

## WATER AND THE WEST

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The Western part of the United States is a land of contrasts. It houses a growing economy and population that will stop at nothing to co-exist with but also use the natural environment around it to get what it wants. The West also contains a parched but beautiful landscape that can seem endless or at least until the next mountain range. The hard currency that is used in every aspect of politics and economy is water. The people that have the water rights are powerful and wealthy because the West is arid and rain does not come very often. I want to discuss the reasons why water is important to the West, why the West is so arid, where the water accumulates, the users of water, and some ways people are dealing with the scarcity of water.

### •WHY IS WATER IMPORTANT TO THE WEST?

Before I explain the reasons why the West is so dry and describe the users of water and what is being done about water today, I want to explain explicitly why water is becoming so precious and important to people today. In the American West today, humans are facing a problem that they in part have caused but are also living in an area that is dry. Basically, the population in the West is growing faster than the environment can support. The West is a naturally occurring arid place that more and more people are moving to this area including Southern California, Colorado, Nevada, etc. “During the last 25 years, the population of the 17 Western states grew by about 32 percent as a whole in comparison with a growth rate of 19 percent for the rest of the nation (Case et al., 1997).” As the population grows in the West, the people need water to survive but also for their businesses and for the food that the farmers will grow that they will eat. Water

is a precious commodity. The problems that result from overextending the water available will be discussed later in the paper.

- **WHY IS THE WEST ARID?**

As I have stated before, the climate for most of the American West is an arid to semi-arid landscape. Figure 1 illustrates the desert conditions in some of the Western states.

**Figure 1-Shows a view of the arid hills surrounding Death Valley, California.**

This occurrence happens for many reasons including the topography of the region and the weather patterns. The topography of the region is partly made up by the Basin and Range Province and the volcanism that occurred during the extension of the crust and the arc-volcanism that occurred because of the convergence of the Farallon and North American plates. Therefore, the Western U.S. has mountain ranges that extend down the coast and stop the moisture from entering the interior of the U.S. from the west. These mountain ranges stop the storms and deprive them of their moisture so that by the time the storms actually make it over the mountains they do not have any moisture. The eastern side of the mountains are in a rain shadow therefore, they are very arid. Hence, the Western United States gets about 20 inches of rainfall per year compared to the 40 inches of rainfall received by the great plains (Western Water Policy, 1998). Figure 2 shows a rainfall map of the continental U.S. and the average rainfall.

**Figure 2-Annual Total Precipitation for the United States from, Water in the West: The Challenge for the Next Century text.**

Note that the western states are without moisture except on the coastline and in the higher mountains. The weather patterns that are dominated by the topography of the region are

basically simple. Instead of the rainstorms coming up from the Gulf of Mexico like for the Midwest, the Western states have storms come from the west and over the Pacific Ocean. The storms rotate from the tropics to the north and they drop their moisture on Alaska, British Columbia, and the Pacific Northwest. When the storms eventually get to the eastern side of the mountains and the Great Basin there is no water (J. Rupp per. com., 2002).

#### •WHERE DOES THE WATER ACCUMULATE?

The moisture that falls on the mountains accumulates in the high country as snow. When the temperature gets high enough, the snow will melt, and the melt water contributes to the water flow of the streams coming out of the mountains. However, if water falls on the eastern side of the mountains they do not flow to the ocean or the Gulf of Mexico. The special feature about the western United States is that all of the basins are internally drained so that the water is stored in lakes beneath the surface of the basin floor. There are also reservoirs that are remnants from the Ice Age. These reservoirs are being tapped by people faster than they are being recharged which is one of the controversies concerning water in the West (Fiero, 1986). Some of the salt lakes in the Great Basin are part of the Ice Age lakes and reservoirs that still exist because the water table is close enough to the surface of the Earth for there to be water on the surface. Mono Lake (Figure 3) is a remnant of a larger ice Age lake that does not have an outlet and shows how the Mono Basin does not drain externally.

**Figure 3-View of Mono Lake in California-Remnant from the last Ice Age.**

#### •USERS OF WATER IN THE WEST

Water is used for many reasons in the West. I want to go over the major users of water because they are the people that have a stake in how the water is controlled and maintained.

First, the largest water users in the West are agricultural users. They use water for a number of reasons. The main reason water is used is to irrigate land. In 1990, water that was withdrawn from either surface water or groundwater for irrigation was estimated at 140 million acre-feet. The irrigation goes mainly to irrigating crops to feed animals. After an increase in water consumption and usage for irrigation from the 1950's until 1975, because of the large dams being built in the West to supply water to the more arid areas, water withdrawals for irrigation have dropped. The highest point of water withdrawal peaked in 1980 in the West with a displacement of 150 million acre feet of water (Western Water Policy, 1998). Water is also used in the agricultural field to water livestock. In 1990, 2.3 million acre-feet of water was used for livestock purposes (Solley, 1997).

The next user of water in the West is domestic and commercial people living in urban areas. In 1990, an estimated 13 million acre-feet of water was used by people for domestic and commercial use in the West. This water is being used for personal home use but also for the irrigation of lawns, filling swimming pools, and irrigation of home vegetable gardens. Unlike agricultural users of water, domestic users have not decreased their need of water and water consumption because of growing populations and the use of more water for homes that are built during urban sprawl.

The third user of water in the West consists of the industrial and mining users. Water is used for different purposes in different mining techniques and for different

industrial uses. In 1990, 5.6 million acre-feet of water was estimated to be used for industrial and mining concerns in the West (Solley, 1997).

The fourth user of water in the West is thermoelectric power plants that use water in their processes to produce energy. 16.2 million acre-feet of water were used during 1990 by the thermoelectric energy plants to help produce energy (Solley, 1997).

The last user of water in the west and not a very big user, is the hydroelectric power plants. They used 1,730 million acre-feet of water in 1990 to help produce power (Solley, 1997). Figure 4 shows the withdrawals of water in the West from 1960 to 1990.

**Figure 4-Graph of water withdrawals by water-use category in the Western U.S. from 1960 to 1990 found in Estimates of Water Use in the Western United States by W. Solley.**

#### •HOW DO THE USERS GET THE WATER?

Historically, water was a resource taken from streams by hand, by wells if the water table was close enough to the surface, also by ditches, and crude water wheels to provide water to the populations in the West. However, there were some innovative thinks at the turn of the 1900's that realized that if people were going to prosper in the West, water was going to have to be moved on a larger scale. Some of the major water moving and water saving dealt with getting water to Los Angeles, building dams and aqueducts, and using the water from the Colorado River to provide water for seven of the western states plus Mexico.

In 1905, Los Angeles purchased the watershed rights of Owens Valley and built an aqueduct that brought water over the Eastern Sierra Nevadas to Los Angeles (DWP). Dams were built on the Colorado River including Hoover Dam and Davis Dam that were used to save water so that it could be used for the purpose of people. Figure 5 show the

Colorado River system and the dams placed on the river that are used for water reclamation.

**Figure 5-Drawing of the Colorado River System from the California Legislative Analyst's Office website concerning the Colorado River.**

Water is also obtained by tapping into the Ice Age lakes that are still under the ground. Tucson, Arizona is facing a water shortage because the lake they are tapping into is not being recharged as quickly as it needs to be, which leads me into the next section of the paper.

### •PROBLEMS

One would think that with all of the human made changes in the environment to get water for themselves that they would realize that the environment would change. However, for quite a long time people were not concerned with the effects of what they were doing to the environment. Today there are laws that have resulted from the changes in the environment and humans have changed their viewpoints. I want to touch on some of the basic changes that happened in the West, mainly California.

The basic changes of the landscape can be seen in different parts of California that have had water diverted away from the original stream course to an aqueduct. Owens Valley and Owens Lake were dried up to such an extent that farming was not possible there and the lakebed created great dust storms (Geology 351). At Mono Lake, the water level of the lake dropped so that the life in the lake was threatened and the birds that feed on the brine shrimp could not nest at the lake and support all of the birds that would come to the lake. The Salton Sea was created by the diversion of the Colorado River. Run-off from agricultural interests have polluted a sink hole that is now the Slaton Sea and possibly are killing the birds that land and nest there (Geology 351).

### •WHAT IS BEING DONE?

Today laws have changed what people can do to the environment around them and especially concerning water. The Department of Water and Power of Los Angeles has been ordered to put water back into the Owens Valley and stop diversions to Mono Lake and let the lake level rise. Also, water is not being controlled by just one person or department. The Colorado River Compact made sure that all the states that housed the river got use of the water. Water conservation techniques have been implemented around the West to save the water and be able to have water for the future. Also, different irrigation techniques and growing different crops has cut down on water usage in the West. Water is a complicated issue in the West. It contains many different reasons and outcomes depending on what has been done.

### •COMMENTS

I have only touched on some of the basic elements of water issues, people, and effects in this paper. Water is scarce in the West but people continue to move out there and set up new businesses. Being a Midwesterner, the thought of not having enough water and having to change drastically the environment around me to get water seems almost not worth the effort. However, the West is a beautiful place and holds resources that humans want. Water will always be an issue there but optimistically the issue will be handled like precious cargo for future generations.

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