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HISTORY OF IRRIGATION  
BY PUMPING FROM WELLS IN COLORADO

by  
Carl Rohwer  
May 25, 1953

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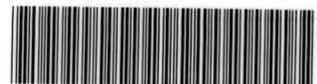
History of Irrigation  
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Irrigation in what is now Colorado was probably first practiced by the Cliff Dwellers who lived in the southwestern part of the State some time before 1400 A. D. The date is uncertain. So far as known, the Cliff Dwellers did not use wells for irrigation, but they did use the underground water from springs to irrigate their crops. In Arizona and New Mexico remnants of the canal systems built by the Cliff Dwellers are still visible. Some of them were major works even by present standards. In Colorado the canals built by these early irrigators have long since been obliterated, but they must have existed because it is inconceivable that so large a population could have lived in that arid land without irrigation.

Sporadic attempts were made to irrigate land in Colorado prior to 1850, usually in connection with trading posts established to supply the needs of trappers. The only records available regarding these first projects are the diaries of travelers whose mention of irrigation was incidental to their reports which dealt chiefly with other matters. The contribution to irrigation made by these pioneers was probably insignificant. They established no permanent settlements and with the decline of the fur trade they abandoned the posts and allowed the land to revert to its natural state, but they did establish the fact that irrigation could be successfully practiced in Colorado.

It is interesting to note that as early as 1844, Antoine Janis had established a claim at the mouth of the Poudre River, 8 miles northwest



from here at what is now La Porte. The tract he chose is a flat area bordering on the Poudre River from which he diverted water to irrigate his land. However, there is no record of when he actually started to irrigate his claim.

The first organized attempt to irrigate a substantial area was made by a Mexican Colony in the San Luis Valley in 1852. They built the San Luis Peoples Ditch which diverts water from the Culebra River. The priority for this diversion, which was established by the court of adjudication, is dated April 10, 1852. Many diversions were made from the streams in the San Luis Valley in the 10 years immediately following. No mention is made of the use of ground water to supplement the supply of water for irrigation although shortages must have occurred. They apparently did not know that much of the San Luis Valley was underlain by an almost inexhaustible supply of artesian water.

During the late Fifties substantial progress was made in the development of irrigation on the east slope of the Rocky Mountains. This development was stimulated by the discovery of gold in Colorado in 1858. Many filings along the Arkansas and South Platte were made in 1859 and 1860. The projects built during this period were all relatively small. No major irrigation structures were required. The canals were short and a brush and rock dam usually sufficed to divert the water into the canal. Very few of these diversions have been abandoned. Enlargements have been made from time to time until what was once not much more than a furrow diverting water from a stream is now the canal system that extends many miles and irrigates thousands of acres.

From 1860 to 1870 there was a gradual increase in irrigation in Colorado but mining was still the dominant industry. However, the establishment of the Greeley Colony in 1870 and the successful operation of this project, gave tremendous impetus to irrigation. Most of the irrigation projects now in operation in Colorado, were built in the 20 years immediately following. Some of the promoters of these projects were over enthusiastic about the extent of the water supply and as a result serious shortages of water developed on some streams. To correct the situation many storage reservoirs were built in the Eighties, to impound the winter flow of the streams. Nevertheless shortages of water still occurred on some projects during periods of low stream flow in dry years. It was at this time that attention was first given to the development of ground water by pumping to supplement the supply of water for irrigation.

Although so far as known, no attempts were made to use groundwater for irrigation by the pioneers, the possibilities of its use were recognized as early as 1870. Horace Greeley, the promoter of the Greeley Colony wrote as follows in an editorial that appeared in the New York Tribune in 1870: "Whosoever lives beyond the close of this century, and shall then traverse our prairie states, will see them whitened at intervals by the broad sails of windmills erected over wells, where every gale or breeze will be employed in pumping water into ponds and reservoirs, so located that water may be drawn therefrom at will and diffused in gentle streamlets over the surrounding fields to irrigate and impel their growing crops". As you can see, Greeley was a master of English as well as a successful promoter. I particularly like "and diffused in gentle streamlets over the surrounding fields", as a description of the hard shovel work of irrigation.

The use of windmills to pump water for irrigation as envisioned by Greeley, was not so fantastic as it seems today. As late as 1910 there were still many plants in Eastern Colorado pumping water from wells by means of windmills to irrigate small tracts. In fact windmills were practically the only sources of power available in remote areas in those days. In the Experiment Station Report for 1901 is a statement that the settlers in the Cheyenne Wells area started irrigating gardens about 20 years previously. This would indicate that windmills were being used for irrigation by pumping from wells in the early Eighties. However no definite dates are given. From about 1906 to 1910 the Office of Experiment Stations of the U. S. Department of Agriculture conducted experiments at Eads, Colorado, on windmill irrigation. Apparently the experiments were not successful because the station was soon abandoned. Although pumping for irrigation with windmills did not prove feasible, except for gardens, many people evidently thought that Horace Greeley's idea was worthy of a trial.

The first well that was put down for the purpose of developing water for irrigation by pumping of which there is a definite record, was dug by E. F. Hurdle in 1885, in the Lone Tree Valley east of Eaton. He put down two other wells in the same area, all of which were successful. These wells were pumped with steam engines and centrifugal pumps. Each well was capable of supplying water for from 80 to 100 acres. One of these wells was 30 feet deep and extended 20 feet into the water bearing gravel. This is quite remarkable when you take into account that these wells were at least 16 feet in diameter, with the cribbing made of short pieces of 2" x 6" lumber laid horizontally in the form of a circle. Since there was a 2-inch gap between alternate 2 x 6's the frictional resistance of the crib must have been tremendous.

One of these wells was still in use in 1917. At that time the well was equipped with two 6-inch centrifugal pumps but apparently they were not operated simultaneously. Two farmers got their water from the well and each one had his own pump. I tested one of the pumps in 1917 and as I recall, it was delivering about 600 gallons per minute. I had hoped to visit the well this spring to see whether it was still in use, but I was informed that it had been filled in, not because it had failed, but because it was right on the line of a new highway.

The success of these wells stimulated interest in the development of ground water. In 1887 it was accidentally discovered that the San Luis Valley was underlain by artesian water. There are many artesian strata in this Valley, some shallow and some deep and they vary widely in yield. Some flows are heavy enough to provide water for irrigation. The first records of use for this purpose date from 1889. These records indicate that one well would supply water for about 20 acres. Pumping of artesian wells was not resorted to until a much later date. I do not know when pumping was first attempted, but a survey in 1927 showed that there was only one well being pumped at that time. Since then there has been a tremendous increase in pumping and at the time of the last U. S. Census, 1950, there were nearly 24,000 acres being irrigated by pumping from wells in the Valley.

Although the Valley of the main stem of the South Platte is underlain by a thick layer of water bearing gravel there is no record of its use for irrigation by pumping prior to about 1910. A survey in 1912 by the State Engineer of Colorado showed that there were 73 irrigation wells in the South Platte Valley nearly all of which had been drilled in 1911 and

1912. From 1910 to 1933 there was a gradual increase in the use of wells in this area. The latter part of this period was the beginning of the long drouth in Colorado.

An acute shortage of water for irrigation soon developed and as a result, lands formerly irrigated lay fallow or where crops were planted they dried up for lack of water. Pumping from the great reservoir of stored water beneath the area was the only source of additional water. Wells were put down as quickly as possible and pumps were installed to help alleviate the critical water shortage. Thirteen hundred wells were drilled in the period from 1933 to 1940. The water from these wells supplied the deficiency and made almost normal crop production possible during the dry years.

A survey made by W. E. Code in 1940 for the Colorado Agricultural Experiment Station disclosed that the number of irrigation wells in the South Platte Valley in Colorado had increased from about 700 in 1933 to nearly 2,000 in 1940. But when the drouth ended the development of the groundwater supply did not stop. Thirteen hundred more wells were drilled from 1940 to 1950, according to the last U. S. Census, and in 1950 there were 3,335 wells in operation. Two thousand eight hundred and thirty-seven of these wells were equipped with electric motors. The area irrigated by pumping from these wells was 194,000 acres, approximately one-fifth of the land irrigated in the Valley from all sources.

A summary of the data on irrigation in Colorado from 1900 to 1950, based on the U. S. Census Reports, is shown in the accompanying table. The increasing importance of pumping from wells for irrigation is clearly indicated. In the ten years from 1940 to 1950 the number of wells and the

Summary of statistics on Irrigation  
for Colorado from 1900 to 1950  
(U. S. Census Data)\*

Drainage Basin	Unit	Year					
		1900	1910	1920	1930	1940	1950
Pumped Wells							
Total	Number	40	121	527	654	2,878	4,988
South Platte	"	"	79	283	457	1,980	3,335
Arkansas	"	-	38	243	194	449	739
Rio Grande	"	-	0	0	1	433	827
Area irrigated by pumping from wells							
Total	Acres	-	3,100	26,457	22,400	176,000	325,000
South Platte	"	-	-	-	-	-	194,000
Arkansas	"	-	-	-	-	-	23,000
Rio Grande	"	-	-	-	-	-	24,000
Area irrigated from all sources							
Total	Acres	1,600,000	2,800,000	3,300,000	3,400,000	3,200,000	2,900,000
South Platte	"	-	-	1,180,000	1,220,000	1,100,000	930,000
Arkansas	"	-	-	640,000	560,000	470,000	460,000
Rio Grande	"	-	-	520,000	550,000	630,000	590,000
Electrically driven pumping plants for irrigation							
Total	Number	-	-	-	-	1,088	3,911
South Platte	"	-	-	-	-	902	2,837
Arkansas	"	-	-	-	-	114	527
Rio Grande	"	-	-	-	-	55	449

\* The method of reporting data varies with each census and therefore the figures given for the different years may not always be comparable. Some of the apparent inconsistencies in the data shown in the table may be due to this cause.

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acreage irrigated has nearly doubled. It would have been interesting to report how much water was actually pumped but the data collected by the Census Bureau are incomplete and cover only the enterprises reporting. Some idea of the amount of water pumped can however, be gained from the

study of the South Platte made by Code in 1940. He reported that the total pumpage from wells in 1940 was 220,000 acre-feet - approximately one-third of the quantity available from stream flow in the area. Power consumption was 15,340,000 kilowatt hours.

The tremendous increase in pumping from wells is not without its dangers. The supply of underground-water is not inexhaustible. Vast areas in other states have been overdeveloped with the result that pumping lifts have become excessive and some areas have had to seek additional sources of supply, often at great expense. Long range pumping plans should not contemplate depleting the groundwater basin at a rate greater than it is recharged. The water stored underground is a reservoir to be drawn upon in times of need. A carefully planned development will provide water for an area based on the capacity of the basin and it will hold in reserve sufficient storage to take care of the emergencies that arise during periods of drouth when the demand for water is excessive. By proper conservation practices these objectives can be attained with the result that no areas will have to be abandoned in the future because we have over-developed the ground-water supply.

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