# Water Conservation

## ... the hydrologic cycle

Agriculture

Recreation

Industry

Domestic

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WITHOUT WATER there would be no life on the earth. Food and minerals necessary for life are carried through our bodies in water solutions. Grasses, grains, and other food and feed plants get the elements they need, carried in water taken up through tiny rootlets. They need lots of it. For example, grass plants take up from 300 to 800 pounds of water to produce 1 pound of dry hay.

Water also serves as our cooling system. The evaporation of water from the surface of our bodies and from plant surfaces makes life possible under extremely hot temperatures.

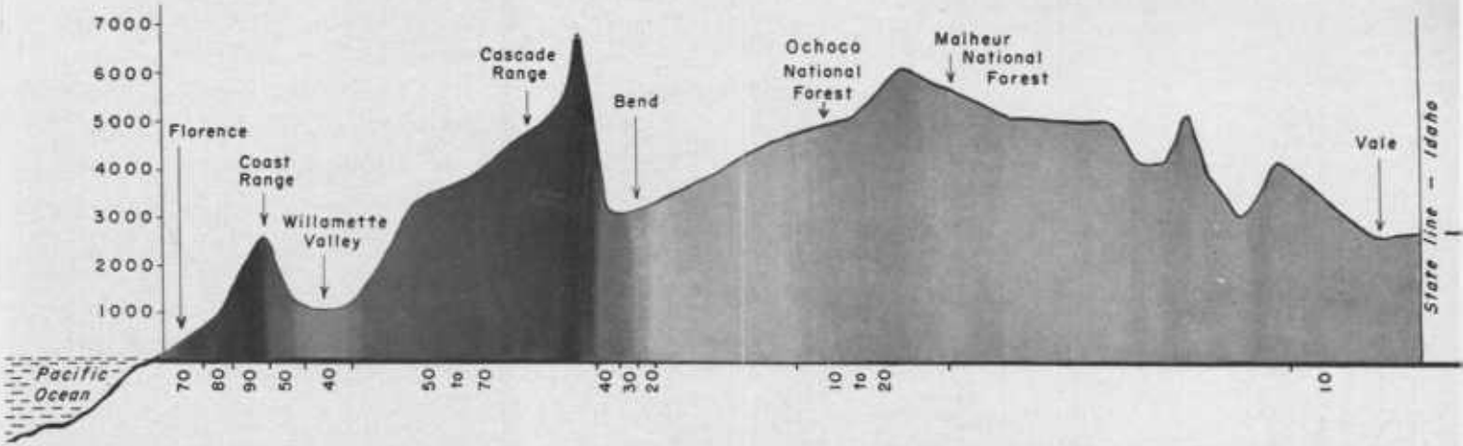
About 80 per cent of the human body is made of water. The green parts of growing plants have even more water—from 85 to 96 per cent.

We may have more precipitation (rain, snow, and other moisture from the air) one year than the next, but the total amount of the world's water is not much different today than it was at the beginning of civilization.

Some areas receive large amounts of precipitation while other areas receive practically none. For example, the average year's rainfall in some parts of the Sahara Desert is less than 1 inch. The average in the "Great American Desert" is about 5 inches. Here in Oregon precipitation varies from around 150 inches a year on some parts of our coast to less than 10 inches in the eastern plateau region. Why is there so much difference?

### *The Water Cycle*

Water moves into the air from the surfaces of lakes, streams, ground, plants, and the ocean as a gas which we call water vapor, and comes back down as precipitation—rain or snow. This round trip is called the "hydrologic cycle." The problem is that more of the water comes back down in some places than in others. Some places get too much and some not enough.




**The heavy lines represent roughly the land surfaces, by elevation points, from the seacoast near Florence directly east along the 44th parallel to a point near the town of Vale on the Snake River. The shaded area shows the annual average precipitation. Note that from the ocean surface to the summit of the Coast Range, the average annual precipitation is around 80 inches. (Some places on the western slopes of the Coast Range receive as much as 150 inches.) Passing over the summit, the precipitation decreases rapidly to an average of 40 inches on the Willamette Valley floor. Ascending the Cascade Range the precipitation again increases to an annual average of between 50 to 70 inches. Much of this, of course, falls in the form of snow. Descending the eastern slope of the Cascade Range the precipitation decreases rapidly from approximately 70 inches at the summit to about 20 inches just east of Bend. In the high plateau region between Bend and Vale, the annual precipitation ranges between 10 and 20 inches. In some sections of this region the average is less than 10 inches.**

The chart at the top of the page shows how much precipitation we get in Oregon's hydrologic or water cycle, and where it falls.

There are two main reasons for the differences in annual precipitation across the state. First, the prevailing air movement is from west to east; second, precipitation is more likely in air which is rising and is less likely in air which is sinking. Therefore, on the windward side of the mountain ranges precipitation should be heavy and on the lee side, light. Places on the lee side are said to lie in the "drought shadow" of the mountains. The additional "wringing-out" effect of the Cascade Range accounts for the fact that the inland plateau region of eastern Oregon is considerably drier than the Willamette Valley.

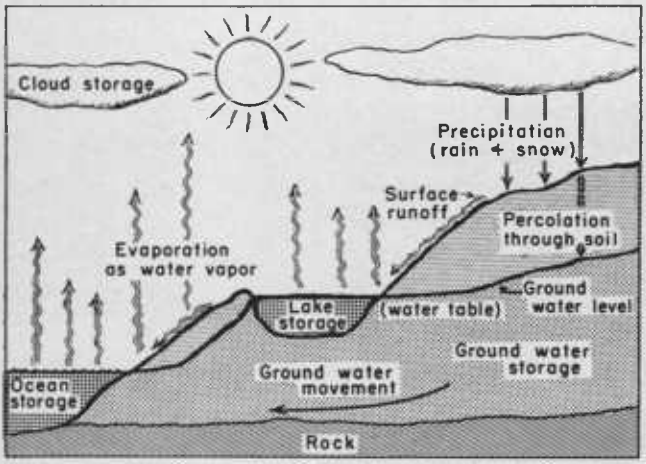
We have two major shadow effects—the Willamette Valley, in the shadow of the Coast Range; and the high plateau region east of Bend, in the shadow of the Cascade Range. The higher the elevation in these mountain peaks the greater the shadow effect on the inland side.

In that portion of Oregon west of the Cascade Range and west of the Coast Range in the southern portion of the state, we would have little concern about the conservation of water if it fell evenly throughout the year. More than 85 per cent of the annual precipitation comes during the fall, winter, and spring months. During the summer dry period we must meet our ever-increasing water needs from ground water supplies, surface streams, or storage reservoirs. Thus conservation is necessary even in the wettest parts of the state.

### *Conservation of Water*

Since precipitation does not always come at the right time or in the right amounts, federal and state research workers are concerned with adding water by irrigation or taking away

## The Water (or Hydrologic) Cycle




**This cycle should be read in a clockwise sense. Water is present as a gas (water vapor), a liquid (raindrops, lakes, ocean) and a solid (snow, ice). Regardless of form, it's still water.**

water by drainage, and other means to make just the right amount for plant growth.

For example, even in western Oregon farmers often add 3 times as much water by irrigation from wells, ponds, or streams as falls naturally during the growing season. This is necessary to get the best production of pasture, vegetable, and fruit crops.

Some areas east of the Cascade Range do not have enough water to keep crops alive, so research in these regions is particularly important. Experiments in artificial rain making have been carried on for several years in Sherman, Gilliam, and Morrow Counties.

Improved methods of tillage and land treatment in dry areas can help the soil hold more water with less runoff and erosion. Some helps are: strip cropping, contour planting, contour plowing, rough tillage, stubble mulching, and increasing the organic content of the soil by plowing down green manure crops.

West of the Cascades the precipitation is so heavy the ground cannot hold it, and we

must try to keep it from washing the soil away. Therefore, the land and crops are managed differently.

Most farmers in western Oregon try to keep a plant cover or mulch on their land during the winter months. They also turn under green manure crops in the spring to keep the soil in the best possible condition to absorb moisture.

Conservation of water for use during the summer months depends on proper maintenance of the forest cover on our mountain slopes. This is particularly true in the Cascades and eastern Oregon mountains where most of the precipitation is snow. Here we depend on snow melt to keep streams flowing during the dry periods. Study by the Forest Experiment Station shows that forest cutting practices can be improved so that 25 to 30 per cent more water will flow down from the mountains during the summer months.

Thousands of small ponds have been built by farmers in most sections of Oregon as a means of holding water until it is needed. The Agriculture Conservation Program alone has helped farmers and ranchers build more than 8 thousand of these ponds. Many large reservoirs have been constructed by the Bureau of Reclamation, Army Engineers, and Irrigation Districts. Were it not for these, many acres of our cropland would grow only drought-resistant plants.

Conservation of water means helping to get the right amount in the right place at the right time. Every person in Oregon can help by encouraging wise storage and use of water.

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This circular was prepared by James C. Moore, Extension Conservation Specialist. The author is indebted to John A. Day, Physics Department, for helpful suggestions.