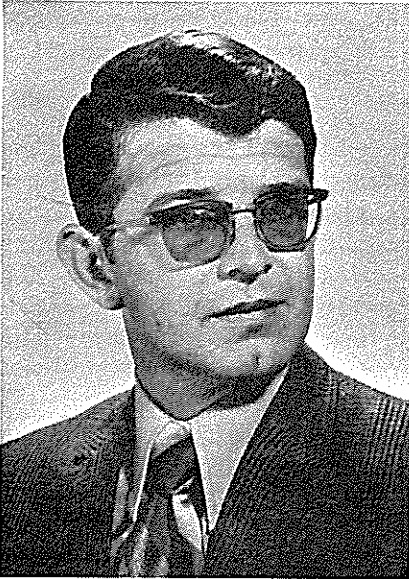


ARIZONA'S GROUNDWATER PROBLEM AND PROPOSED LEGISLATION

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Biographical Sketch



Born in Scottsbluff, Nebraska. Graduated from Holdrege High School, Holdrege, Nebraska in 1955. Engaged in irrigated and dry land farming from 1955 to 1965. Graduated from Arizona State University in 1968. (B.S. - Accounting) Will graduate from Arizona State University College of Law in June, 1971. (J.D.)



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Arizona's Groundwater Problem As It Stood In 1948

In 1947 almost all knowledgeable sources agreed that Arizona's groundwater problem had reached the critical point. The Legislature of Arizona was asked time and again by the Governor to consider the problem in special sessions. Irrigated acreage was at its highest point in history, and increasing steadily, without regard to declining groundwater levels. The surface waters had long since been put to maximum use. Day by day the feeling seemed to grow that there was a need for some kind of statewide groundwater control in Arizona.

Very little farming is accomplished in Arizona without irrigation. But in 1947 an extensive agricultural industry had been developed through a continuous expansion of irrigation projects for more than 50 years. Practically all early agricultural development resulted from the diversion of water from flowing streams and by constructing dams and storage reservoirs on the rivers. By 1930 the use of these surface waters for agricultural development was so complete that since that time no water has run out of the mouth of the Gila River, which drains most of the state (1).

Nearly all the agricultural development in Arizona since 1930 has resulted from an increasing use of underground water supplies made available by the installation of wells and pumping systems. Owing to the increased efficiency of pumps, higher prices for crops, and lower costs for power, groundwater began to play an important part in Arizona agriculture.

These developments made it possible for the irrigated acreage to increase from about 330,000 acres in 1910 to 950,000 acres of land in 1947 (2). It is easily seen that Arizona agriculturalists were quite proud of their efforts in developing elaborate irrigation systems.

It was during the 1930's that concern for the conservation of underground water supplies first developed. Some saw the early need for settlement of the legal and policy questions surrounding groundwater, but their hopes for settlement were in vain (3). However, between 1940 and 1947 it became increasingly apparent that there was not enough water available to support the increasing agricultural program. There had been no rain to speak of since the winter of 1940-1941. This situation rapidly used up surface reservoir supplies as well as underground supplies of water. Studies by the University of Arizona in 1946, showed clearly that practically all the underground water supplies had been developed. Also, it was felt that only a decreasing amount of underground water would be obtainable in the future (4).

Some experts were projecting that if something was not done about the situation, Arizona's irrigated acreage would have to be decreased by one-third (5).

During the early 1940's proposals were introduced into the legislature calling for the establishment of study committees for the writing of a code, but these proposals could not gain needed support (6). As early as 1942, the Arizona Farm Bureau Federation called for a code (7). In 1944, after five years of investigation by the U. S. Geological Survey, the State Land Commissioner informed the Governor, that without a groundwater code "The agri-

cultural development of the state can never be safeguarded against over development that will always threaten the return of certain areas to the desert" (8).

In 1945 the pressure for enactment of some kind of code increased when the Governor warned the legislature that the long awaited Central Arizona Project would not receive Bureau of Reclamation support unless the state took action to control its groundwater depletion problem (9). The result was the Groundwater Act of 1945 (10). The primary purpose of this Act was that it be an information gathering device. Persons owning and operating wells were required to give certain information to the State Land Commissioner. No new wells could be drilled without first giving notice of intention to drill. However, the Act in no way placed any limitations on groundwater pumpage.

"Governor Osborne was an ardent supporter of a groundwater code and was determined to see one passed. He assailed what he called the 'forces of greed and destruction' who resisted passage of a code. Failing to obtain action from the regular session of the legislature in 1947, he called the legislature back into session three times for the specific purpose of writing a groundwater code and finally was successful" (11).

Groundwater Law In Arizona

A law which permits limited state regulation of the use of groundwater for irrigation in Arizona was enacted by the Sixth Special Session of the Eighteenth Arizona Legislature in March 1948. This code did not adopt any of the basic principals of water law but was an exercise of the general police power of the state in providing reasonable regulations for the designation and establishment of "critical groundwater areas".

Groundwater as defined in the Act, "means water under the surface of the earth regardless of the geologic structure in which it is standing or moving. It does not include water flowing in underground streams with ascertainable beds and banks" (12). According to Arizona law, as developed by court decisions, there are two classes of underground waters, those flowing in definite underground channels, and percolating waters. The importance of this distinction by the courts will be discussed later. Suffice it for now to say that the Code applies only to percolating water.

Administration of the law is vested in the State Land Department (prior to 1950, the State Land Commissioner). The Code provides for the registration of all irrigation wells operating prior to the enactment of the 1945 Groundwater Act and in addition for the filing of "Notice of Intention to Drill" new wells for any use.

One of the duties of the State Land Department is the designation, on the basis of adequate factual data, of groundwater basins and their subdivisions, and the alteration of the boundaries thereof as future conditions require. The fact that an area is designated a groundwater basin does not give the department authority to regulate the drilling or operation of wells in the basin.

However, the Department is further empowered, after notice and hearing, to designate critical groundwater areas. A critical groundwater area, according to the law, is any basin or subdivision thereof "not having sufficient groundwater to provide a reasonably safe supply for irrigation of the cultivated lands in the basin at the then current rates of withdrawal." The designation of a groundwater basin or a critical groundwater area may be initiated either by the Department or on a petition signed by a given percentage of the groundwater users in the groundwater basin concerned (13). Maps of the present critical groundwater areas in Arizona are included as Appendix A.

The law does not place any restrictions on the drilling of wells for irrigation or otherwise in non-critical areas, nor does it limit the use of water from existing wells in critical areas. The main restriction that the Code imposes is upon the drilling of wells for the irrigation of new land within a critical area. In addition, replacing or deepening present irrigation wells will be allowed only upon a satisfactory showing that the well intended to be replaced or deepened will no longer yield sufficient water to irrigate the land normally supplied by it within the five years immediately prior to filing application for the permit. Otherwise, the only irrigation wells allowed to be drilled in critical groundwater areas are those for the irrigation of lands which were irrigated on the date the area was declared critical or had been cultivated within five years prior thereto.

Infractions of the law or of rules issued under it are classified as misdemeanors punishable by a fine of not less than \$25 or more than \$250 for each offense. Persons who persist in the violation of any provision of the Act or of regulations for its enforcement, after due notice and after the expiration of a reasonable period of time in which to comply are guilty of a separate offense for each day the violation continues. The law permits a person to appeal from orders and decisions of the Department to the County Superior Court, in which the case will be tried de novo and from the Superior Court to the State Supreme Court.

The constitutionality of the Act has been questioned on a number of grounds. In 1955 the case of Southwest Engineering Co. v. Ernst reached the State Supreme Court (14). Southwest Engineering Co. had applied to the State Land Commissioner for a permit to construct a well on land within a critical area which did not have a history of cultivation. The Commissioner denied the application and the company then sued to enjoin the Commissioner from preventing the construction of the well. The primary argument of the company was that the action of the Commissioner was an unreasonable and arbitrary use of the police power to interfere with private property without due process of law and without just compensation. In considering this argument the court said:

"We are of the opinion that there is a preponderant public concern in the preservation of lands presently in cultivation as against lands potentially reclaimable, and that whereas here the choice is unavoidable because a supply of water is not available for both, we cannot say that the exercise of such choice, controlled by considerations of social policy which are not unreasonable, involves a denial of due process (15).

In other words the police power can be exercised in any reasonable manner to meet the needs of the public.

The company further argued that the classifications involved in the Code were arbitrary and unreasonable and therefore violated the equal protection clause of the Fourteenth Amendment since the classification was not reasonably related to the purpose for which the Code was passed. The Code allegedly discriminated among persons in a single class, the distinction between present and potential users being unwarranted. Admitting that the distinction was an unusual one, the court said "this is not sufficient grounds to invalidate the Act if the classification has a rational basis. That the classification does have a rational basis is readily apparent." The court then stated that there were sound reasons for the distinction involving protection of the community against economic loss due to the water shortage in the state.

Finally, the company contended the Act was unconstitutional for want of definiteness and gave to the Commissioner law making powers. The court accepted the argument that a law must not be so "vague, uncertain, and incomplete that reasonable men could not agree on the law's meaning and application," but found that there was sufficient certainty concerning the principals to be used in the determination of critical areas and the procedures to be followed. The court stated that since the groundwater problem is quite complex it is necessary that the determination of certain facts or conditions be delegated to an administrative body.

In 1960 the Supreme Court interpreted the Code in the case *State ex rel Morrison v. Anway* in which the court stated that a landowner could transfer the application of groundwater from a parcel of land having a history of cultivation to a parcel of land not having such a history. The court did not agree with the State Land Department's argument that the Code forbade expansion of the acreage developed by groundwater (16).

As stated previously, the courts in Arizona draw a distinction between underground percolating water and water flowing in defined underground streams. The importance of this distinction is realized when it is seen how an individual acquires rights in these different kinds of water. Water flowing in defined underground streams is subject to the same rules as surface water, the doctrine of prior appropriation. In essence this doctrine declares that the waters are public property, but may be appropriated and put to beneficial use. Claims to water depend not on the ownership of riparian land, but on the use to which the water is put, and the time at which the claim is established. In the event of conflict the earliest right takes precedence. This water right under prior Arizona law was issued for beneficial use on a specific parcel of land and could not be used elsewhere under most conditions although there were provisions for transferring the right if its use on the original land became impracticable for reasons beyond the control of the owner. However, under present Arizona law a right to surface water is no longer appurtenant to the land for which it was appropriated. The right is valid only so long as the water is actually used and may be forfeited if the right is not used for five successive years.

Percolating water in Arizona as decided in the case of *Brister v. Cheatham*, is subject to the doctrine of reasonable use (17). That is, the owner of the land has a right to take as much water as he can put to reasonable use on that land, without regard to the effect of the withdrawal on neighboring landowners. There is no priority of rights in this system.

In a recent Arizona case, *Jarvis v. City of Tucson* (18) the court held that the beneficial user of groundwater may transport the water off his land as long as that use of the water does no damage to other users. In that case, damage to others was presumed because the land in question fell within the boundaries of a designated critical groundwater area, and therefore, the City of Tucson was enjoined from transporting the water away from the land from which it was pumped.

Clearly the prior user of groundwater would rather fall under the doctrine of prior appropriation because he would be able to assert his prior right any time pumpage by his neighbors damages him. However, with the decision in *Proctor v. Pima Farms Company* (19) the court took a very restrictive view concerning what was necessary to prove the existence of an underground stream. It required clear evidence of a channel with well defined beds and banks, and current, and a certainty of location. The presumption is, without evidence to the contrary, that underground water is percolating and therefore subject to the reasonable use doctrine. The result of this decision by the court is that practically all underground water in Arizona is subject to the reasonable use doctrine.

Effect Of Present Law On Groundwater Problem

Since 1939 a planned program of groundwater studies has been conducted by the U. S. Geological Survey in cooperation with the State of Arizona. The results of these studies show a steady decline in the groundwater levels throughout the state. Although the rate of decline has leveled off somewhat in certain areas, there does not appear to be any relief in the near future. The following statistics will show that the 1948 Arizona Groundwater Code has not been effective in decreasing the groundwater overdraft. (Tables 1, 2, and 3 are included as Appendix B)

Table 1 shows that between 1940 and the effective date of the Code in 1948 groundwater pumpage in Arizona had more than doubled, increasing from 1.5 million acre feet to over 3 million acre feet. During the same period the state experienced a one-third increase in irrigated acreage. The large difference in the rates of increase is explained by the fact that there was a drought throughout the state during this period. Without surface water available the farmers naturally started pumping more groundwater. It is estimated that the annual recharge of groundwater in the state of Arizona is 1.0 million acre feet (20). According to this estimate, groundwater pumpage since before 1942 has been far greater than the annual recharge. The net result has been a general overdraft on the groundwater reservoir and a constant lowering of groundwater levels. On an annual basis it has been many years since water supply has exceeded water use, therefore much of the water being used to meet today's needs is being derived from stream flows stored in the groundwater reservoir many years ago. Groundwater pumpage continued to increase from the

time the Code went into effect until 1953. The bulk of the increase seems to be explained by the fact that irrigated acreage was also increasing. However, it should be noted that there were very few critical groundwater areas under the Code until 1951. Therefore, increases in groundwater pumpage until that time cannot be blamed on the provisions of the Code, only its administration.

Since 1953, both groundwater pumpage and irrigated acreage have remained relatively stable. Groundwater pumpage is averaging approximately 5.0 million A.F. annually, while irrigated acreage has leveled off at about 1.2 million acres. Even though groundwater pumpage has been stabilized there still remains an acute overdraft of approximately 4.0 million acre feet annually (21). As long as this overdraft continues, groundwater levels will continue to decline. In addition, as water levels decline, pumping costs increase and the quality of the water is lowered.

To show the effect of the Code, Tables 2 and 3 show the average pumpage and depth to water in two areas which have been declared critical by the State Land Department.

Lower Santa Cruz Basin

This area was declared critical in three stages. The Gila-Santa Cruz area was created June 19, 1951, and the Eloy critical area was created April 4, 1949. Additions were made to both these areas on October 15, 1954.

From Table 2 it can be seen that since 1949 pumpage in the lower Santa Cruz Basin has remained at approximately 1 million A.F. While the Code may be credited with the stabilization of groundwater pumpage levels, it should be noted that since there was already an overdraft on the groundwater supply, groundwater levels have continued to fall. The decrease has been as much as 160 feet in some areas. It is estimated that pumping costs increase \$.03 per acre foot, per foot of lift (22). Therefore, if the average decline in the water level has been 120 feet, this represents an increase of \$3.60 per acre foot of water used.

Salt River Valley

The Salt River Valley critical area was created September 1, 1951 and additions were made August 14, 1956. From Table 3 it can be seen that pumpage levels in the Salt River Valley began to level off almost immediately after the area was declared critical and have remained stable at around 2 million A.F. annually. Again however, even though pumpage has remained stable, the water level has continued its rapid decline. Beginning in 1965 groundwater pumpage has shown a marked decrease due to the fact that more surface water has been available for irrigation. The additional surface waters and the decreased pumpage since 1965 has stopped this decline and even raised water levels in some areas.

From the above factors it is clear that although increases in pumpage may be stopped when an area is declared critical, the decline in the water level will continue as long as there is no actual cutback in the amount of water pumped. Under the present groundwater code there is no way that the State Land Department can effectively control declining water tables.

Comparison Of Groundwater Statutes In Other Western States

After having pointed out the deficiencies in the groundwater laws of Arizona it becomes necessary to investigate the groundwater laws of those western states whose groundwater situations are similar to that of Arizona before one can determine what future legislation is necessary in Arizona. At first glance it appears that each state has enacted groundwater legislation in light of its own particular problems which have been somewhat unique in each case.

However, upon deeper examination similarities can be found which allow division of the 17 western states into three groups. The first group, including North Dakota, South Dakota, Kansas, Oklahoma, Wyoming, Idaho, Utah, Nevada, Washington, Oregon, Colorado and New Mexico have statutes which bring the right to use percolating waters under the doctrine of prior appropriation. Two states, Arizona and Texas, extend regulation of groundwater to certain uses of such waters in areas in which it is particularly needed, but without basing restrictions on priority of appropriation. In three other states, California, Montana, and Nebraska, there are no statutory restrictions upon the diversion and use of percolating waters (23).

The appropriation group can be considered as a whole with note of some of the significant variations. A statute that makes adequate provision for the appropriation of groundwater must contain among other things, such features as: designation of waters affected, designation of public administrative agency, recordation of claims of preexisting water rights, procedure for acquiring new rights, determination or adjudication of groundwater rights, supervision of extractions of groundwater, changes in exercise of groundwater rights, and loss of rights.

1. Waters affected. Several of the original groundwater laws in specifying waters subject to appropriation set up elaborate classifications of groundwaters having reasonably ascertainable boundaries, with seemingly no two states having the same classification system. The trend now is away from elaborate classifications and toward complete coverage of all groundwaters that are subject to practical administration.
2. Public administrative agencies. All of the statutes place some responsibility upon the State Engineer or other comparable state official. The tendency is to provide procedure for registering in the office of the administrative agency claims of preexisting rights and applications for the acquirement of new rights. The administration of all these rights is the responsibility of a single state agency.
3. Preexisting rights. Here we are worried about the claims of rights to the use of groundwater that are initiated prior to the enactment of the groundwater statute. These are sometimes called claims of vested rights or claims of existing rights. They relate to rights which are claimed to exist by reason of previous actual application of groundwater to beneficial use. Claims are made on forms furnished by the states and are filed in the state agency. When properly filed

and recorded these claims are usually prima facie evidence of the rights so described.

4. Acquiring new rights. The excess water in the source of supply above the quantities to which holders of preexisting rights are entitled is available for appropriation under the specific procedure prescribed in these statutes. The procedures usually parallel those provided for appropriations of surface waters with such variations as are caused by differences in the character of these water supplies and in methods of withdrawal.
5. Determination or adjudication of groundwater rights. The trend is toward including in the appropriation statutes provisions for administrative determinations of groundwater rights followed by court adjudications. Even though surface stream procedure is followed the different nature of groundwater supplies calls for special handling. The boundaries of each source of groundwater supply must be defined. Information is needed with respect to the depth and capacity of the groundwater reservoir, safe yield, extent and quality of the supply, and servicable methods of withdrawal. If two or more such reservoirs overlie one another wholly or in part, it is necessary to decide whether they are physically interconnected and whether they shall be adjudicated and administered separately or together.
6. Supervision of extractions of groundwater. Supervision over the extraction of groundwater begins when it appears that the water supply in a defined area is overdrawn, or is about to be overdrawn or dangerously polluted. Investigations and hearings are held by the state agency to determine whether corrective controls are required. Control of groundwater diversions in a critical area generally takes the form of closing the area to further appropriation while the critical condition persists, and of restricting current withdrawals in the reverse order of priority.
7. Changes in the exercise of groundwater rights. Most of the appropriation statutes allow a prior appropriator to abandon his original well or original use and transfer his rights to another well or use if no injury will result to the holders of other rights.
8. Loss of groundwater rights. Provision is generally made for loss of groundwater rights by forfeiture for non use over a prescribed period of years.

Other than Arizona, Texas is the only western state which has enacted extensive legislation controlling the diversion and use of groundwater not based upon the doctrine of prior appropriation. The Texas statute authorizes the creation of underground water conservation districts. The purposes of these districts are the conservation, preservation, protection, recharging, and the prevention of waste of groundwater. They may issue bonds and levy ad valorem taxes. Subject to the rules and regulations of the district, for the purpose of preventing waste, the English rule of ownership by the landowner is recognized and priorities and provisions of the surface water laws do not apply.

California's courts have held that the use of percolating groundwater in that state is subject to the "correlative rights" doctrine (24). Under this system, in times of shortage an individual user is entitled to "only his reasonable share" of available water. By statute, the state has declared that he will not lose his right to that share because he has been using some alternate supply of water (25). The statute also requires annual reports to be filed with the State Water Rights Board. The only Montana legislation requires filing of logs of all wells drilled. Nebraska merely provides for registration of irrigation wells, minimum spacing between irrigation wells, and preferential uses.

In this brief survey of the groundwater law of the other western states we are attempting to draw from the experience of those states in determining what future groundwater legislation is necessary in Arizona. In general 12 of the 17 western states have effective codes which are based on the appropriation doctrine and are continually being updated. The remainder of the western states place little control or regulation on the diversion or use of groundwater.

While the appropriation statutes are in effect in approximately 70% of the western jurisdictions with which we are concerned, the aggregate area irrigated with groundwater in these states is extremely small as compared with the total for the west. Considering relative irrigated acreage according to the Bureau of the Census the 12 states that have appropriation statutes governing percolating waters are included in the 13 states with the smallest total acreages of land irrigated from pumped wells (26). Therefore, it appears that the trend toward adoption of appropriation type statutes is effective in only those states which have enacted legislation prior to extensive development of agriculture. This trend may effect the other western states in the near future. However, it seems more likely at this time that groundwater legislation in those states will proceed along lines other than priority of appropriation.

Arizona's Projected Water Needs And Public Reaction

Before one can propose legislation to regulate groundwater two additional things must be considered. First, the projected water needs of the state of Arizona, and second, the reconciliation of the different public interests involved in this type of legislation.

Arizona has one of the highest rates of population growth in the United States. Estimated population in 1969 was 1,692,000. Future projections indicate that population will reach 2.1 million by 1980, 3.3 million by 2000, and 5.5 million by the year 2030 (27). The U. S. Geological Survey estimates that presently the total consumptive use of water in Arizona is 7.0 million A.F. annually. Of this amount an estimated 2 million A.F. is surface water. The remaining 5.0 million A.F. is pumped from groundwater sources. Since the estimated annual recharge is 1.0 million A.F., the overdraft on the groundwater reservoirs is 4.0 million A.F. per year (28). With the projected population increases stated above, it is easily seen that the water shortage in Arizona will reach crisis proportion unless remedial action is taken.

Of the 7.0 million A.F. of water consumed annually, 5.5 million A.F. is devoted to irrigation. It has become increasingly obvious that "...acre for acre, domestic uses consume less water than agricultural uses. However, as more presently unirrigated desert areas are developed, the demand for water in these more than compensates for any additional water released from agricultural use" (29). It should be noted at this point that demand for water is increasing not only in absolute terms but also in terms of per capita use. Perhaps the most important reason for this increase is the demand for more water for recreation purposes. While some might argue that recreation is not of primary importance, there can be no doubt that recreation is accepted as a legitimate use of water and that such use will increase in the future.

The most likely source of water from outside the state is the Colorado River. Congressional approval for the Central Arizona Project was finally given in 1968 (30). Present estimates are that this system will deliver approximately 1.2 million A.F. of water for use in Central Arizona (31). This amount is not nearly as much as the present overdraft of the groundwaters with no guarantee that groundwater pumping will actually be reduced. Also, assuming that the C.A.P. will be of great benefit to the state it should be realized that even the most optimistic projections show that the project will not be completed before 1980. Arizona's groundwater problem is an existing reality which should be dealt with as quickly as possible.

Of major importance is possible public reaction to any new legislation. Protection of private rights in property is unquestionably a matter of public concern. Constitutional guarantees are invoked in securing the individual's rights. However, the Arizona Supreme Court has held that a significant public interest such as the need for efficient use of a rapidly depleting groundwater supply takes precedence over the property interests of the individual (32). The water shortage in Arizona has reached such proportions that it is necessary for all the people of the state to begin taking an overall look at the problem rather than focusing on their own individual needs. Not until this realization is made will the state be able to most efficiently balance the direct and indirect benefits to the community.

Conclusions And Proposed Legislation

Arizona's first solution to its groundwater problem was the Groundwater Code of 1948. It would be inaccurate to say that this Code was completely ineffective. The Code was effective in that it brought about the stabilization of irrigated acreage in Arizona and in so doing stopped the increasing rate of overdraft. This would have been fine except for the fact that in 1948 there was already a substantial overdraft on groundwater reservoirs. Although groundwater pumpage has remained relatively stable since the enactment of the Code, the then existing overdraft has sent pumping levels lower and lower.

The following statement by Dean E. Mann summarizes the problem:

"With the legal issues apparently settled there is little interest in altering basically the existing legal and administrative arrangements involving groundwater. Farmers will continue to pump until it is economically no longer feasible to do so, or until they receive

offers sufficiently attractive to induce them to sell their water rights. Meanwhile, new lands are opened up without restriction and with the eventual danger of overdevelopment. Groundwater laws have perhaps prevented the expansion of agriculture and further overdevelopment of land dependent on groundwater, but they have not redressed the serious imbalance of withdrawal and supply that existed before the laws were put on the statute books" (33).

It is our conclusion that additional legislation relating to the groundwater problem is necessary. There are substantial areas in Arizona which, unless some change is made, will be out of water in the near future. Therefore, the remainder of our paper will be devoted to proposed legislation.

Initially it should be realized that new groundwater legislation will not necessarily have an immediate effect on all groundwater pumpers. There are some areas in the state that need immediate relief, but the main purpose of any additional legislation would be in its future effect. The primary failing of the Groundwater Code as it stands now is that there is no way to stop an overdraft once it begins. Future legislation should be aimed at stopping an overdraft problem before it becomes critical, in addition to regulating pumpage in those areas where there is already an overdraft. Ideally the goal is that groundwater pumpage in a particular area will be no greater than the amount of recharge.

Procedurally there are two ways that new groundwater legislation can be put into effect, either by amending the present Groundwater Code or by completely repealing the old Code and starting anew.

We feel that although the present Groundwater Code was not strong enough, it was satisfactory as far as it went. Therefore, it is believed that strengthening of the present code is all that is necessary.

There have been proposals before the legislature of Arizona providing for the centralized control of all matters dealing with water. We feel it is of primary importance that any future groundwater legislation be incorporated into this type of program.

The authors feel that there are two major alternatives available to the legislature of Arizona to meet both present and future groundwater problems. These alternatives are: 1) A system of prior appropriation, and 2) A system involving pro-rata cutbacks. These systems are similar in some respects and each involves advantages and disadvantages which must be considered. It should be pointed out that the two proposals are offered merely as individual frameworks upon which future legislation can be based. We do not purport to resolve all the minor technicalities that would be encountered in any such legislation. Instead, our proposal is to investigate the major difficulties involved in each system.

Prior Appropriation System

As stated in Section IV. by far the majority of western states control their groundwater pumpage through a system of prior appropriation. Therefore, it would seem appropriate that Arizona should consider this type of legislation

for its own groundwater problems. However, it was also noted in Section IV. that the states which have enacted prior appropriation legislation in dealing with their groundwater problems are the states with the least amount of land irrigated with groundwater. In other words at the time those states adopted this system, their agricultural development dependant upon groundwater was practically non existant. Therefore, the prior appropriation system did not affect preexisting rights. Consequently, Arizona's problems in enacting this type of legislation would be quite different and more complex.

So, it appears that no state has ever applied prior appropriation retroactively. For such a system to effectively solve the groundwater problem in Arizona, it would have to be applied in that manner, because application to future users only would in no way eliminate present overdrafts.

There are constitutional problems which arise when this type of system is applied to rights already in existence. As the law now stands in Arizona a landowner has a right to the reasonable use of groundwater upon his land (34). However, in Southwest Engineering Co. v. Ernst the Supreme Court of Arizona held that the State could deny the landowner this right if his land lay within an established critical groundwater area, thereby upholding the constitutionality of the 1948 Code. It should be noted that the policy enumerated in that case was that there is sufficient public interest to allow the placement of the rights of present groundwater users above the rights of future users. In order for a prior appropriation system to have the needed effect on Arizona's groundwater shortage, it would be necessary that the court be willing to go even further and allow the rights of some present users to be subordinated to the rights of other present users, keeping in mind that under present law these rights are equal. In other words in Southwest Engineering the court was willing to divest an owner of rights not in use, whereas here the court would be required to discriminately take away rights that are being used.

Even assuming that these constitutional problems can be overcome, difficult administrative problems would remain. Due to the fact that agriculture in Arizona makes extensive use of groundwater it would appear that the initial determination of the prior appropriators and the extent of their rights would present an almost insurmountable problem of adjudication and administration. This is true even though all wells in the state are required to be registered under the Code. Adjudication would still be necessary because the Code did not require the dating of wells existing before 1945. This would have to be done before any priority of rights could be established.

Another problem in applying any groundwater legislation is the determination of how much water is actually available in a certain area. Unless this information is obtainable the decision of when to cut back junior appropriators will be difficult. However, if the advances of engineering and hydrology allow accurate determination of the available water supply, the prior appropriation system would offer a reasonably definite method for regulating groundwater pumpage. However, one should realize the difficulties encountered when trying to determine if pumpage by one party is actually damaging another party's well.

Arizona statutes already provide that all water, other than percolating water, are subject to prior appropriation. In order to enact this type of legislation an amendment to the present statute to include percolating water would be necessary. However, it should be made clear that appropriations of percolating water will not be affected by appropriations of other waters.

Recent litigation in Arizona has pointed out that it is necessary that some system be adopted which will allow municipalities to transport groundwater away from the land on which it is pumped. The "reasonable use" doctrine as it is now applied in Arizona does not allow this because it is said that the right to reasonable use of the water is appurtenant to the land. The advantage of the prior appropriation system is that it usually does not matter where the water is used as long as it is put to beneficial use. However, at least some states have added the further requirement that the water cannot be taken out of the groundwater basin from which it is pumped.

In concluding the discussion of this type of system, it is the opinion of the authors that, although prior appropriation might have been the most desirable method if it had been enacted earlier in Arizona's history, at this point in time the practical difficulties encountered make this system less desirable than the other proposal.

System Involving Pro-Rata Cut-Backs

This type of system would provide for an equal reduction on each irrigation pumper upon a finding by the state agency that the water shortage in a given area had reached sufficient proportions. In other words, if there is a critical overdraft in a given area the problem will never be solved by merely prohibiting the drilling of new wells. Once the amount of groundwater pumpage exceeds the amount of recharge the only way the situation can be remedied is by decreasing the amount of pumpage. Since, as we stated previously, the present groundwater code operates satisfactorily within its limits, there is no reason why such a cut-back system could not be implemented within the present setup.

At the present time if an area is declared a critical groundwater area, the state agency is given only the power to restrict the drilling of new irrigation wells. The critical groundwater area method would continue to be used, but this system would give the state agency additional steps to take where the present Code is ineffective. These additional steps would allow the agency, upon the creation of a critical groundwater area, to not only prohibit the drilling of new wells, but also to either, 1) require that all present pumpers maintain the status quo, or 2) require that all present irrigation pumpers in a critical area equally reduce their groundwater withdrawals.

Besides these additions to the Code we propose that it is also necessary that municipal and industrial users be exempted from only the cut-back provisions. However, all other prohibitions should be applied equally to all users. To meet the demands of a growing population provisions should be made for allowing M & I users to purchase groundwater rights. While the cut-back system offered will have its heaviest effect on the agricultural sector, we do not feel that the entire burden should be placed upon the farmers. In times of water shortage, if M & I users need more water it would be more beneficial to the state

if they are required to purchase that water from present users, rather than taking more water out of the ground themselves. In order to implement these provisions it would be necessary for the legislature to declare groundwater rights severable from the land so that the M & I users would not have to begin speculating in land, but would be able to transport the water off the land from which it is pumped. This would be in line with the 1962 Surface Water Law Amendment A.R.S. SEC. 45-172 which provides that surface waters are no longer appurtenant to the lands for which they were originally appropriated.

In A.R.S. SEC. 45-301, "critical groundwater area" is defined as any area "not having sufficient groundwater to provide a reasonably safe supply" to meet the current demands for irrigation. Past history shows that this definition is too indefinite and does not provide a sufficient basis for action by the state agency. It is recommended that clear guidelines be set out by the legislature to enable quick and responsive action to groundwater shortages. Acting on this more detailed definition, the state agency will be able to act in the public interest and apply the prohibitions outlined before the groundwater withdrawals equal crisis proportions.

Not only must there be a sufficient public interest in utilizing the cut-back system, but also the cut-backs themselves must be reasonable and carried out in the least injurious manner possible. Therefore, we recommend that limitations be placed upon the severity of the cut-backs so that, for example, the maximum cut-back would be 10 percent of each individual's average amount of pumpage and no further cut-backs can be declared until five years had elapsed. Also, it should be provided that no cut-backs can be enforced until the individual has been given one year notice. The penalties provided in the present groundwater code are sufficient to bring about compliance with the proposed amendments.

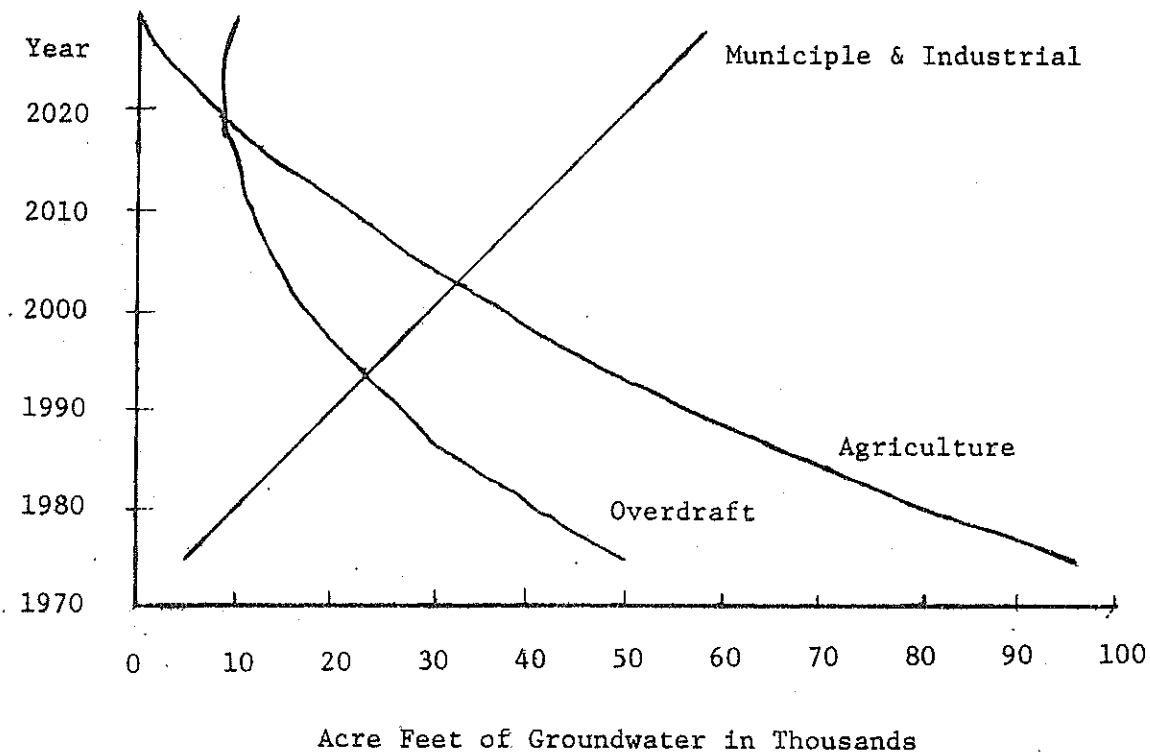
While it is conceded that a 10 percent cut-back on certain marginal farms would force the discontinuance of operations, the majority of farmers would be able to withstand the cut-backs by making more efficient use of the smaller amount of water. After the initial five-year period, if any additional cut-backs are necessary, the groundwater user will have sufficient warning to convert to lower use crops or take other steps if necessary.

Before a cut-back system can be effectively administered it will be necessary for all groundwater pumps to be accurately metered in one manner or another. This will enable the state agency to obtain the information necessary to both decide whether a cut-back is necessary and to enforce the cut-back once it has been declared. The metering of all pumps and the addition of personnel to read those meters would appear to be quite expensive. However, this expense would certainly be justified in light of the water saved and the additional accuracy of this type of information.

The following examples A and B, illustrate the use of the cut-back system:

A. This is a hypothetical area in which the groundwater shortage is such that in 1974 annual pumpage is 100,000 A.F. with only 50,000 A.F. annual recharge. This area has already been declared "critical" under the present code. Assuming a cut-back system has been enacted, the following table illustrates its effect on this hypothetical area

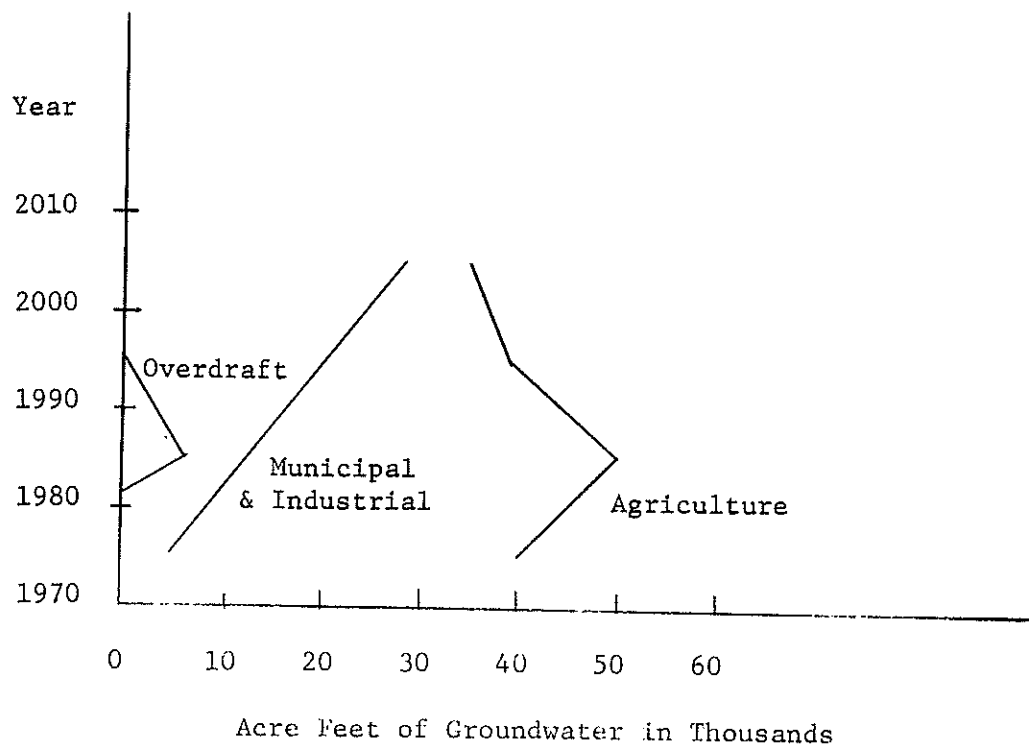
<u>Year</u>	<u>M & I Pumpage</u>	<u>Agri. Pumpage*</u>	<u>Annual Amount of Cut-Back (10%)</u>	<u>Annual Overdraft</u>
1970-74	5,000	95,000	---	50,000
1975-79	10,000	81,000	9,000	41,000
1980-84	15,000	68,400	7,600	33,400
1985-89	20,000	57,060	6,340	27,060
1990-94	25,000	46,854	5,206	21,854
1995-99	30,000	37,669	4,185	17,669
2000-04	35,000	29,402	3,267	14,402
2005-09	40,000	21,962	2,440	11,962
2010-14	45,000	15,266	1,696	10,266
2015-19	50,000	9,239	1,027	9,239
2020-24	55,000	3,816	423	8,816
2025-29	60,000	-	-	10,000



B. This is a hypothetical area in which the annual groundwater pumpage does not yet exceed the annual recharge of 50,000. The area has not yet been declared "critical".

<u>Year</u>	<u>M & I Pumpage</u>	<u>Agri. Pumpage*</u>	<u>Amount of Cut-Back</u>	<u>Annual Overdraft</u>
1970-74	2,000	40,000	-	-
1975-79	4,000	45,000	-	-
1980-84	6,000	50,000	-	6,000
1985-89	8,000	45,200	4,800	3,200
1990-94	10,000	38,880	4,320	-
1995-99	12,000	36,880	-	-
2000-04	14,000	34,880	-	-

* The figures in this column assume that after the designation as a critical groundwater area, all M & I pumpage increases result in an equal reduction of agricultural pumpage.



It can be seen from example A that in an area already experiencing an extreme groundwater shortage, cut-backs in this manner may never completely halt the overdraft. However, we don't believe this means the system is a failure. A major aim of any new groundwater law in Arizona is to gain time to plan and develop new sources of water. Also, it should be noted that we have assumed this area to be one in which there are rapidly increasing M & I uses. The system would be more effective in an area where M & I uses are relatively stable because in our proposal M & I uses are exempt from cut-backs.

Example B shows that this system would effectively control groundwater problems in areas which are not presently experiencing overdrafts. Although this system might seem overly harsh on agricultural users, it must be remembered that any increased uses of groundwater by M & I must be purchased from irrigators. Under the present Code M & I users are allowed to increase groundwater pumping without regard to the injury to agricultural users from lowering groundwater tables.

In the discussion of the proposed prior appropriation system it was noted that there are difficult constitutional questions raised when the state attempts to give priorities among agricultural water rights which were equal before passage of the act. In a system of pro-rata cut-backs these water rights are subordinated to the public interest on an equal basis, thereby eliminating the equal protection argument. As long as the guidelines set out by the legislature are reasonably calculated to bring about cut-backs only when there is a definite public need, any claims of denial of due process must fail. An individual's rights will be subordinated if there is sufficient public necessity.

In the case of a possible cut-back in an over-developed area the users of that area should be given some voice in the determination of the necessity for and the amount of that cut-back. This could be done by adopting provisions similar to A.R.S. SEC. 45-308 allowing initiation of proceedings by a certain percentage of the users in the area.

As under the present system, cut-backs would only be utilized as long as necessary. The rights of the groundwater user would not be permanently decreased. If at a later point in time, additional waters become available or other circumstances warrant it the cut-backs could be removed.

With the law and water rights in the state of Arizona as they are now, the authors feel that the pro-rata cut-back system is the most desirable method available to meet the groundwater problem. The equality of application is by far superior to that offered by the prior appropriation system. Under this system the difficult task of dating water rights would be eliminated. The current distinction between percolating waters and other groundwaters would be maintained thereby precluding inevitable litigation. To our knowledge, no other jurisdiction has attempted a pro-rata cut-back system and therefore, Arizona would be in the enviable position of being able to develop its own rules for its own problems.