THE WATER CYCLE

Water is perhaps the ultimate example of recycling. Water constantly renews its purity by cycling itself from a liquid (or a solid) into vapor and back again. The change to a vapor removes most impurities and allows water to return to Earth in its clean form. (Exception: **acid rain**, see F-51, Surface Water Issues.)

The study of water, or **hydrology**, starts with the **water cycle**, or the process by which water renews itself. Since the cycle is continuous, it doesn't really have a beginning, but a convenient place to start studying it is with **precipitation** (rain, snow, sleet and hail). When precipitation falls to earth, several things can happen. It can be absorbed into the soil. This is called **infiltration**. This process allows water to seep into the earth and be stored underground as **groundwater**. Precipitation can also become **runoff**, flowing into rivers and streams. Water can **evaporate**, or it can be returned to the atmosphere by **transpiration** through plants. Since it is often difficult to separate these two processes, they are often lumped together and called **evapotranspiration**.

Precipitation can also be **stored**. An ice cap is a form of storage. In temperate climates, water is found in depression storage or surface water—puddles, ditches, and anywhere else that runoff water can gather. This is a temporary form of storage. Water will evaporate from the surface and will infiltrate into the ground below it. It will be absorbed by plants and transpired back into the air. It will flow to other areas. This "cycling" of water is continuous.

A number of factors such as soil type, slope, moisture conditions, and intensity of storm event affect how water travels through this cycle. For example, when rain falls, some of it will infiltrate into the ground, but this rate of infiltration may be fast or slow. If the soil is already wet and saturated, much of the rain will become runoff. If the soil has low moisture content, a large percentage of it may be absorbed. The type of soil will also impact the rate of infiltration. Clay or packed soil allows little water to seep in. Sandy or loose soils allow more infiltration.

The rate of rainfall is a factor to consider. If rain is hitting the ground faster than it can infiltrate, it becomes runoff. The grade or slope can also influence runoff. Water infiltrates very little on steep grades. Human-made structures can reduce infiltration even further. Virtually no water infiltrates through paved roads and parking lots, so almost all of it becomes runoff. This affects the entire water cycle.