in excess of replenishment caused the water table to drop an average of 130 feet, increasing pump lifts from an average of 35 feet to an average of 165 feet; and caused the valley floor to lower about 5 feet, thereby reducing ground-water storage capacity approximately 500,000 acre feet, making irrigation a precarious practice, and rendering remedial action inadequate to restore historic conditions. *Western Ground Waters and Food Production*, U.S. Dep't of Agriculture, Misc. Publication No. 504, 22-23 (1942).

<sup>2</sup> Phelps, Kearney, Adams, Clay, Fillmore and Hamilton counties and parts of Polk, Seward, Franklin, Webster, Nuckolls, Thayer, Saline and Jefferson counties.

<sup>3</sup> Lugn, *Ground Water in Nebraska* 8-14, and particularly at 14 (unpublished paper 1947).

<sup>4</sup> Interview with V.H. Dreezen, Conservation and Survey Division, University of Nebraska; Condra, 1 *Nebraska Survey Water Bulletin* 77 (1944); cf. Lugn, op. cit. supra note 3, at 6.

## I. IMPORTANCE OF GROUND WATER IN NEBRASKA

Nebraska is a state of extremes and immensities. Its most eastern part ordinarily receives precipitation adequate for the successful production of crops; while, without the artificial application of water, its western part is suitable only for grazing and dry-farmed crops. Its interior land, the great South-Central Plain, a region of high fertility, is uncertain and unpredictable. Here yields are bountiful if the rains come, but during times of drouth the land is baked and barren. Hence, the story of profitable agriculture throughout a large part of Nebraska necessarily is inseparably linked to water.

The drouth of the 1930s unfolded to us all the dependency of land upon water and quickened the never-ceasing quest for additional water to supplement the precipitation which nature so frequently bestows with meagerness. We have an abundance of fertile land but, as we now know with sureness, a pressing need for water. This, in a sense, has been the story of all the western states. It is not an event of recency.

It is said that as early as 1540, when Coronado marched into the valley of the Rio Grande, an irrigation economy was already established there.<sup>5</sup> Since that time irrigation—the artificial application of water to land—has steadily increased. Presently, more than 20,000,000 acres of land, otherwise barren or marginal, support a complex modern society dependent upon irrigation for its existence.<sup>6</sup>

Historically, irrigation has largely been the application of surface water to farm lands, but in recent years there has been an immense and significant increase in the use of ground water. About 10 per cent of all the irrigated land in the United States, or about two million acres, is dependent solely upon ground water; and another 10 per cent relies in part upon its use.<sup>7</sup>

In Nebraska we too have witnessed a large increase in the use of ground water for irrigation. In the nineteenth century, windmills were used for irrigation purposes.<sup>8</sup> Since that time

<sup>5</sup> "When Francisco Vasquez de Coronado with his band of conquistadors made his way up the Rio Grande in 1540, he discovered Indian villages founded on a well-developed irrigation economy." *Western Ground Waters and Food Production*, op. cit. supra note 1, at 6.

<sup>6</sup> *Ibid.*

<sup>7</sup> *Id.* at 5.

<sup>8</sup> *Water Resources of Nebraska*, Nebraska State Planning Board 92 (1941): "Soon after irrigation from surface supplies was begun in the valley of the Platte, farmers began to use windmills as a means of raising water from wells. The records show that many windmills were in use for irrigation purposes prior to the year 1900."

the growth has been constant . For example, the number of irrigation wells in Dawson, Buffalo and Hall counties alone increased from approximately 900 in 1935<sup>9</sup> to about 4,649 in 1954.<sup>10</sup> As of the spring of 1955 there were about 11,782 irrigation wells in Nebraska<sup>11</sup> and about 700,000 acres under pump irrigation.<sup>12</sup> About 700,000 acres are irrigated under gravity systems.<sup>13</sup> Hence, water is applied artificially to approximately 1,400,000 acres of land, and about one-half the total irrigated acreage is dependent upon wells.

No state in which irrigation is practiced has a more abundant, better distributed or more accessible supply of ground water than Nebraska. It has been estimated that approximately one billion acre feet of ground water are in transient storage within the boundaries of the state at all times,<sup>14</sup> or an amount sufficient to cover the entire state with a lake approximating 20 feet in depth.<sup>15</sup>

The need for water, the increase in pumpage and the bountiful supply of ground water certainly suggest, then, that careful consideration be given to this natural resource which, unlike coal and iron, replenishes itself within our time if used with prudence.

## II. DEFINITION OF GROUND WATER

Ground water is that water found in the zone of saturation beneath the surface of the earth.<sup>16</sup> It derives solely from precipitation which penetrates the mantle of the earth and in obedience to gravity and in opposition to capillarity reaches the zone of saturation, the top of which we call the water table. It is a slowly moving yet dynamic body. It "is simply a part of the earth's endless and complex water cycle, through which water moves restlessly and eternally between the sea, the skies, and the land."<sup>17</sup> This cycle was aptly suggested by the author of Eccles-

<sup>9</sup> Possibilities for a Joint Investigation of the Platte River Basin, National Resources Planning Board 74 (1941).

<sup>10</sup> Irrigation Inventory, 1954, Nebraska On The March 7 (July 1955).

<sup>11</sup> Ibid.

<sup>12</sup> Reed, Effect of Drouth on Well Irrigation Interest and Groundwater Levels in Nebraska, Nebraska on the March 1 (October 1955).

<sup>13</sup> Condra, op. cit. supra note 4, at 47.

<sup>14</sup> Lugn, op. cit. supra note 3, at 1; Condra, 29 Nebraska Conservation Bulletin 3 (1947). We speak of many of our birds as transient visitors. The word "transient" as applied to the movement of ground water represents the opposite extreme of meaning. Ground water moves very, very slowly.

<sup>15</sup> Lugn, op. cit. supra note 3, at 1.

<sup>16</sup> Condra op. cit. supra note 4, at 29.

<sup>17</sup> Western Ground Waters and Food Production, op. cit. supra note 1, at 11. See also Condra, op. cit. supra note 4, at 6, who points out that the complete hydrologic cycle is modified in Nebraska.

iaestes who said that "All the rivers run into the sea; yet the sea is not full; unto the place from whence the rivers come, thither they return again."<sup>18</sup> The phenomenon described is known in modern scientific knowledge as the hydrologic cycle. It is this water—the water which lies beneath the surface of the earth in the zone of saturation—which we draw upon for pump irrigation.

The practice of pump irrigation necessarily is limited by the quantity of ground water which is accessible and usable, and which is being constantly replenished by precipitation, and by the law which governs its extraction. Accordingly, the pump irrigator has a very real interest in knowing something about the supply which is available for his needs and about the law which controls its use.

### III. RIGHTS ACQUIRABLE IN WATER

When we speak of water we speak of something which is not subject to ownership in the sense of an ordinary chattel. In ancient Rome, for example, it was said that "By natural law itself these things are the common property of all: air, running water, the sea, and with it the shores of the sea."<sup>19</sup> And in eighteenth-century England, Sir William Blackstone, the distinguished commentator, said that:

There are some few things which, notwithstanding the general introduction and continuance of property, must still unavoidably remain in common, being such wherein nothing but a usufructuary property is capable of being had; . . . Such (among others) are the elements of light, air and water . . . For water is a movable, wandering thing; and must of necessity remain common by the law of nature; so that I can only have a temporary, transient, usufructuary property therein; wherefore if a body of water runs out of my pond into another man's, I have no right to reclaim it.<sup>20</sup>

This principle, that only a right to use is acquirable in water, is recognized throughout the United States. Thus at an early day a Pennsylvania court, in speaking of water, said:

It is only when it has been received on the surface of the earth, not while it is falling from the clouds, that it can be made to minister to the ordinary wants of life; and if it be common at first, it must continue to be so while it is returning by its natural channels to the ocean.<sup>21</sup>

<sup>18</sup> Ecclesiastes, c. 1, ver. 7.

<sup>19</sup> Institutes Justinian, bk. 2, tit. I, § 1.

<sup>20</sup> 2 Cooley, Blackstone 14 (4th ed.).

<sup>21</sup> Mayor v. The Commissioners of Spring Garden, 7 Pa. 348, 363 (1847).

It is appropriate, then, that when we speak of water we recall that it does not yield itself to absolute ownership. Only a right to use may be acquired; and this right to use is affected and circumscribed by the rights of other persons and the interest which the state has in a resource which is so largely a public treasure.

#### IV. JUDICIAL DIVISION OF GROUND WATER INTO PERCOLATING WATER AND UNDERGROUND STREAMS

Generally speaking, the courts have divided ground water into two classes: (1) percolating waters, and (2) underground streams.<sup>22</sup> Percolating waters have been judicially defined as "vagrant, wandering drops moving by gravity in any and every direction along the line of least resistance."<sup>23</sup> Underground streams, on the other hand, are bodies of water flowing in known and well-defined channels, often through porous substances such as gravel, and are of the character of surface streams except for their location.<sup>24</sup> In any consideration of ground water it is appropriate, then, that the classification recognized by the courts be observed.

##### A. *Common Law Rules As To Percolating Water*

###### 1. English Rule

When the English courts were called upon to decide questions pertaining to rights to percolating water they were persuaded that it was a part of the land, like granite or marble, and therefore belonged absolutely to the owner of the land under which it was found. This was an application of the maxim, "Whose the soil is, his it is from the heavens to the depths of the earth." It was a rule which derived from the premise of essentially absolute private rights in land. It arose in a wet and verdant island where competing interests were not pronounced,

<sup>22</sup> "While this distinction has been severely criticized by competent ground-water hydrologists, the classification appears so generally throughout court decisions that it must be taken into account by anyone dealing with ground-water law." *Western Ground Waters and Food Production*, op. cit. supra note 1, at 17.

<sup>23</sup> *Los Angeles v. Hunter*, 156 Cal. 603, 105 Pac. 755, 757 (1909); c.f. *Pasadena v. Alhambra*, 180 P.2d 699 (Cal. 1947); *Sycamore Coal Co. v. Stanley*, 292 Ky. 167, 166 S.W.2d 293 (1942); *Olson v. City of Wahoo*, 124 Neb. 802, 248 N.W. 304 (1933); *Condra*, op. cit. supra note 4, at 29, 41.

<sup>24</sup> See *Olson v. City of Wahoo*, 124 Neb. 802, 810, 248 N. W. 304, 308 (1933); cf. *Condra*, op. cit. supra note 4, at 29; 2 *Weil, Water Rights in Western States* § 1077 (3d ed. 1911); *Sycamore Coal Co. v. Stanley*, 292 Ky. 168, 166 S.W.2d 293 (1942).

when the presently existing knowledge of underground structures had not been accumulated, and at a time when it was somewhat more fashionable to speak in absolutes than it is today. It ignored the principle that absolutism in water is not permitted. Under the rule of the English courts, which is called the English Rule,<sup>25</sup> an owner of land could, therefore, withdraw the percolating ground water beneath his land and use it according to his pleasure, regardless of the damage which might be visited upon his neighbor. He was not restricted to a beneficial use of the water upon his own land, but could extract it therefrom and sell it to other persons for uses foreign to the land from which it was taken.

## 2. American-Nebraska Rule

Although the courts of some states have adopted the English Rule, it has been recognized that while it might work well in England, it might operate disastrously if applied indiscriminately to so diversified a country as the United States where large stretches of arid land depend upon irrigation for the production of crops.<sup>26</sup> The modern trend of decisions in the United States has been, then, in favor of a doctrine of correlative ownership of percolating ground water, as distinguished from the doctrine of absolute ownership. The correlative right doctrine is known as the American Rule. It is the rule in Nebraska. This rule, as defined by the Supreme Court of Nebraska, is that:

. . . the owner of land is entitled to appropriate subterranean waters found under his land, but he cannot extract and appropriate them in excess of a reasonable and beneficial use upon the land which he owns, especially if such use is injurious to others who have substantial rights to the water, and if the natural underground supply is insufficient for all owners, each is entitled to a reasonable proportion of the whole. . . .<sup>27</sup>

Under this rule exportations of water for purposes foreign to the land from which it is taken, if any injury thereby is worked upon another owner with equal rights, is not permitted. The American Rule places the right to the use of percolating ground

<sup>25</sup> *Olson v. City of Wahoo*, 124 Neb. 802, 811, 248 N.W. 304, 308 (1933). Paine, J. said: "This rule is that percolating waters are regarded as belonging to the owner of the freehold, like rocks, soil, minerals, and, in the absence of malice, the owner may appropriate such waters while they are upon his premises, regardless of the fact that such use cuts off the flow of such waters to adjoining land. . . ."

<sup>26</sup> *Erickson v. Crookston Waterworks, Power and Light Co.*, 100 Minn. 481, 111 N.W. 391 (1907).

<sup>27</sup> *Olson v. City of Wahoo*, 124 Neb. 802, 811, 248 N.W. 304, 308 (1933).

water more nearly on an equal basis with riparian rights. But while the two rules are now similar in operation, there is a great difference in their scope. Riparian rights attach only to lands along a stream, limited in extent; while the right to use percolating ground water applies to land anywhere within the state where such water is present.

Accordingly, in Nebraska percolating waters are like unto a common well from which each landowner may draw according to his needs, provided, however, that his draft is reasonable in relation to the rights of other landowners, to the end that no one is injured by the unreasonable draft of his neighbor.

### *B. Common Law Rules As To Underground Streams*

While the rule of correlative rights, the American Rule, applies to percolating waters, different principles of law are applicable to underground streams.<sup>28</sup> According to court decisions in the western states, the distinction between rights in surface and underground streams is not based on the fact of their location above or below the surface of the earth, but on the fact of knowledge, actual or acquirable, of their existence, location and course; and the courts endeavor, so far as practicable, to apply the rules of law applicable to surface streams to like streams of water flowing underground.<sup>29</sup>

### V. NEBRASKA LAWS DO NOT EXPRESSLY PERTAIN TO GROUND WATER

There are no statutory or constitutional provisions in Nebraska which pertain expressly to the use of ground water. Accordingly, solutions of the questions which may arise incident to ground water necessarily must at this time be largely predictions.

The common law was in force in Nebraska with respect to the use of the water of natural streams until the legislature in 1889 enacted the first irrigation code inconsistent with the common law. This code was amended and extended in 1895 and its basic provisions became a part of the Nebraska Constitution in 1920. The constitution, as amended in 1920, provides that the use of the water of every natural stream within the state is dedicated to the people for beneficial purposes, and that the right to divert the unappropriated waters of every natural stream shall

<sup>28</sup> Olson v. City of Wahoo, 124 Neb. 802, 248 N. W. 304 (1933).

<sup>29</sup> 2 Wiel, Water Rights in the Western States 1077 (3d ed. 1911); Bull v. Siegrist, 169 Ore. 180, 126 P.2d 832 (1942); Sycamore Coal Co. v. Stanley, 292 Ky. 168, 166 S.W.2d 293 (1942).

never be denied.<sup>30</sup> These constitutional provisions, as suggested, were a substantial adoption of the basic irrigation law which was in existence at the time the constitution was amended.<sup>31</sup>

Our law of appropriation, which provides for priority of right, expressly applies to natural streams. As the courts apply the rules of law applicable to surface streams to like streams of water flowing underground, underground streams like surface streams are held to be subject to appropriation in jurisdictions which recognize the right of appropriation.<sup>32</sup> There is authority, then, for the proposition that an appropriation of ground water may be obtained in Nebraska if it is part of an underground stream. It may be of interest to know that as of the end of 1954 approximately 835 applications for permits to appropriate water by pumps had been filed with the Department of Roads and Irrigation.<sup>33</sup> These applications did not demonstrate whether an appropriation of percolating water or of the water of an underground stream was sought, and the Department of Roads and Irrigation has taken no action on the applications. They have been filed of record, however, and their filing conceivably may be of some future value to the applicants.

There is a presumption that ground water is percolating water rather than the water of an underground stream,<sup>34</sup> and accordingly the burden of proof is upon the person who seeks to establish that ground water is part of an underground stream.<sup>35</sup> The establishment of this fact, in face of the presumption against it, ordinarily would be attended by difficult problems of proof. By way of illustration, however, is the geological formation known as Todd Valley<sup>36</sup> which in previous eras is said to have been a channel of the Platte River from the village of Morse Bluff to a point near Ashland. It is reported to be from five to eight miles in width and approximately 35 miles in length, and at several places it has beds of gravel and sand approximately 100 feet in

<sup>30</sup> Neb. Const. art. XV, §§ 5 and 6.

<sup>31</sup> Neb. Laws c. 68, art. 1, § 1 (1889); Neb. Laws c. 69, §§ 42, 43 and 65 (1895).

<sup>32</sup> Annot., 109 A.L.R. 416 (1937); Annot., 55 A.L.R. 1499 (1928).

<sup>33</sup> Information obtained from Dep't of Roads and Irrigation. It should be noted that each application may represent more than one well.

<sup>34</sup> Pasadena v. Alhambra, 180 P.2d 699 (Cal. 1947); Campbell v. Willard, 45 Ariz. 221, 42 P.2d 403 (1935); Clinchfield Coal Corp. v. Compton, 148 Va. 437, 139 S.E. 308 (1927); Heninger v. McGinnis, 131 Va. 70, 108 S.E. 671 (1921); Tampa Water Works Co. v. Cling, 37 Fla. 586, 20 So. 780 (1896).

<sup>35</sup> See note 32 supra.

<sup>36</sup> See Olson v. City of Wahoo, 124 Neb. 802, 248 N.W. 304 (1933).

depth. It receives its water from local precipitation and by way of leakage from the Platte River north of Cedar Bluffs, where the river is in direct contact with the sand and gravel of the Todd Valley, thus making an underflow through it from the Platte River. There is informed opinion to the effect that the flow or volume of water passing through the gravel of the Todd Valley is more than ten million gallons daily. The supreme court has recognized that the water flowing in the gravel bed of the Todd Valley has a "known and well-defined" channel,<sup>37</sup> and that it is therefore an underground stream.<sup>38</sup> Hence, it is entirely possible that an appropriative right to the use of this ground water might be obtained under existing law.

Similarly, our law of riparian rights probably is applicable to underground streams. This doctrine provides for the reasonable use by riparians of stream flow, and it too would be applicable to the waters of the Todd Valley. If an appropriation of the waters of the Todd Valley were granted, there might be a conflict between the right of the appropriator and the rights of riparians; and in such a controversy our courts probably would follow the principles which heretofore have been announced with reference to appropriators and riparians having interests in a surface stream.

With reference to percolating water, however, there are no statutory or constitutional provisions which would authorize the granting of an appropriative right to their use. Moreover, the generally prevailing rule of the common law is that the doctrine of appropriation does not apply to percolating water.<sup>39</sup> The use of percolating water necessarily, therefore, is governed by the rule of correlative rights, which, like the doctrine of riparian rights, seeks a reasonable and coordinated use of a common treasure.

#### VI. POSSIBLE CONFLICTS BETWEEN GROUND-WATER AND SURFACE-WATER USERS

The classification of ground waters and the question of the right to their use become important also as between overlying landowners on the one hand and riparians and appropriators from

<sup>37</sup> Id. at 810, 248 N.W. at 307 (1933).

<sup>38</sup> The flow in the Todd Valley, although apparently satisfying judicial requirements, may not meet the definition of an underground stream used by geologists. See Condra, *op. cit. supra* note 4. at 29.

<sup>39</sup> Annot., 109 A.L.R. 408 (1937); Annot., 55 A.L.R. 1499 (1928). Some of the western states, however, do grant appropriative rights to percolating water

natural streams on the other. For example, do riparians and appropriators have a right to divert a stream to the extent of depleting the ground-water supply of adjacent or contiguous lands? Similarly, do the owners of land overlying ground waters, merely by virtue of such ownership, have a right to withdraw ground waters for use on their lands without regard to the effect on riparians and appropriators? Without undertaking to give specific answers to these questions, it may be said that their solution necessarily would involve a determination of the relationship between ground water and surface flow.

In the vicinity of Columbus, for example, the Loup River is supported by ground water and the former does not contribute appreciably to the latter.<sup>40</sup> There the water table is the foundation on which the river flows. It is like a foundation which supports a building. If the water table lowers, the stream lowers or disappears. Diversion of stream flow in the vicinity of Columbus has, then, no appreciable effect on ground water, while interceptions of ground water may have an effect on stream flow.

On the other hand, east of North Platte the Platte River rides on a thick alluvial floor, bordered by a pervious formation, and stream flow is diminished by lateral percolation which enriches the South Central Plain.<sup>41</sup> Diversions of stream flow here may cause a lowering of the contiguous water table, while extractions of ground water from lands lying south of the river probably would not substantially affect stream flow. Moreover, if the ground water fell within the definition of an underground stream, as does the flow through the Todd Valley, the rights of landowners therein would be governed by the rule of riparian rights or, if an appropriation to its water were obtained, by the doctrine of appropriation; and hence the legal questions involved might be different from those present when percolating water is involved.

It is apparent, then, that thoughtful study of such problems must enlist the aid of geologists and hydrologists who hold the secrets upon which their resolution to a most significant degree must necessarily depend.

<sup>40</sup> *Dischner v. Loup River Public Power District*, 147 Neb. 949, 964-967, 25 N.W.2d 813, 820-821 (1947).

<sup>41</sup> *State ex rel. Cary v. Cochran*, 138 Neb. 163, 170-171, 292 N.W. 239, 244-245 (1940). Condra, *op. cit. supra* note 4, at 23; *Orderly Distribution of Available Water Supply*, address of Robert H. Willis presented at the Thirty-Seventh Annual Convention of the Nebraska State Irrigation Association, December 10, 1929.

Generally, hydrologists now adhere to the view that nearly all ground water is percolating water which is constantly, but slowly, moving.<sup>42</sup> The decisions of the courts, however, have divided ground water into percolating water and underground streams in a manner which is not quite responsive to the findings of contemporary hydrology. It is unfortunate that the law of ground water began its development before hydrology became the informed science it is today. The courts probably have not been furnished with as detailed and clear a view of underground structures as is now possible.

#### VII. POSSIBLE LEGISLATIVE SOLUTIONS OF GROUND WATER PROBLEMS

In the event that excessive use of ground water develops critical areas, the legislature probably will be invited to enact legislation. And much uncertainty might be removed by the legislature in one comprehensive statute. Questions of classification of water, rights to its use, and methods of protecting rights to its use, need not be left entirely to the courts. Courts decide cases upon the issues involved in each case, and the law which is made judicially is made piecemeal and over an extended period of time. Moreover, legislation might be sustained by the courts even though the courts themselves would not have established the same rule by judicial decision. The legislature may examine what has been done legislatively elsewhere, and, of course, as a fact-finding body consider what contemporary science has found.

Geologists and hydrologists are not uniform in their views on ground-water legislation, and it seems that this is attributable to a desire for more study in defining the sources, paths, and recharging ability of all ground-water areas. The question of recharging seems to provide the greatest area of controversy as to the nature of ground-water legislation. Some informed persons entertain the view that ground water should be pumped extensively regardless of a lowered water table because periodic periods of excessive rainfall may replenish the ground water. Others believe that pumpage should be restricted so as to maintain a reasonably constant water level at all times. If the legislature accepts the first view, it might consider legislation providing for voluntary restrictions imposed by ground-water districts; and if

<sup>42</sup> Interview with V.H. Dreeszen, Conservation and Survey Division, University of Nebraska. Adolph F. Meyer, an eminent hydrologist, is of the opinion that there are no underground streams except in limestone regions where streams, caves and water-falls all may exist, and that there is not a "stream" in a drift, regardless of the source of the water, when movement is limited to a few feet daily. Letter from Meyer, April 13, 1955.

it accepts the second view it might consider legislation providing for involuntary restrictions imposed administratively on a state-wide basis.

Texas is the only state which has adopted the voluntary or local-district approach.<sup>43</sup> There, controls on pumpage in an area are initiated by local action under legislative authority which permits the creation of such districts. This system, however, has been criticized on the ground that there is not enough local technical interest or skill to provide an effective program.<sup>44</sup>

Nine western states have adopted the state-administration program<sup>45</sup> which provides:

1. Title to ground water shall be in the state, subject to existing vested rights.<sup>46</sup>
2. Domestic wells shall be exempted from control.<sup>47</sup>
3. Permits for the drilling of wells shall be granted or denied by the state.<sup>48</sup>
4. There shall be restrictions on pumpage.<sup>49</sup>
5. There shall be rules for the proper drilling of wells.<sup>50</sup>
6. Existing water rights shall be forfeited through nonuse.<sup>51</sup>

Essentially, these provisions follow the Uniform Underground Water Law for Western States which was drafted by the Association of Western State Engineers in 1934.<sup>52</sup>

## CONCLUSION

A single drop of water falling from the sky may appear in various forms before the hydrologic cycle is completed. Without attempting to exhaust the possibilities of so general a proposition, it may be said that it may first appear as diffused surface water, then run into a surface stream; it may penetrate the mantle of the earth, reach the zone of saturation and become percolating water; it may later appear as a ground-water contribu-

<sup>43</sup> Tex. Rev. Civ. Stat. Ann. art. 7880-3c, B (Vernon, 1954).

<sup>44</sup> Comment, 30 Tex. L. Rev. 872 (1953).

<sup>45</sup> Arizona, Idaho, Kansas, Nevada, New Mexico, Oregon, Utah, Washington and Wyoming.

<sup>46</sup> E.g., Ariz. Code Ann. § 75-101 (1939).

<sup>47</sup> E.g., Idaho Code § 42-227 (Supp. 1955).

<sup>48</sup> E.g., Nev. Comp. Law Ann. § 7993.15 (Supp. 1943-1949).

<sup>49</sup> E.g., Id. at § 7993.19.

<sup>50</sup> E.g., Ariz. Code Ann. §§ 75-151, 75-154 (Supp. 1952).

<sup>51</sup> E.g., Wyo. Comp. Stat. Ann. § 71-708 (1945).

<sup>52</sup> Comment, 30 Tex. L. Rev. 862 (1953). For a discussion of the validity of such legislation, see Comment, 29 Neb. L. Rev. 645 (1950).

tion to the base flow of a surface stream, or it may become spring water; or, possibly, it may contribute to an underground stream. Thus, both ground water and surface water have but one source: precipitation.

Ground water is like a bank account: No more can be withdrawn than is deposited without a reduction of the amount in storage.<sup>53</sup> Hence, excessive pumpage attended by meager precipitation may very quickly develop ground-water shortage.

While legislative regulation of the pumpage of percolating water presently may not be required, it seems that the state does enjoy power to exercise administrative control if need therefor exists. Regulatory legislation designed to administratively enforce the doctrine of correlative rights to percolating water certainly would appear to be within the province of legislative power. Legislation appropriately designed to accomplish this objective would not constitute an impairment of property interests. As a California court said, whenever the draft of a landowner exceeds a reasonable use of ground water, he appropriates to himself that which belongs to others who are entitled to a like use, and to that extent he obstructs the free use of property charged with a public interest and regulation is invited.<sup>54</sup> Accordingly, if regulation of pumpage is required, there is legislative power which may be exercised to that end; for like the river of which the late Justice Holmes wrote, ground water "is more than an amenity, it is a treasure."<sup>55</sup>

Rights to the use of the water of underground streams, if any, probably would be acquirable and governed by our law of

<sup>53</sup> A method for determining the age of water by the measurement of its tritium content has recently been developed. The Institute for Nuclear Research at the University of Chicago examined water samples from three Nebraska wells. It was found that the average age of water from a Howard County well was about 40 years; that of water from a Merrick County well was about 14 years; and that of water from a York County well was about 61 years. Although no definite conclusions have been drawn at this time, these findings may suggest the slowness with which ground water moves and the need for conservation. Reed, Nebraska on the March 6 (October, 1955).

<sup>54</sup> *Ex Parte Elam*, 6 Cal. App. 233, 91 Pac. 811, 812, (1907). The *Elam* case pertained to artesian wells, but, in *Ex Parte Maas*, 219 Cal. 422, 27 P.2d 373 (1933), the Supreme Court of California sanctioned legislative regulation of pumped wells. For discussions of cognate problems, see *Lindsley v. Natural Carbonic Gas Co.*, 220 U.S. 61 (1911) and *Ohio Oil Co. v. Indiana*, 177 U.S. 190 (1900).

<sup>55</sup> *New Jersey v. New York*, 283 U.S. 336, 342 (1931).

appropriative rights. Hence, legislation as to such water may not be necessary.

A maximum use of ground water within safe limits will support increased industry and a more profitable agriculture. To this end the study of ground water which has long been in progress under the direction of Dr. Condra and now of Professor Reed will be of invaluable help; and recognition, encouragement, and support of this work should be of vital interest to all persons interested in the utilization of this natural resource. Its increased use may very well open up a bright and sunny prospect, to the well-being of the state and all its people.