

Lesson: The Water Budget



Most people have to plan carefully how they spend their money. Very few people have unlimited amounts of money to spend. The amount of money needed for expenses over a given period is called a budget. In this presentation, you will learn about the Earth's **"Water Budget."**

Earth also has a budget, a water budget. Earth's water budget is the total amount of water contained in and on the planet. The oceans contain about 97 percent of all the water on Earth. Which ocean has the largest volume of water?

The Pacific is the largest ocean, followed by the Atlantic, Indian, and Arctic oceans. Only 3 percent of all the water on Earth is freshwater. Most of that 3 percent is frozen in glaciers and in ice found near the polar regions. Only about one-third of all freshwater on Earth is found as liquid in rivers and lakes, and in underground sources. Compared to the amount of salt water, the amount of freshwater on Earth is very small indeed.

The amount of water in the ocean determines sea level. The sea level is the point at which the ocean surface touches the shoreline. Over Earth's long history, the sea level has changed. About 12,000 years ago, during the last great ice age, the sea level was lower than it is today; perhaps as much as 100 meters lower. At that time, the edge of the sea was at the continental shelf.

Why was the sea level so much lower then than it is today? During that period, Earth's climate was colder, snowfall increased, and as a result, much of the world's water was frozen-locked up in the form of glaciers and polar ice caps. When water freezes, less is available for the oceans, and the sea level drops. Since the Ice Age, the climate of Earth has warmed, causing much of the ice to melt. This melting ice added water to the ocean (through rainfall and runoff), and the sea level has risen.

Will the warming trend continue? Will the level of the sea continue to rise? The past offers some clues. Several ice ages have occurred during Earth's history.

Each ice age was followed by a warming trend. If the past provides hints about the future, there will most certainly be another period of global cooling, perhaps followed by another ice age. Some scientists are almost certain of this; it is only the timing of these events that remains uncertain. For now, the sea level still appears to be rising, very slightly, each year.

Water falls to the ground as rain, snow, sleet, and hail. These forms of moisture that fall to the earth are called precipitation, and they become the streams and rivers that

eventually flow into the oceans. The land area through which water passes on its way to the ocean is called a **watershed**.

Rain even falls directly over the ocean. You may wonder, then, why the sea level doesn't keep rising indefinitely. The **water cycle** is the cycle of evaporation and condensation that controls the distribution of the earth's water as it evaporates from bodies of water, condenses, precipitates, and returns to those bodies of water. It is also called hydrologic cycle. The water cycle is responsible for the reuse, or recycling, of this most important of natural resources.

One of the stages in the water cycle is evaporation. **Evaporation** is the process by which liquid water changes to a gas. During evaporation, water molecules at the water's surface move into the air as water vapor, a gas.

You cannot observe water molecules moving from a liquid to a gas. The water molecules are too small and too far apart to be seen. But if weather conditions are just right, you can observe water vapor in the air. If the temperature is cold enough, water vapor forms a cloud. Fog is a cloud of water vapor that forms close to the ground.

The process of cloud formation is called **condensation**. Condensation occurs when molecules of water vapor come close enough together to form a cloud. Condensation is another stage in the water cycle.

Clouds are moist because they contain tiny droplets of water. If the droplets are heavy enough, they fall to the earth as rain or another form of precipitation. Thus, precipitation is an important part of the water cycle. As a result of the water cycle, freshwater is returned to the land to be used by plants and animals. Eventually, this water returns to the ocean.