

The Water Problem

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About the beginning of the present century a change of climate and weather was in the making but at that time the change was not noticeable and such variations were assumed to be the usual and natural fluctuations of the ^{dry years} warm and ~~wild~~ wet ~~and~~.

Those of us who have resided in various parts of the West over the past 50 or 60 years can look back to the years of the late '90s and recall the then existing winters and summers as compared with our present experiences.

During my boyhood days, living on a mountain ranch some 16 miles west of Golden, Colorado, I put in lots of days farming our small fields of grain and potatoes and other crops. These acres were "dry farming^{ed}" and on our place, about 1897, we raised potatoes that weighed 4 and 5 pounds apiece, 40 bushel wheat and 60 bushel oats and mountain garden truck, turnips in large fields did remarkably well. Such crops were grown some 60 years ago and now we find these old fields abandoned and scarcely little or no farming is practiced. During the '90s mountain meadows of natural grass were cut and stacked in the field or stored in the barn for winter feed. One can hardly realize that the lush crops of former years are apparently a thing of the past.

I came to Fort Collins the first week of September, 1899 and entered College as a preparatory student to become a full fledged freshman, fall of 1900. The weather then in Fort Collins was much the same as at my mountain home - cold with

considerable snow and ice. As a student at the College, at the turn of the century, it was the usual thing, almost without exception, for us to go skating on Sheldon's Lake or near by ponds on Thanksgiving Day and we would enjoy this sport until late February. Skating these days is hardly possible until the Christmas holidays or some time in January and then for only a short time. These things are cited from personal experience to indicate that we now have a very different climate from that of 50 years ago. On Dec. 19th, 1954, $\frac{2}{3}$ miles east of Loveland, by chance, I found a boy swimming in the Greeley-Loveland Canal, well we couldn't have done this fifty years ago.

Our weather is changing and unfortunately in the wrong direction. Only during the past few years have we become conscious that something is going wrong and each year, ^{especially} just at present, we are becoming more alarmed about the water supply. In view of what is known at present we can conclude that mean temperatures are increasing and precipitation is decreasing. The reason for this appears to be an astronomical effect that may continue for several years to come. Heavy rains, floods and lower temperatures prevail in some parts of the United States and therefore the conclusion is immediately drawn that again our western area will be wet again. We can have a wet year in 1957 but since the effect is moving adversely it is very probable that the drought with us will

continue and likewise, for instance, the eastern part of our country, will gradually become drier. There is evidence at this time that this change has been going on for a considerable time where the world weather is causing a rise in ocean temperatures and wind direction in the two hemispheres. The biological aspect of this change is interesting. In former years cod fish off the west coast of Greenland was scarce but for the past five years ^{also} record catches have been made of this specie of fish, likewise tuna formerly was a rare visitor off the coast of Bergen, Norway but of recent years the tuna industry has become a large economic factor of the this country, other semitropical fish of various sorts are now found further north of their usual habitat, Insects, animals, plants and man himself are drifting northward. This phenomenon as dictated by nature can scarcely be recognized as a chance event. The change is slow and persistent and it could not be expected that tomorrow will be the turning point for the better, this situation can be best illustrated by an enormous pendulum possessing massive inertia too suddenly stopped to be swung in the opposite direction. The arctic ice cap is gradually being dissipated to cause a rise in the sea level, the glaciers are retracting in some areas and the reports indicate a stable condition or possibly some addition, but on the whole melting exceeds ice accumulation.

Now let us see what is happening in our immediate area. A brief inspection trip down the South Platte Valley to Fort Morgan a few days ago revealed a rather startling water supply situation. I was informed by Water Commission geologist Samplers that the return flow to the river is at low tide and his statement was further corroborated earlier by Carl Metzger, who farms at Julesburg, in the fact that up to about three years ago the return flow in the river was sufficient for direct irrigation up to about July 1st and afterwards to draw from the Julesburg Reservoir to finish the season. For these past few years the river supply ^{flow} dwindled to the extent that the reservoir storage had to be withdrawn early in May. ^{Samplers} who administers the river in Dist. No 1, Kersey to Balzac, finds it necessary to call for water from the upper districts to supply the older ditch rights that until recently was more or less amply supplied by return flow in his district. During 1932 and '33 I assisted the Bureau of Reclamation in preparing the economic report covering the Colorado-Big Thompson Project. The question of evaluating the water supply for the project brought into the picture the extent of return flow to the South Platte resulting from the application of about 300,000 acre feet over the irrigated area in the Poudre, Thompson, at Vrain, Boulder and Upper South Platte farming districts. The matter of return flow has been investigated since the early 1800s

and these past records strongly indicated a more or less steady increase in the return flow to the river. Our conclusion was that about one-third of the season use of 300,000 acre-feet in direct irrigation would result in some 100,000 acre feet in the return flow. Well, here we are in 1956, some 23 years later and we find that seepage return is practically nil. This situation can be partly explained in the fact that throughout the South Platte valley, more particularly the area north and south of the river between Kersey and Julesburg, more than 4000 irrigation wells ^{are being} pumped to deliver enough water to fill Horseshoe Reservoir four times during the season of 1955. Capacity of this reservoir is 146,000 acre-feet. Also the pumped wells in the Lodgepole valley, near Julesburg, have delivered enough water to fill the Julesburg Reservoir three times in one year. Capacity of this reservoir is 28,000 acre-feet. It appears obvious that we cannot continue this practice of depleting the underground reservoir at the present rate. It is estimated that we are pumping this water out at a rate ten times faster than the water table can be replenished. The depletion of the return flow to the river is going to have a marked effect upon the junior irrigation rights along the tributary streams, such as the Fowler, Thompson, St Vrain, Boulder, Clear Creek and Bear Creeks, by cutting off these rights to supply senior rights along the South Platte.

Wherever about the State the water situation is

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becoming acute. Stream flow practically everywhere is extremely low and in the southwest part of the State a few towns are without a water supply. The Rio Grande, ^{in the} San Luis Valley, is at a minimum stage. The largest irrigation canal in Colorado, the Rio Grande Canal, capacity 1,700 second-feet, fairly early right, has carried only 2 second-feet since about July 15th. This canal heads near Del Norte. The Farmers Union Reservoir near Creede, was drained out early in June and the canal ^{supplied by this} reservoir in the valley near Monte Vista, has been dry all summer. Some of the artesian wells in the valley are dry and about the only water for irrigation is from pumped wells. There is a possibility that pumping will lower the water table to the point where many wells will be abandoned as dry or uneconomical to secure a water supply.

In some areas in the valley farms were not seeded this spring because of the water supply outlook. Municipal water supply for some of our cities is critical.

Colorado with its many desirable characteristics such as an agreeable climate, immune from destructive tornadoes, hurricanes, floods and overcast weather, altitude to modify excessive temperatures, and add up with other desirable features, induce people to migrate to our State as permanent inhabitants. The population is growing at a steady pace which means more and dependable water supplies to meet our needs.

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Examining the water problem we find the curve representing the population is rising and the curve showing the water supply is gradually dropping. As the years move on these two curves get further apart which indicates the serious situation we are approaching. People are in the move to live in Colorado, farmers are to be supplied with water, industry is expanding to use more water and we are going down hill on water supply. In an extended interview with Gen. Samuel B. Sturgis, Chief Engineer of the U.S. Army, was asked the question "Will water become scarce?" His answer was simply Yes.

What are we going to do about this problem? Let us go back and get some idea of what is taking place, New England, according to past records, averages three hurricanes per century, during the past two or three years this area has suffered three such storms, Carol, Edna and Diane, all destructive. During 1955 there were 870 tornadoes that swept across the United States. Our present water consumption for the country as a whole is some 200 billion gallons per day. It is estimated that by 1975 the consumption will be 450 billion gallons or 1.7 times more. The population of our country, 1958, was almost 168,000,000, increased by 2,14,000^{for the year} which is 1.3 percent. At this rate by 1975 our population will be approximately 220,000,000

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Many theories have been advanced as to the cause of the change in weather. Some scientists feel volcanic dust explains in part why it is a disturbing factor; sun spots, which are variable is chiefly the reason. Since the spots increase and decrease in a more or less uniform pattern every eleven years it is assumed this variation influences the weather. It probably has some effect. Carbon dioxide gas in the atmosphere is at present a tremendous quantity, 235 billion tons. We are now adding 10 billion tons per year every time you drive your car around the block you make a contribution of this gas to the atmosphere. This gas together with ozone, water vapor and other gases at high altitude retards the radiation of heat from the earth's surface which increases the temperature of the air somewhat in the nature of the glass roof on a greenhouse. These various natural effects have been known for a long time but since man has little or no control we can only bend our efforts in the direction of safe guarding ourselves in the best possible manner. At the moment there does not appear to be a solution to this problem. Thank you for the privilege of discussing this interesting situation with you, ^{it is} always a pleasure to attend Rotary.