

TA7

C6

CER 59-35-A

copy 2

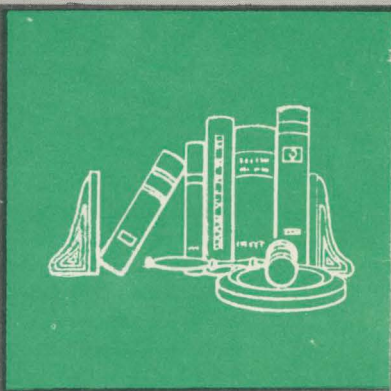
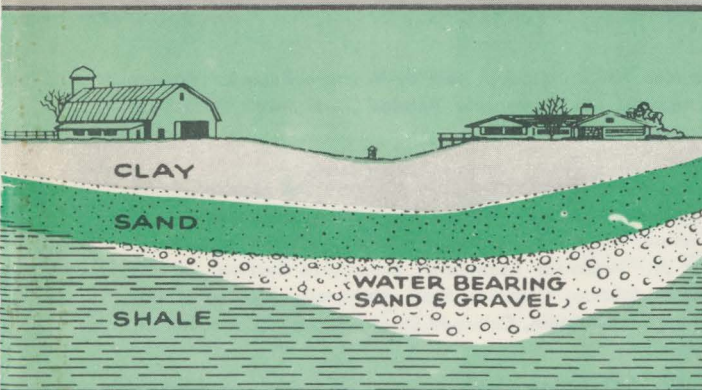
~~MASTER FILE COPY~~

COLORADO'S GROUND-WATER PROBLEMS

ENGINEERING RESEARCH

AUG 11 '71

FOOTHILLS READING ROOM



BULLETIN 505-S
WATER AND THE LAW

AGRICULTURAL EXPERIMENT STATION
COLORADO STATE UNIVERSITY
FORT COLLINS

CER 59 EJT 35-A

DATE DUE

FEB 26 1987

MAR 1 1987

VSU

ACKNOWLEDGMENT

Author wishes to express appreciation to Frank
 e, Professor of Law, University of Wyoming,
 generously of his time and effort to provide
 information contained in the study.

based on research financed in part by Western Regional
 Economic Analysis of Laws and Related Institutions Aff



Contents

Ground-Water Doctrines in the United States.....	1
How the Four Doctrines Would Affect Colorado Ground-Water Users	5
Ground-Water Legislation in Colorado.....	22

ACKNOWLEDGMENT

The author wishes to express appreciation to Frank J. Trelease, Professor of Law, University of Wyoming, who gave generously of his time and effort to appraise the basic information contained in the study.

This bulletin is based on research financed in part by Western Regional Project W-42, entitled, "Economic Analysis of Laws and Related Institutions Affecting Ground-Water Use in the Western States."

This publication is one of a series of three bulletins covering the physical, legal and economic aspects of ground-water use, by Morton W. Bittinger, Assistant Civil Engineer, Civil Engineering Section; Edward J. Farmer, Research Assistant, Economics Section, and Irving F. Davis, Jr., Assistant Economist, Economics Section, of the Colorado Agricultural Experiment Station, Colorado State University. Copies of the others can be obtained from the Bulletin Room, Colorado State University, Fort Collins, or from County Extension Agents.

Colorado's Ground-Water Problems . . .

WATER AND THE LAW

Edward J. Farmer*

Ground-Water Doctrines in the United States

In the United States four doctrines or rules control use of ground water. They are:

1. The English "common law" doctrine or "absolute ownership" rule.
2. The American rule or "reasonable use" doctrine.
3. The California doctrine or "correlative rights" rule.
4. The doctrine of prior appropriation or "prior rights" rule.

These four doctrines are discussed in this pamphlet.

Each of the four ground-water doctrines would have a different effect on Colorado's ground-water users. The easiest way to show the influence of these doctrines is to describe an imaginary farming area and apply each rule to the same group of farmers.

An Assumed Situation

Picture a typical dryland farming community in an arid or semi-arid region of Colorado (Figure 1). Include a range of mountains, a dry streambed, and five dryland farms. Assume one of the farms is yours and the other four belong to your neighbors, Farmers Jones, Smith, Brown, and Green.

At a considerable depth below the surface of the earth is a buried stream channel filled with sands and gravels. The lower portion of the channel is saturated with ground water. The water fills the pores or spaces between the grains of sand and rocks. This may be called a ground-water basin or underground reservoir. Underlying the ground-water basin is a deep layer of shale. Shale is a fine-grained clay-like rock. It

* Research Assistant, Economics Section, Colorado Agricultural Experiment Station, Colorado State University.



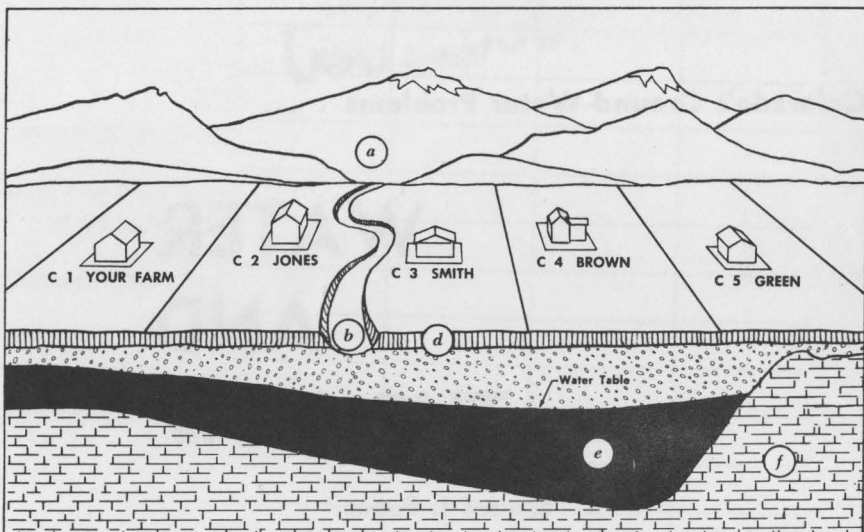


FIGURE 1. An illustration of a typical dryland situation showing: (a) A mountain range, (b) a dry streambed, and (c) five dryland farms, one of which is yours. The others are owned by your neighbors: Farmers Jones, Smith, Brown and Green. A cross section of the subsurface reveals: (d) a layer of topsoil, (e) a buried stream channel saturated with underground water, and (f) a formation of shale.

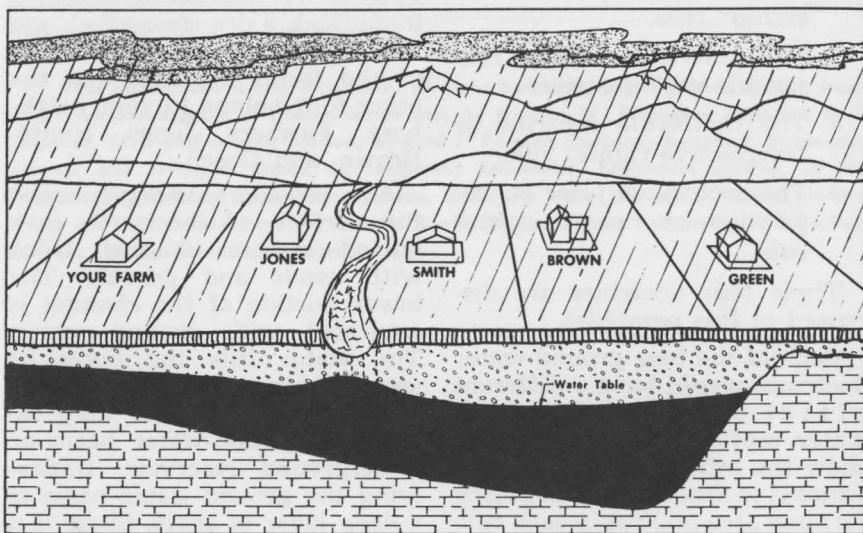


FIGURE 2. When it rains, water from the stream replenishes the ground-water supply.

will not readily absorb or transmit water. It serves as a trap and prevents the water in the reservoir from escaping below.

The shale barrier which rises abruptly and approaches the earth's surface tends to keep the water in the reservoir confined under the first four farms. It also forces the water underground to move in the same direction as the stream. Notice that Farmer Green's land lies outside of the ground-water basin. He is in a poor position to drill for ground water. The subsurface beneath his land is dry.

The underground reservoir receives most of its water from the stream. When it rains the stream flows and water seeps from the streambed into the underground basin (Figure 2).

In arid and semi-arid regions, streams usually flow only in direct response to precipitation

(Figure 3). As a result, most of the year the stream is dry and seepage to the ground-water supply does not occur.

Making Use of Ground Water

Let us imagine you are the first to discover water beneath the land. You immediately drill a well and begin to irrigate your crops (Figure 4). Your farm becomes more productive. You find irrigation highly profitable.

Your neighbors, Farmers Jones and Smith, are quick to recognize the value of your discovery. They each drill a well and begin to irrigate (Figure 5). Farmer Jones' well is number two in the area, and Farmer Smith's is number three. Your well is number one.

Farmer Brown is a true dry-lander. He drills the fourth well in the area, but instead of irri-

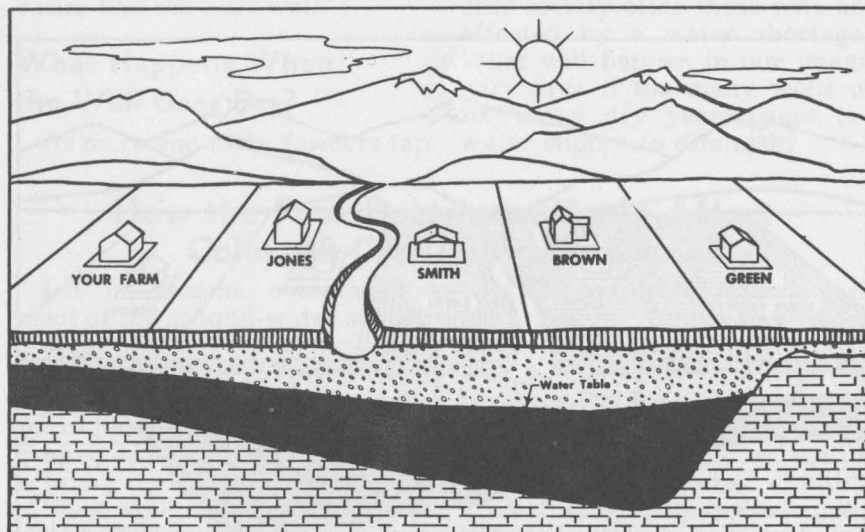


FIGURE 3. Recharge occurs only when it rains. After a storm is over, the water table gradually subsides until the water level reaches its normal position in the basin.

gating his land, he sells the water to Farmer Green (Figure 6). Farmer Green, you will recall, is unable to obtain water because of the location of his farm. What was once a dry and thirsty land

is now green and prosperous with irrigated crops.

Your well happens to be located on land overlying the shallow outer margin of the groundwater basin. It is the poorest

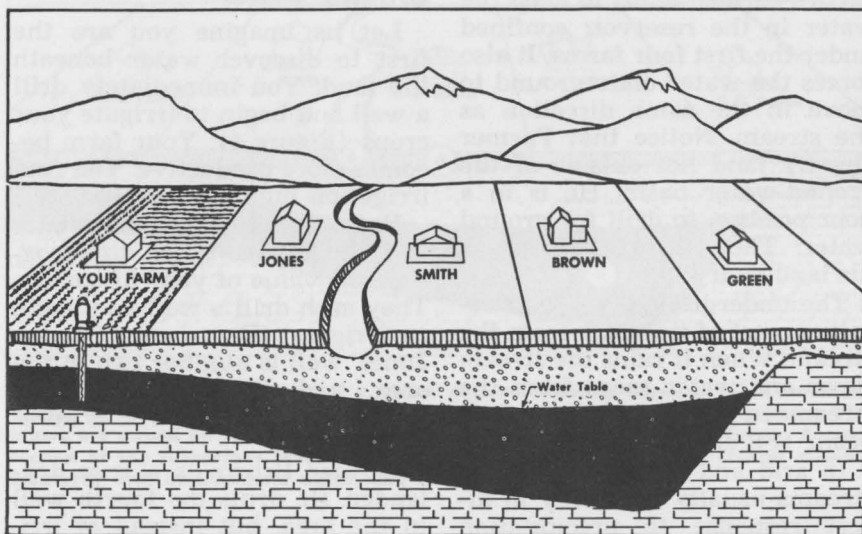


FIGURE 4. You are the first to drill a well and irrigate your crops.

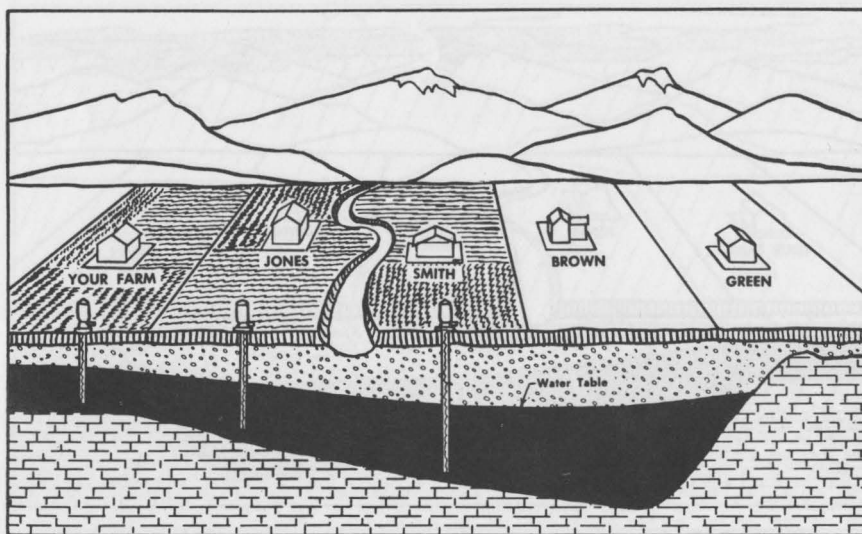


FIGURE 5. Jones and Smith drill wells and irrigate their farms.

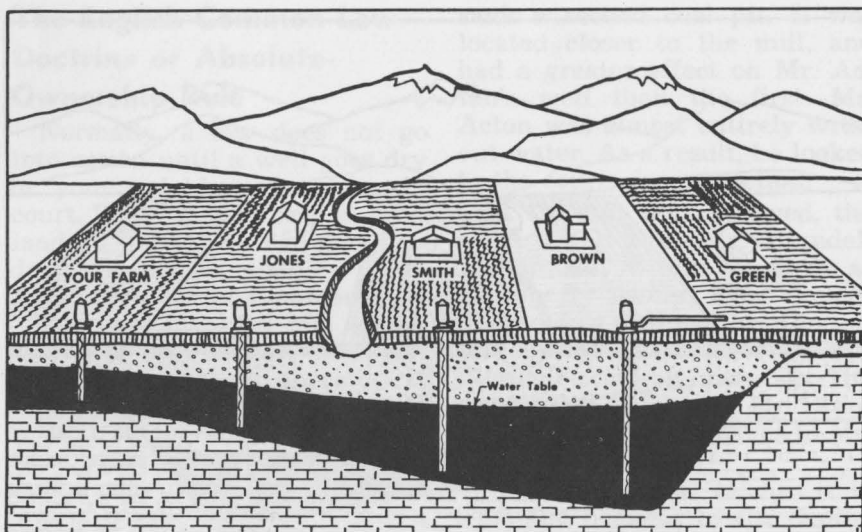


FIGURE 6. The fourth well is drilled by Farmer Brown. He transports the water and sells it to Farmer Green.

producer of the four. The other wells are better located than yours. Farmer Brown, who is transporting his water out of the basin, has the best well.

What Happens When the Well Goes Dry?

As more and more farmers tap

a limited ground-water supply, sooner or later someone suffers. Too many wells often spell not enough water. What protection does society offer those who are affected by a water shortage? What will happen in our imaginary area if too many wells or too many dry years cause the water supply to diminish?

How the Four Doctrines Would Affect Colorado Ground-Water Users

Let us assume overdevelopment of the ground-water supply is occurring. Overdevelopment of a ground-water supply means evidence indicates there is danger of more water being removed from a basin by pumping than is being replaced by seepage.

Your well, because of its location, is the first to be influenced by overpumping (Figure 7). The ground-water level declines until

it is impossible for you to irrigate. You are forced to go back to dryland farming.

In a year or two the situation becomes worse. The ground-water supply continues to decline. Soon Farmer Jones' well is affected, then Farmer Smith's. Finally, only the pump belonging to Farmer Brown is able to successfully withdraw water from underground (Figure 8).

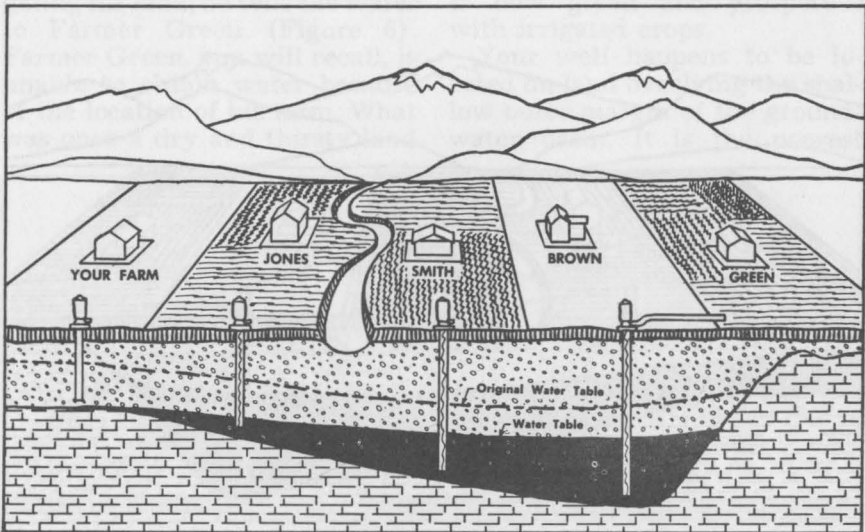


FIGURE 7. When pumping removes more water from the basin than rainfall replaces, the water table drops. Your well is the first one to go dry.

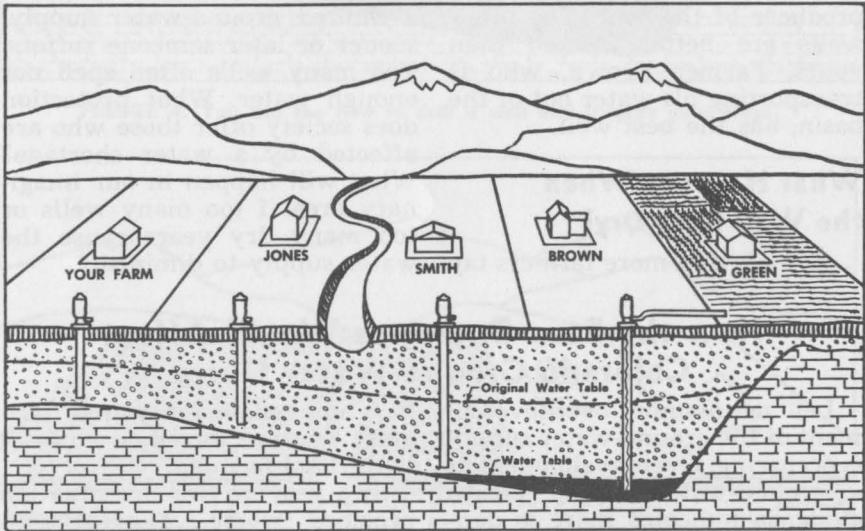


FIGURE 8. During a critical shortage, the well most favorably located is the last one able to pump.

The ground-water supply in your community has reached a critical condition. Orderly regulation of some type is desirable.

How would your water rights and your neighbors be affected by one of the four ground-water doctrines?

The English Common-Law Doctrine or Absolute-Ownership Rule

Normally, a law does not go into action until a well goes dry or your neighbor complains in court. Such was the case in England in 1843. The common-law doctrine was the result.

An Early Case in Common Law

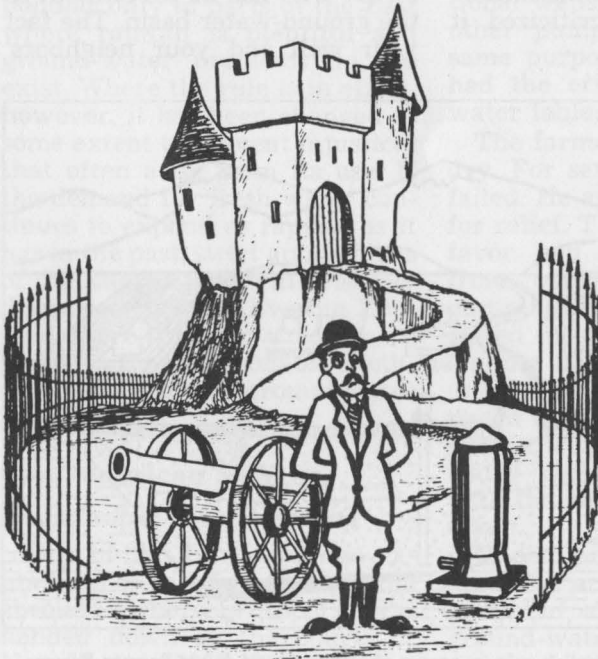
The case involved Mr. Acton, a cotton mill owner, and Mr. Blundell, a coal-pit operator. It seems that Mr. Acton dug a well in 1821 to operate his mill. Sixteen years later, Mr. Blundell sank a coal pit about three-quarters of a mile from Mr. Acton's mill.

When the coal pit was excavated below a certain depth, Mr. Acton's well began to go dry. Three years later, Mr. Blundell

sank a second coal pit. It was located closer to the mill, and had a greater effect on Mr. Acton's well than the first. Mr. Acton was almost entirely without water. As a result, he looked to the courts for protection.

In the suit that followed, the court ruled that Mr. Blundell was entirely within his rights as a property owner, even though Mr. Acton's well had been in use for several years prior to Mr. Blundell's coal-pit operation. The court ruled in favor of Mr. Blundell, and refused damages to Mr. Acton.

"Whose the soil is, his it is from the heavens to the depths of the earth." This is the English rule. It gives the landowner "absolute ownership" to all the water that passes or is stored beneath his property. He can



The English rule provides for absolute ownership.

pump the water from beneath his land at his own free will and pleasure. He can use all that is there for any purpose and to any extent. The harm that may be done to a neighbor pumping from the same supply may be disregarded.

Nothing in a strict application of the common-law doctrine protects one farmer from another. For example, a Wisconsin farmer was found intentionally wasting water to harm his neighbors. One of the neighbors took him to court. The supreme court of the state upheld the wasteful farmer on the basis of the common-law rule. The court said the water was the property of the farmer and he could do with it as he pleased, even though he was not using it in any useful way. This decision has never been approved by any other court in the nation. Many courts have criticized it severely.

What would happen in your area during a severe water shortage if Colorado were under the English rule? You and your neighbors Jones and Smith would be forced to discontinue irrigated farming when your wells went dry (Figure 9). The investment in your irrigation equipment would be lost. You would have to depend upon dry-land crops for your livelihood, or abandon your farms and move to a new or better location.

Application of the Rule

Under this assumed situation, Farmer Brown would be the only one in your community to profit by the doctrine of "absolute ownership." His right to continue pumping would be protected, even though he is selling his water to Farmer Green, a landowner who has no investment in the ground-water basin. The fact your well and your neighbors'

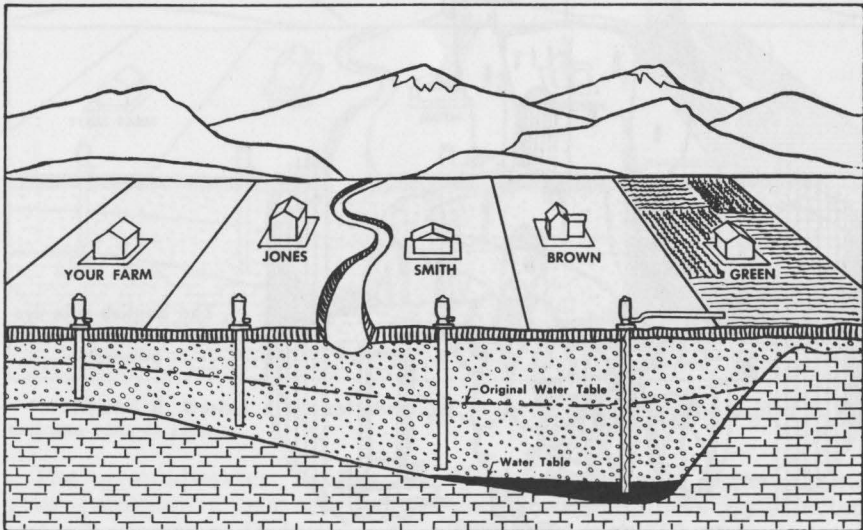


FIGURE 9. Under the English rule, a severe shortage would favor Farmer Brown.

wells were drilled before Farmer Brown's has no legal significance.

One right is as good as another, regardless of when or how the water is put to use. You and your neighbors Jones and Smith would be without relief whether Farmer Brown uses the water on his own land, wastes it, or sells it for a distant use.

An Unpopular Rule in the West

The English rule was widely accepted in the United States until shortages of ground water began to appear. In the arid West it was considered unfair for one person to waste water while others were doing without. As a result, the doctrine was gradually replaced by rules considered more applicable to western conditions.

The English rule has remained popular only in parts of the East where rainfall is plentiful and ground-water problems do not exist. Where the rule is in effect, however, it has been changed to some extent to prevent injustices that often arise from its use. If the demand for fresh water continues to expand as rapidly as it has in the past, strict applications of the English rule will probably disappear entirely. Even in England, there has been a movement to adopt more reasonable methods of controlling ground-water development.

The American Rule or Reasonable-Use Doctrine

One of the first decisions expressing dissatisfaction with the absolute-ownership theory was handed down in the courts of New York in 1900. This decision,

together with an earlier one in New Jersey, resulted in the adoption of a new rule. It came to be known as the American rule, or doctrine of reasonable use. This rule says that "one must so use his own rights as not to infringe upon the rights of another."

The Need for a New Rule in Water Rights

The New York case involved a farmer and the City of Brooklyn. The farmer had leased certain farming lands in Kings County. He used a portion of the lands for the purpose of growing celery and watercresses, which he irrigated with ground water.

In 1885, the City of Brooklyn sank a well nearby and constructed a pumping station to export water into the city. Nine years later the city sank additional wells and constructed another pumping station for the same purpose. The city's action had the effect of lowering the water table.

The farmer's well began to go dry. For several years his crops failed. He appealed to the courts for relief. The judge ruled in his favor and restrained the city from operating its wells and pumping stations. The judge declared the City of Brooklyn was making an unreasonable use of underground water. His decision stated reasonable use did not include the withdrawal of ground water for uses not connected with the land from which it was taken.

Under the American rule, the diversion or sale of underground water to areas outside of the ground-water basin is permissible only if injury does not re-

sult to neighboring well owners. Neither can water be used maliciously. However, all of the water that is reasonably required may be used on land overlying the basin whether it harms a neighbor or not. A farmer is free to develop his land to almost the same extent as he would under the common-law rule. Thus, we are not sure the use of water under this doctrine is reasonable. Whether or not a use is reasonable depends upon the interpretation given by the courts.

A Case for Reasonable Use

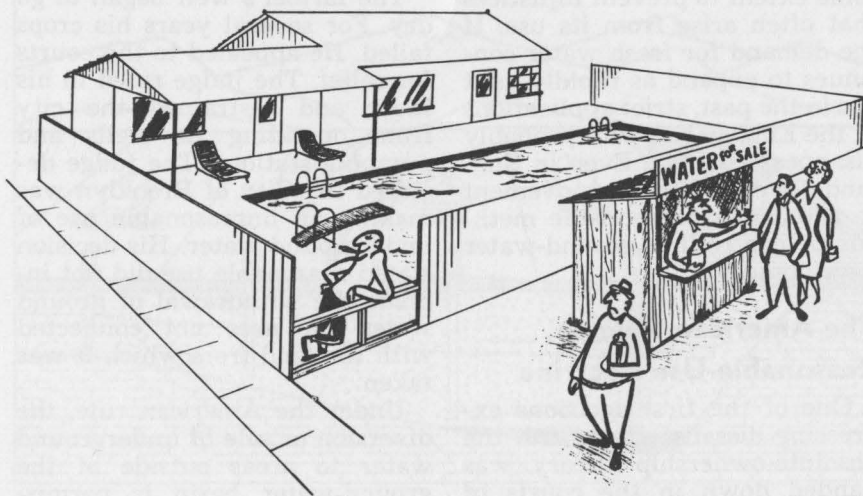
Unlike the English rule, the American rule prohibits waste. For example, in Minnesota a landowner was discovered wasting a large amount of ground water which otherwise would have fed a nearby spring. People in a village depended upon the spring for fresh water. In the case that followed, the court favored the village. The judge declared that it was illegal for a

landowner to drain, collect, or divert underground water for the sole purpose of wasting it.

Assume that your well goes dry as the result of a water shortage. Under the American rule, the courts can force Farmer Brown to cease selling and diverting water to Farmer Green who lies outside of the ground-water basin. If Farmer Brown wishes to continue pumping, he would have to use the water on his own land. When Farmer Brown ceases pumping, Farmer Green is forced to operate without the benefit of his source of irrigation water. This presumably will permit the ground water to rise to its former position in the basin and enable you to resume irrigation (Figure 10).

The American Rule in Action

If the shortage becomes severe and the ground-water level continues to decline, you and Jones both may be affected. Since Farmer Smith is using his water



The American rule is concerned with reasonable use of water.

reasonably on his own land, you and Jones would be forced to discontinue irrigated farming when the water table drops too low to pump. Under the American rule,

Farmer Smith would be the only one permitted to irrigate with ground water during a critical shortage (Figure 11).

The American rule is regarded

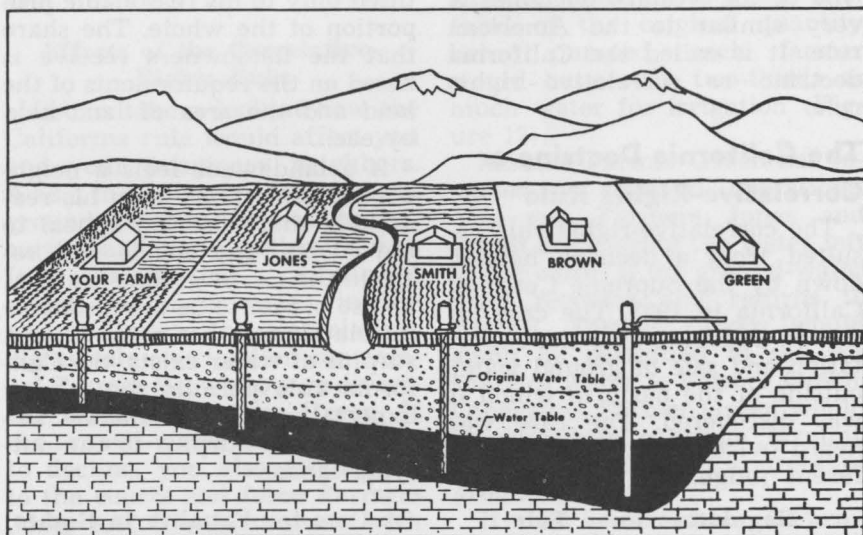


FIGURE 10. The water table rises when Farmer Brown is forced to shut off his well because of an unreasonable use. This enables you to continue pumping.

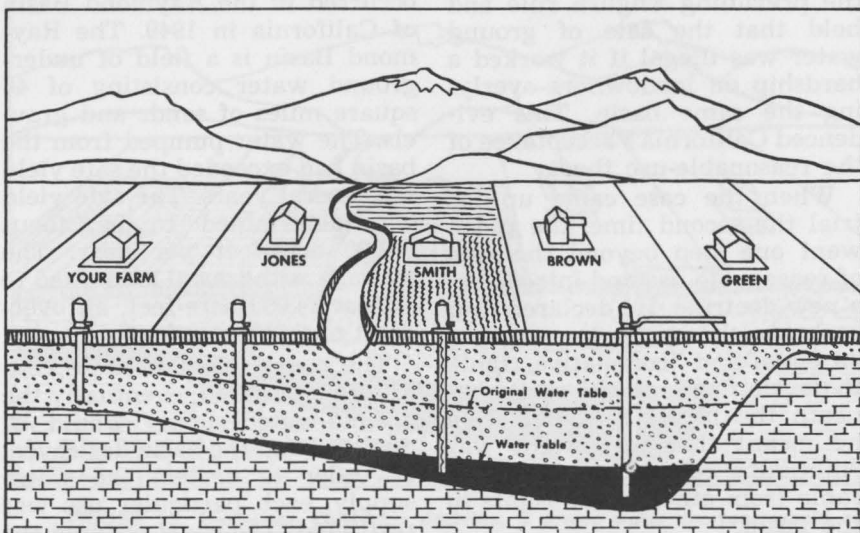


FIGURE 11. Under the American rule a severe shortage would favor Farmer Smith.

as a considerable improvement in justice over the English rule, especially in the East. However, in the dry regions of the West, stronger laws have developed. One of the western doctrines is very similar to the American rule. It is called the California doctrine or correlative - rights rule.

The California Doctrine or Correlative-Rights Rule

The correlative-rights rule resulted from a decision handed down by the Supreme Court of California in 1903. The case involved a dispute over the exportation and sale of ground water outside of the basin in which it was discovered. The case was heard twice, each time by a different judge.

Regulation for a Fair Share of the Supply

The first time the case was tried, the court departed from the prevailing English rule and held that the sale of ground water was illegal if it worked a hardship on landowners overlying the same basin. This evidenced California's acceptance of the reasonable-use theory.

When the case came up for trial the second time, the judge went one step beyond the rule of reasonable use and introduced a new doctrine. He declared that each overlying landowner had an equal and "correlative right" to develop and use the water beneath the lands. By correlative he meant that each right was "mutually related" and inseparable from other water rights in the basin.

Under this rule, each owner of

land overlying the same supply of water may take such water for any beneficial use. If the natural supply is not sufficient for all, each landowner is entitled only to his reasonable proportion of the whole. The share that the landowners receive is based on the requirements of the land and the area of land held by each.

If a landowner feels a neighbor is taking more than his reasonable share, he can appeal to the courts. The courts will restrain the use of ground water if its use proves to be unreasonable in relation to other uses. When a surplus of water exists, the California rule permits the sale or exportation of the amount declared to be surplus to the outlying lands.

A Case for Equality in Rights to Ground-Water Use

The first case of actual division of a scarce supply of water occurred in the Raymond Basin of California in 1949. The Raymond Basin is a field of underground water consisting of 40 square miles of sands and gravels. The water pumped from the basin had exceeded the safe yield for several years. The safe yield was determined to be about 18,000 acre-feet per year. The average withdrawal amounted to almost 24,000 acre-feet, an overdraft of 6,000 acre-feet annually.

The court found if these conditions continued, eventually the ground-water supply would be depleted and the basin destroyed. In order to protect the water supply, each particular use was restricted. The court ordered the landowners in the basin to re-

duce their use to about two-thirds of the amount of water they ordinarily pumped. A "Water Master" was appointed by the court to enforce the provision.

Effects of the Correlative-Rights Rule

Let us take a look at how the California rule would affect you and your imaginary neighbors. Assume overdevelopment of ground water in the area has occurred and your well goes dry. It is evident that a surplus of water no longer exists in the basin. Under the correlative-rights rule court action can compel Farmer Brown to stop diverting water to Farmer Green. If the ground-water level continues to decline, you also can appeal to the courts and force Farmers Jones and Smith to share with you the remaining supply. Farm-

ers Jones and Smith would be required by law to reduce pumping by the percentage necessary to enable you to obtain your equal share. Assuming the restriction amounts to about one-third of the original quantity being pumped, each farmer would have only two-thirds as much water for irrigation (Figure 12).

Assume Farmer Green has reverted to dryland operations. You and Farmers Jones and Smith are sharing the water left in the basin. If the ground-water level recovers and returns to normal, Farmer Brown would again be permitted to sell his share of water to Farmer Green. Otherwise, Farmer Green would be forced to continue farming without diverted sources of ground water.

It must be remembered Farmer Brown can always decide to

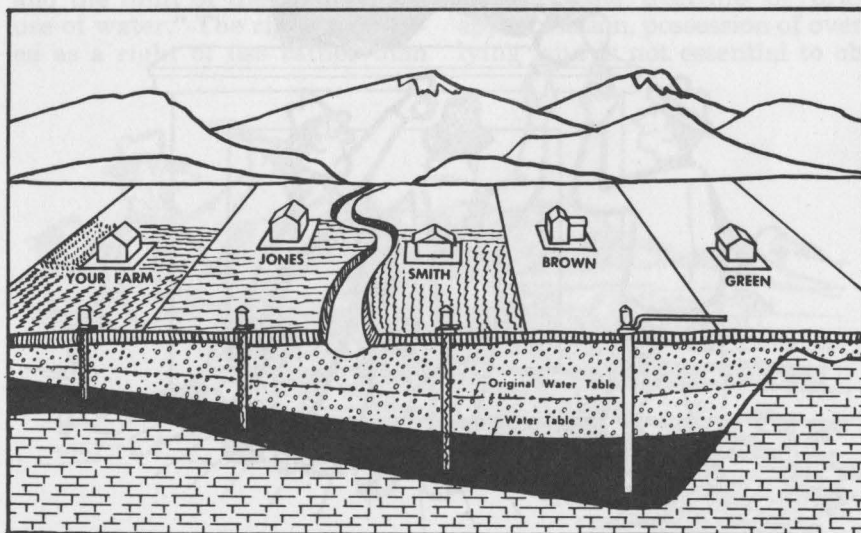


FIGURE 12. Under the California doctrine, a severe water shortage would cut off the supply of Farmer Green. The other farmers would share the remainder of the water.

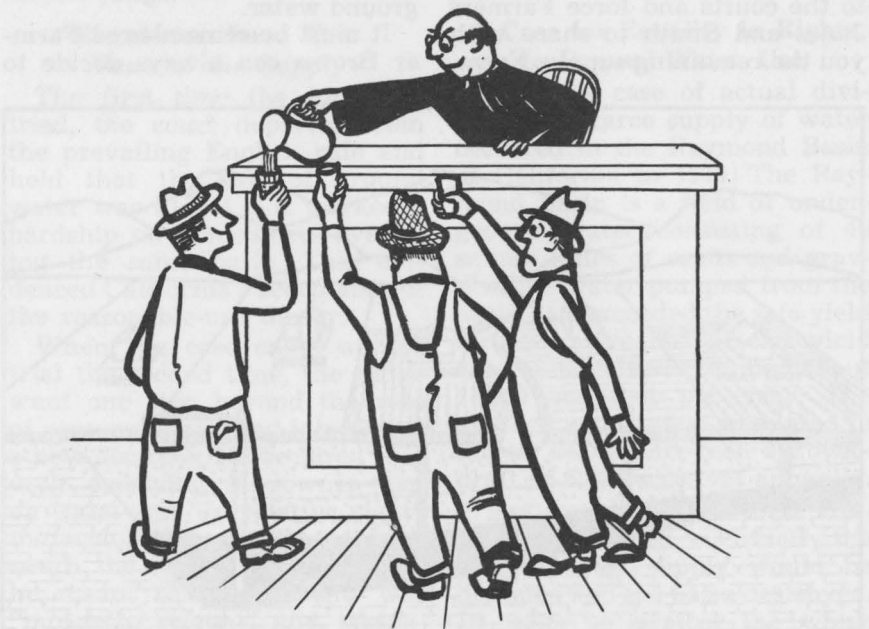
irrigate his own land. In this event, he could pump his full and rightful share. However, we have assumed Farmer Brown has never had the desire to irrigate his own farm.

A Comparison of Three Ground-Water Doctrines

The California rule is similar in some respects to both the American and the English rules. They are all doctrines based on land ownership. Under these doctrines, a farmer must always own land overlying the underground water reservoir in order to gain a right to use water during a shortage. However, under the correlative rule, the landowner actually does not own the

water. He has only a right to its use. The use must be beneficial and reasonable even when applied to overlying land.

If a recent purchaser of overlying land, or an overlying landowner on a non-irrigated farm, chooses to drill a well and irrigate, he may at any time seize his share of the water. This applies to all of the rules we have discussed. It also applies regardless of whether or not a shortage exists. Under the California rule this may present serious problems, particularly in small overdeveloped areas. Eventually, each irrigator may receive such a small share of the water that he would find it impossible to continue irrigated farming.



Under the California doctrine during a shortage, water may be distributed according to the requirements of the land and the area of land held. Landholders do not own the ground water; they merely have the right to use it.

The Doctrine of Prior Appropriation or Prior-Rights Rule

After the discovery of gold in California in 1848, the early miners devised another rule of law. It developed from a custom whereby the first one to use the water of a stream had a right to its continued use over all later users. This so-called "first come—first served" theory gradually ripened into the doctrine of prior appropriation or prior-rights rule. It has been used to control the development and use of surface and ground waters alike.

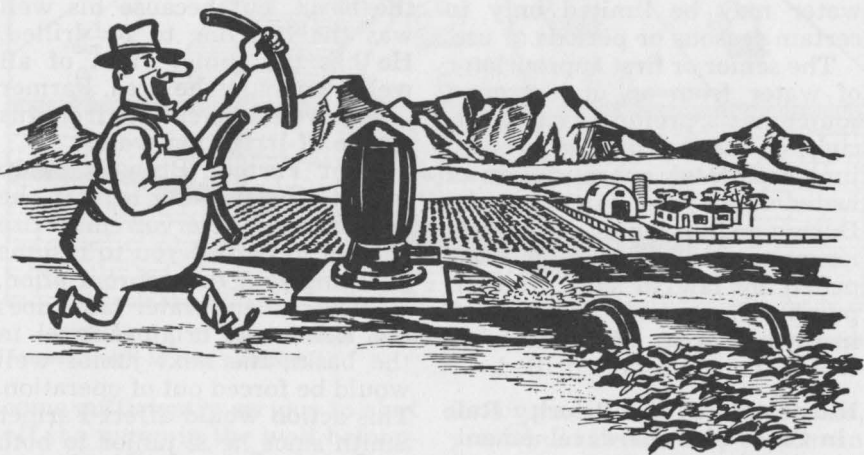
Establishing Prior Rights

The modern version of the priority doctrine declares the underground water of a state is public property. It holds to the principle that "beneficial use shall be the basis, the measure, and the limit of the right to the use of water." The right is granted as a right of use rather than

as an ownership right in the water itself. Each right is limited by the beneficial needs of the land regardless of whether or not the land overlies the ground-water basin. In other words, as long as the water is used for some reasonable and beneficial purpose, it can be exported at the will of the appropriator.

In most states, priority of use extends from the date on which the appropriation is initiated rather than when it is perfected. This prevents shoddy and hasty construction of the diversion works in an attempt to obtain an earlier right. The appropriation usually is declared complete when the diversion structure is finished and the water is applied to a beneficial use. In the case of underground water, a well would constitute a diversion structure.

Under the doctrine of prior appropriation, possession of overlying land is not essential to ob-



To appropriate underground water means to drill a well and apply the water to a reasonable and beneficial use.



Under the doctrine of prior appropriation, the senior or first appropriator of water from an underground source has a preferred right. In times of water shortage, the pumps could be shut off in reverse order of the dates on which the wells were drilled.

tain a water right in a basin. Once a right is established, however, it remains in effect only as long as the water use conforms with existing regulations.

The regulations differ from one state to another. For example, in most states a water right will terminate if the water is not used for some beneficial purpose for a stated length of time. Usually, the time period varies from three to five years. Also, the right to the use of water may be limited only to certain seasons or periods of use.

The senior or first appropriator of water from an underground source has a preferred right. His right of use is protected over all junior or later appropriators of water from the same supply. During a shortage of water, junior appropriators may be compelled by law to shut off their pumps. The pumps are shut off in reverse order of the dates on which the wells were drilled.

Illustration of the Priority Rule in Cases of Underdevelopment

We have assumed you were the first farmer in the area to

drill a well. Farmer Jones was second, Smith was third, and Brown was last. Now let us assume use of the water supply in your area is based on the doctrine of prior appropriation.

If the rule is applied in the strict sense, the following would result in case a water shortage occurs: If your well goes dry, Farmer Brown would be the first one forced to shut off his pump (Figure 13). This is not because he is diverting water outside of the basin, but because his well was the last one to be drilled. He has the junior right of all well owners in the area. Farmer Green would be cut off from his source of irrigation water.

After Farmer Brown's pump is shut off, the water level in the underground reservoir may rise enough to permit you to resume pumping your full appropriation. However, if the water table does not rise to its original level in the basin, the next junior well would be forced out of operation. This action would affect Farmer Smith since he is junior to both you and Jones (Figure 14).

Eventually, conditions may be-

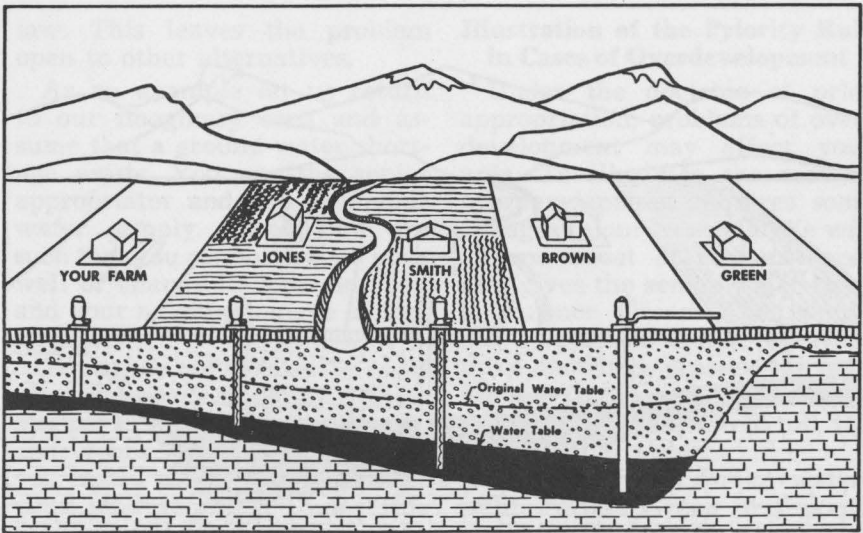


FIGURE 13. If a shortage affects your well, the courts can force Farmer Brown to stop pumping water from the basin.

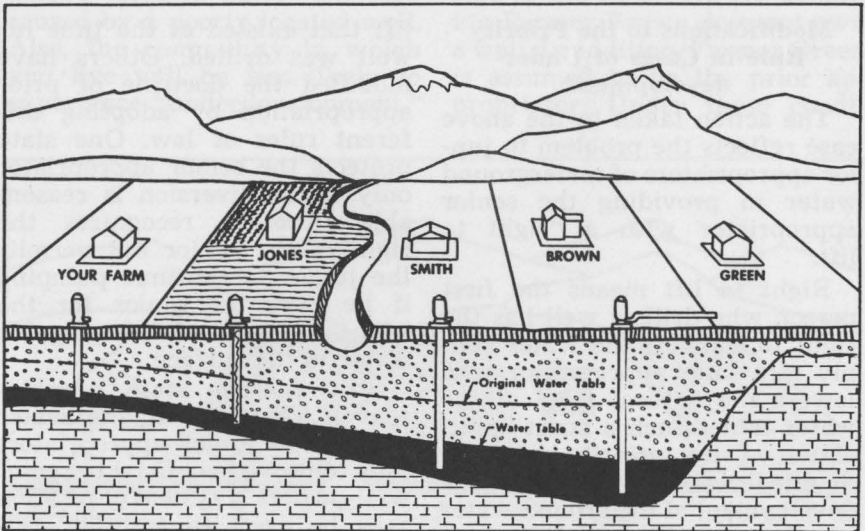


FIGURE 14. If ground-water conditions fail to improve, the courts can force Farmer Smith to stop pumping.

come sufficiently serious to shut off the pump in the well belonging to Farmer Jones. Even though the water table rises to

its original level in the basin, you would be the only farmer in the area allowed to pump (Figure 15).

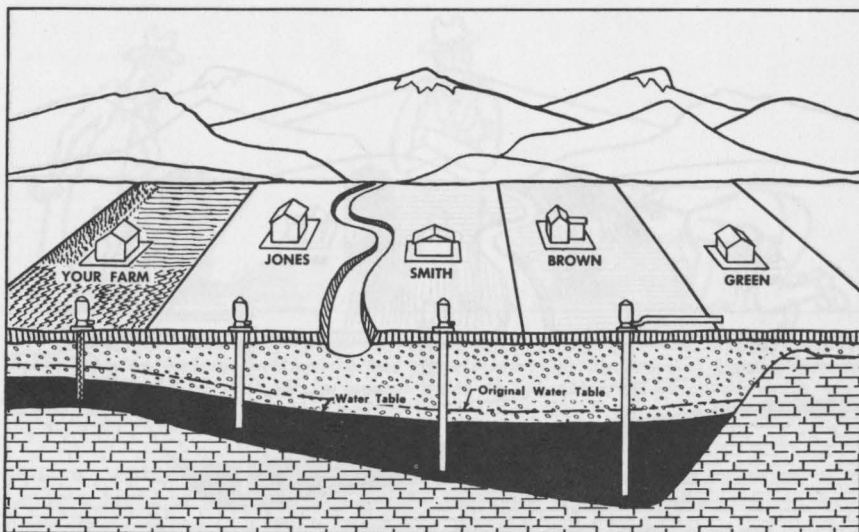


FIGURE 15. Even though the water table is rising, you would be the only farmer permitted to pump.

Modifications to the Priority Rule in Cases of Underdevelopment

The action taken in the above case reflects the problem to junior appropriators of underground water in providing the senior appropriator with a "right to lift."

Right to lift means the first person who drills a well has the right to shut off the water supply of a later appropriator who lowers the natural level of the water table. Such a strict application of the priority rule undoubtedly would minimize the development of the ground-water supply in your area. This happens because only one person in the area is permitted to pump even though the underground reservoir is nearly full of water.

Some states still hold the first appropriator is entitled to the

lift that existed at the time his well was drilled. Others have modified the doctrine of prior appropriation by adopting different rules of law. One state protects the senior appropriator only if his diversion is reasonable. Another recognizes the right of the senior but permits the junior to continue pumping if he pays the senior for the added expense of bringing his water to the surface.

Still another state provides that if shutting off the water supplies of junior appropriators fails to prove beneficial to senior well-owners, a system of rotation may be used. In addition, this particular law holds residents of a critical area may agree to "... any other method or scheme of control of withdrawals, apportionment, rotation, or proration ..." of the water supply that will not conflict with the present

law. This leaves the problem open to other alternatives.

As an example let us return to our imaginary area and assume that a ground-water shortage exists. You are the senior appropriator and you lose your water supply. Conditions are such that you cannot deepen your well or change its location. You and your neighbors make a compromise.

You agree not to take the legal steps necessary to shut off their pumps. In return, Smith, Brown, and Jones promise to furnish you with the irrigation water your land requires. Under this type of an agreement, neither you, nor your neighbors are unnecessarily harmed by a temporary ground-water shortage caused by a poorly located well. Also, the community in which you live will be less likely to experience "underdevelopment."

Illustration of the Priority Rule in Cases of Overdevelopment

Under the doctrine of prior appropriation, problems of overdevelopment may affect your area. To illustrate the case of overdevelopment requires some changes in our example. We will assume a set of circumstances that gives the senior water-right to Farmer Green. This would not be possible under the other three doctrines, because the land Farmer Green is irrigating does not overlie the source of the underground water.

To obtain the senior water-right, Farmer Green first would have to obtain a parcel of Farmer Brown's land upon which to drill a well and divert water outside of the basin. We are assuming Farmer Brown does not own a well. In addition, Farmer Green is assumed to be the prior appropriator. Under these condi-

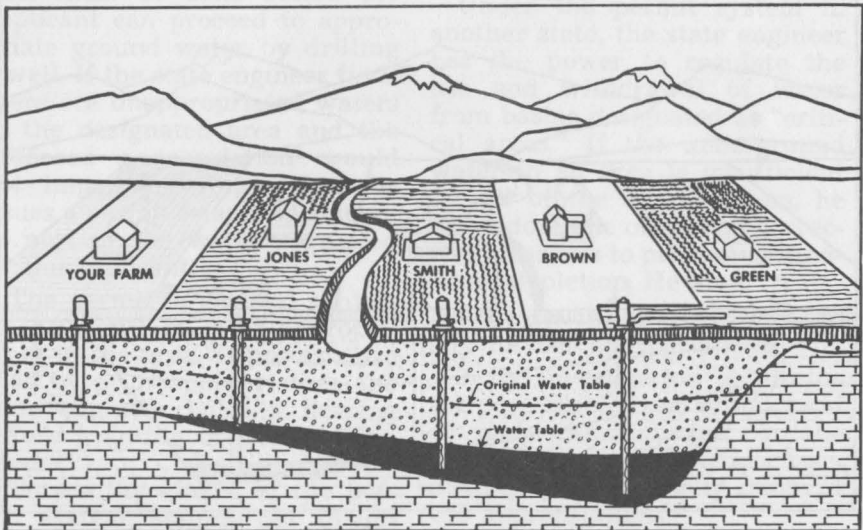


FIGURE 16. Here are the effects of the priority rule on the area if we assume the senior well belongs to Farmer Green.

tions, a ground-water shortage would have a much different effect on your community than was described in the situation of underdevelopment.

You continue to be the first one affected by the shortage (Figure 16), but your well is now junior to the other four. If a shortage occurs you would be unable to keep your well from going dry by stopping your neighbors from pumping.

The difference in priorities assumed to exist under the two situations affects the total number of farmers allowed to irrigate. In the example of underdevelopment, you were the last and only farmer permitted to pump. However, in this example, three farmers remain pumping from a much smaller supply of water (see Figures 15 and 16).

The Danger of Overdevelopment

In the situation of overdevelopment, the water level in the basin would have to decline below the depth of Farmer Green's pump intake before the senior well would be affected. In other words, the doctrine would not restrict the remaining three farmers from pumping. Each well which is junior to Green's automatically would be cut off by a declining water table. Farmers Jones and Smith could pump as long as the water remained high enough in the basin to be intercepted by their wells (Figure 17). Thus, when Farmer Green is the senior appropriator, drouth and overpumping could easily cause overdevelopment of the underground water supply. The resulting conditions would be similar to those discussed earlier under the English rule.

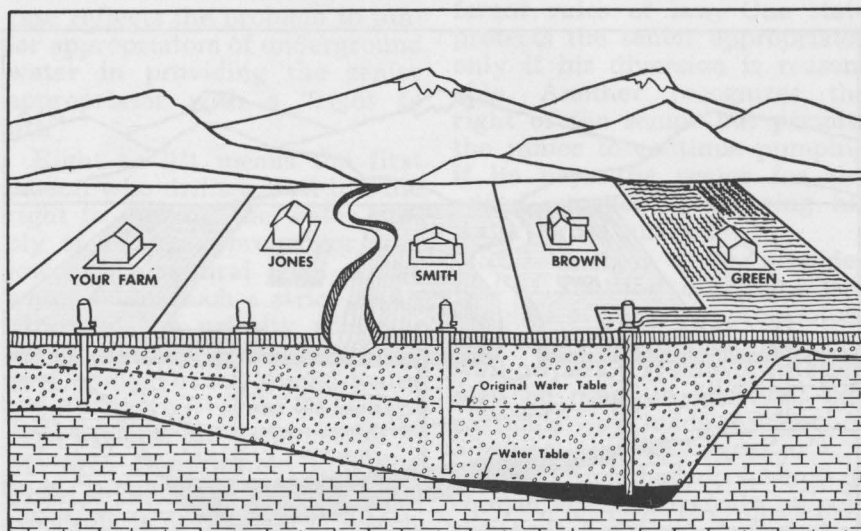


FIGURE 17. Jones and Smith would continue to irrigate until their wells went dry. The water table would be lowered until the underground basin becomes depleted of available water.

The ground-water supply would be exhausted and the ground-water basin possibly destroyed.

The Permit System Under the Priority Rule in Cases of Overdevelopment

Under the priority rule, the permit system appears to be a partial solution to the problem of overdevelopment. This system operates on the principle that if development is carefully controlled, overdevelopment may not occur. States which have adopted this system have placed the control and regulation of water supplies in the hands of a state official, usually the state engineer. His decisions are subject to review by the courts of the state.

Under the permit system in one state, any person who wishes to drill a well for irrigation or industrial use must file an application with the state engineer. This must be done before the applicant can proceed to appropriate ground water by drilling a well. If the state engineer finds there are unappropriated waters in the designated area and the proposed appropriation would not impair existing rights, he issues a permit to appropriate all or part of the water requested by the applicant.

The permit is granted subject to the rights of prior appropriators in the area. If protests are filed by prior appropriators, the state engineer holds a hearing before granting or denying the permit.

To see the effects of the permit system, assume our imaginary farming community is twice as large as before. Eight farms

overlie the ground-water basin instead of four (Figure 18).

You, Jones, Smith, and Green are irrigating with water pumped from the basin. Farmer "X" on an adjacent farm decides to drill a well and use a share of the ground-water supply. But, there is only enough water to irrigate four farms.

If Farmer "X" drills a well and irrigates his land, he will lower the ground-water table and your well will go dry. However, before Farmer "X" can drill a well he will have to apply to the state engineer for a permit. In this event, the state engineer will deny his application on the basis that there is an insufficient quantity of water in the basin to satisfy an additional appropriation. This action will prevent overdevelopment of the ground-water supply and protect the prior rights of you and your neighbors.

Under the permit system in another state, the state engineer has the power to regulate the use and withdrawal of water from basins designated as "critical areas." If the underground water in an area is insufficient for all of the appropriators, he may adopt one of several corrective measures to prevent ground-water depletion. He may:

1. Close the critical area to any further appropriations.
2. By investigation determine the permissible total withdrawal of underground water in the critical area and apportion it according to the priority dates of the appropriations.
3. Order junior appropriators to cease or reduce pumping.

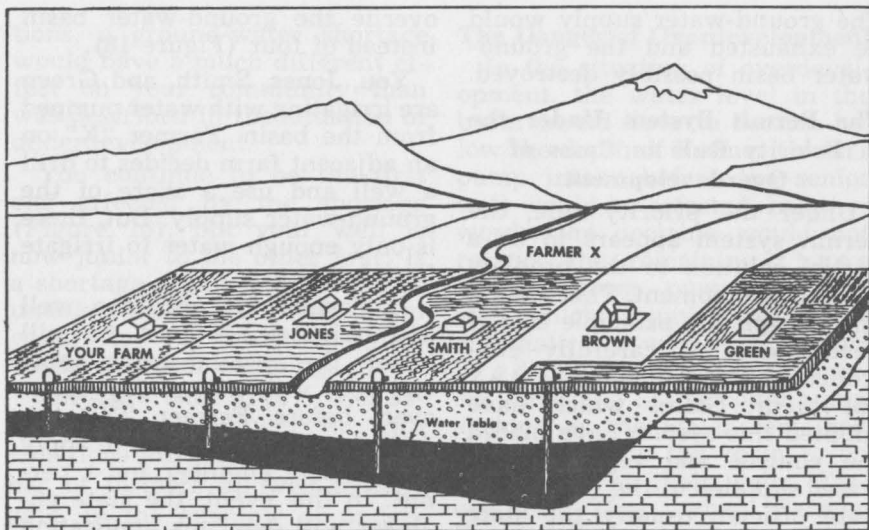


FIGURE 18. If Farmer "X" drills a well, a shortage of ground water will develop from overpumping.

4. Set up a system of rotation for use of the remaining supply of water.

5. Or, elect to adopt alternative measures of control that are legal, agreeable to, and suggested by the residents in the area affected by the critical designation. Furthermore, he may be authorized to make regulations con-

cerning the spacing, distribution, and location of wells in critical areas.

When ground-water conditions improve, or if evidence indicates unappropriated water is available in the area, the critical designation is removed and the area is opened for further development.

Ground-Water Legislation in Colorado

In the United States, the recent trend in ground-water legislation is away from the absolute-ownership rule. Eleven of the seventeen western states have chosen the doctrine of prior appropriation as a base for laws on ground-water use. The remaining six will probably proceed along other lines.

The President's Water Resources Policy Commission Study

of 1950 revealed control measures are tending toward the conservation of ground water on the reasonable use basis. Most states apply the same rule to ground water as to surface streams. In the East; the common-law rule is being replaced with the priority doctrine, at least where surface-water rights are concerned.

For many years Colorado had

no law which could definitely be termed a ground-water law. Colorado regulated the use of its valuable ground-water supplies by an adaptation of the constitution's provision for natural stream use.

Article XVI, Section V, of the constitution declares the unappropriated water of every natural stream is the property of the public and makes such waters subject to appropriation for beneficial use. It also provides that priority in time of appropriation shall give the better right among those using the water for the same purpose.

Rights to the use of waters of definite underground streams, of the subflow of surface streams, and of ground waters distinctly tributary to surface or underground water courses are subject to appropriation under the Supreme Court's definition of "natural stream." But no rule existed to govern or control the use of percolating ground water considered non-tributary to either surface or underground channels. The long-standing question was: Which basic doctrine should be adopted to control these waters?

On May 1, 1957, the Colorado Legislature enacted a ground-water law which provides control over "... any water not visible on the surface of the ground under natural conditions."*

The law provides that within three years from the effective date of the act all ground-water users must register existing wells with the state engineer. New

wells cannot be drilled or the supply of water from existing wells increased unless the user applies to the state engineer for a "Permit to Use Ground Water." The state engineer will issue the permit unless it comes from within a "Tentatively Critical Ground-Water District."

The law created a State Ground-Water Commission composed of eight members appointed by the governor. The commission was given authority to conduct a preliminary survey and designate Tentatively Critical Ground-Water Districts. All areas in the state where it appeared that the withdrawal of ground water had "approached, reached or exceeded the normal annual rate of replenishment" were to be declared tentatively critical. The law further provides that the commission may, at any time, or at the request of the state engineer, or upon petition of a substantial number of well owners within an area of the state, investigate and declare an area to be a Tentatively Critical Ground-Water District.

When a district is declared tentatively critical, the commission establishes boundaries and closes the area to further ground-water development. The state engineer has the power to refuse to issue "Permits to Use Ground Water" in critical districts except for:

1. Wells used solely for stock watering purposes.
2. Domestic wells having discharge pipes of 2 inches or less.
3. Artesian wells with dis-

*Colorado Revised Statutes, Secs. 147-19-1 to 147-19-15.

charge pipes not exceeding 3 inches in diameter.

4. Or, to replace, deepen, or reconstruct wells in need of restoration which have been in operation for more than one year prior to the date the law took effect.

In not less than 30 nor more than 60 days after an area has been designated as a tentatively critical district, the commission must conduct an election to select a District Advisory Board. The District Advisory Board is composed of five members who must be residents and qualified voters of the restricted district. Eligible voters include those who are qualified to vote in general elections, own real property within the critical district, and who own a well which will be affected by the critical designation.

The duties of the District Advisory Board are to cooperate and work in conjunction with the State Ground-Water Commission in all matters concerning the control, diversion, and use of ground water in the restricted district. However, the consent of a majority of the members of the District Advisory Board will be necessary before the commission's tentatively critical designation will remain in effect for more than 12 months.

The commission may, at any time after an area has been declared tentatively critical, remove the designation or modify the restrictions upon its own initiative, or at the unanimous request of the District Advisory Board, or upon petition of two-

thirds of the resident well owners affected by the designation.

To visualize the Colorado law in action, return to our imaginary area and assume that a ground-water shortage exists. Let us assume further that the State Ground-Water Commission declares your area a Tentatively Critical Ground-Water District and closes it to further ground-water development.

After your area is declared critical, the commission will conduct an election to select a District Advisory Board. Five people in the area will be elected by you and your neighbors to serve on the board. We will assume that the critical district covers an area much larger than the area covered by our original five farms.

The effect of the Colorado law now depends entirely upon the action taken by the local residents. If the qualified voters in the critical area are in favor of restricting the use of underground water, they will elect a group of five men who are campaigning for the critical designation. However, no basic ground-water doctrine is defined by the law to govern the use of the water supply in the basin after the critical designation is accepted.

If the critical designation is considered undesirable, the voters will elect a board from those who are campaigning against the restriction.

It is only natural that the fear of control will force most of the community to vote against the critical designation. Few people will voluntarily impose state enforced regulations upon them-

selves, and fewer will force such restrictions upon their neighbors.

A suggested alternative to provide effective ground-water control in overdeveloped areas is to encourage ground-water users to take group action through public or semi-public districts. These districts could be organized in critical basins and provide local residents an opportunity to solve their own problems. Local solutions to ground-water shortages might be forthcoming from areas where state water laws and bitter court cases aimed at individuals have failed. Under such a plan, most of the ground-water

management functions would be exercised by the people in the areas affected by shortages of underground water.

Uncontrolled use of ground water such as the state has experienced in the past is not the answer to Colorado's ground-water problems. Colorado cannot continue to overdevelop its underground water resources on a non-regulatory basis resembling the common-law form of absolute ownership. Hope of better control lies in study and understanding of the complex problems, and through improved legislation.