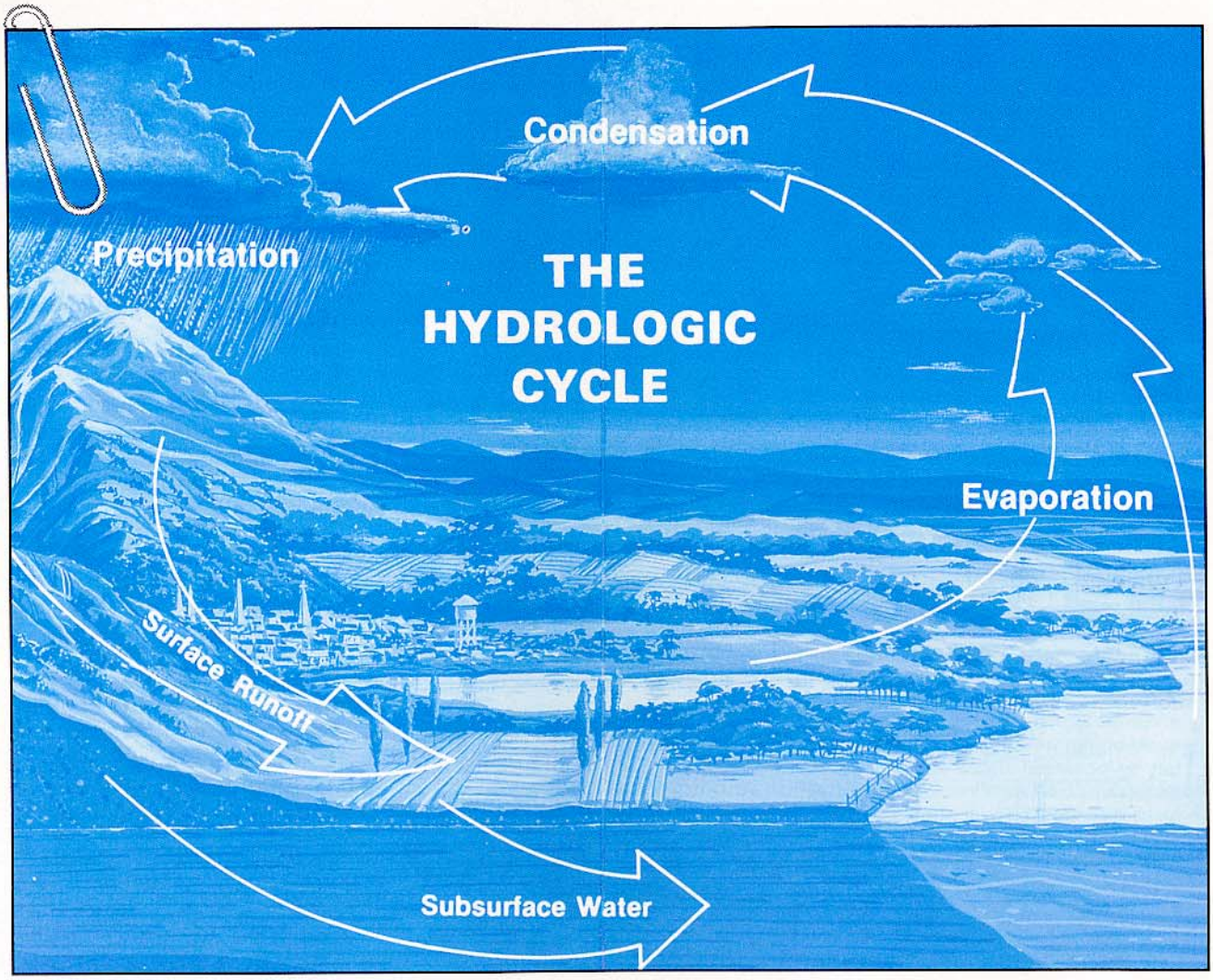
Teacher Feature

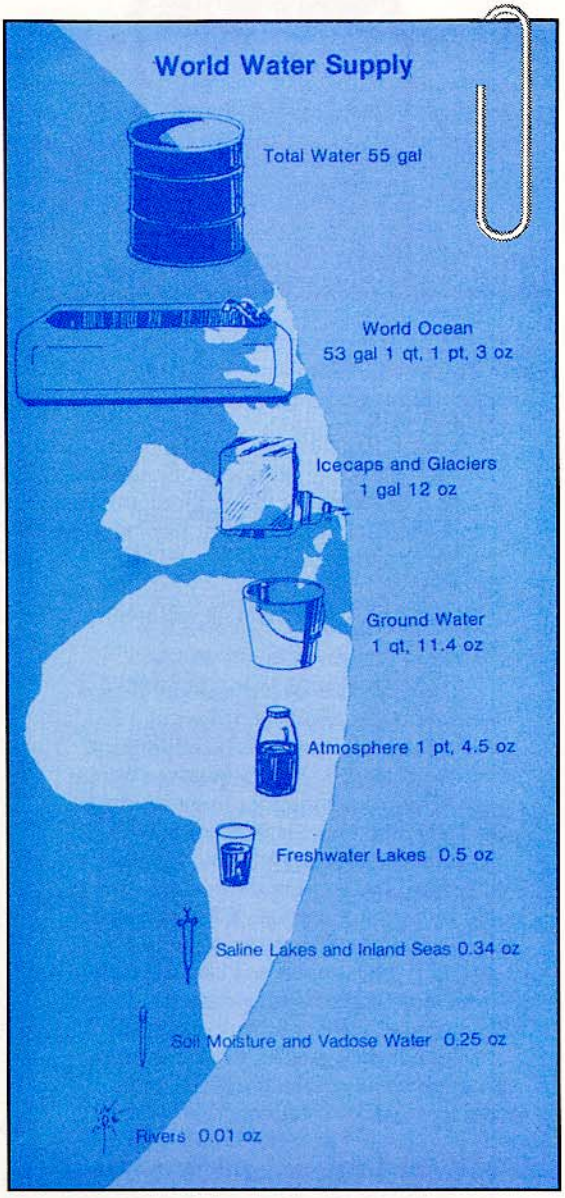
The Hydrologic Cycle



From the time water condensed on the cooling earth, our water environment has been in motion. The waters of long-ago geologic history are the waters of the 20th century; little has been added or lost through the ages since the first clouds formed and the first rains fell. The same water has been transferred time and time again from the oceans into the atmosphere, dropped on the land, and transferred back to the sea. This endless circulation is known as the hydrologic cycle.

Thus, the hydrologic cycle is a natural machine; a continuous distillation and pumping system. The sun supplies heat energy, and this together with the force of gravity keeps the water moving—from the earth to the atmosphere as evaporation and transpiration, from the atmosphere to the earth as condensation and precipitation, and between points on the earth as a streamflow and ground-water movement. As a cycle, this water system has no beginning or end. But from our point of view, the oceans are the major source, the atmosphere is the deliverer, and the land is the user. No water is lost or gained, but the amount available may fluctuate because of variations in the oceans, or more usually, in the atmosphere. In the geologic past, large alterations in the cyclic roles of the atmosphere and the oceans have produced deserts and ice ages across entire continents. Even now, small alterations of the local patterns of the hydrologic cycle produce floods and droughts.

- Every second, billions of sun-heated molecules evaporate to help supply the water for the hydrologic cycle.
- The world's total water supply is 326 million cubic miles. (One cubic mile equals more that 1 trillion gallons.) At any instant, only about 5 of every 100,000 gallons are in motion. Most of the water is stored in the oceans, frozen in glaciers, held in lakes, or detained underground.
- The contiguous United States receive about 1,430 cubic miles of rain each year.
- If the world's total supply of water were poured onto the 50 United States, the land surface would be under 90 miles of water.
- Only about 3,100 cubic miles of water (chiefly in the form of invisible vapor) is contained in the atmosphere at any given time. If it were to fall all at once, the earth would be covered with only about 1 inch of water.
- Once fallen, water may run swiftly to the sea in rivers, or may be held in a lake for 100 years, in a glacier for thousands of years, or in the ground for 10,000 years or more. Or, it may evaporate immediately. Eventually, all the water is released to enter the cycle once more.
- Of the 102,000 cubic miles of water that passes into the atmosphere annually, 78,000 cubic miles falls directly back into the oceans. Streams and rivers collect and return to the oceans some 9,000 cubic miles of water, including a large quantity of water that has soaked into the ground and which, as "ground water," has moved slowly to natural outlets in the beds and banks of streams. The remaining 15,000 cubic miles of water maintains life processes, principally as soil moisture that provides water for vegetation. This water reaches the atmosphere again by the process of evapotranspiration.
- More than 2 million cubic miles of fresh water is stored in the earth, about half within 1/2 mile of the surface. This is more than 35 times the amount held on the surface in lakes, rivers, and inland seas. However, the amount is relatively small when compared to the 7 million cubic miles stored in glaciers and icecaps.
- The 317 million cubic miles of water in the oceans constitutes 97.3 percent of the earth's supply.



Proportional distribution of the world's water, if the entire supply were considered as in a 55-gallon drum.

Information taken from *The Hydrologic Cycle* prepared by the U.S. Department of the Interior.