

Watershed Hydrology

Water is Delaware's most valuable natural resource. It is critical to our existence, provides habitat for wildlife, and makes possible numerous recreational opportunities. Water is constantly recycling and changing its state through the processes of evaporation, condensation, and precipitation, commonly referred to as the *water cycle*.

The water in our streams and ponds is warmed by the sun's rays, causing it to evaporate and enter the atmosphere as a gas. As these water molecules collect in the atmosphere, the humidity increases until the air mass can no longer hold any more moisture. At this point, the water vapor condenses and falls back to the Earth in the form of snow, rain, sleet, or hail. Some of this precipitation is filtered through the soil and ends up as ground water. If more precipitation falls than the soil can absorb, it becomes runoff. Both ground water and runoff eventually reach a stream, bay, or other water body, and the water cycle begins all over again.

Ground water is the sole source of drinking water throughout the Chesapeake Basin. Millions of gallons of ground water are withdrawn from the Basin's *aquifers* on a daily basis. Ground-water quality in the Chesapeake Basin is highly variable. Much of the water in unconfined aquifers has been impacted by human activity at the surface.

Surface water bodies, such as rivers, lakes, bays, and oceans are the most visible expressions of water in the water cycle. These reservoirs act as "barometers" for measuring the health of the water in the cycle. For example, diverse aquatic habitats and fish populations are representative of a healthy water body. An excess of nutrients can lead to a reduction in the diversity and populations of these living resources. The rivers and creeks of the Chesapeake Basin provide important habitat for migrating birds, finfish, and shellfish. However, these waters are being pressured by development along the shorelines.

Riparian Buffers

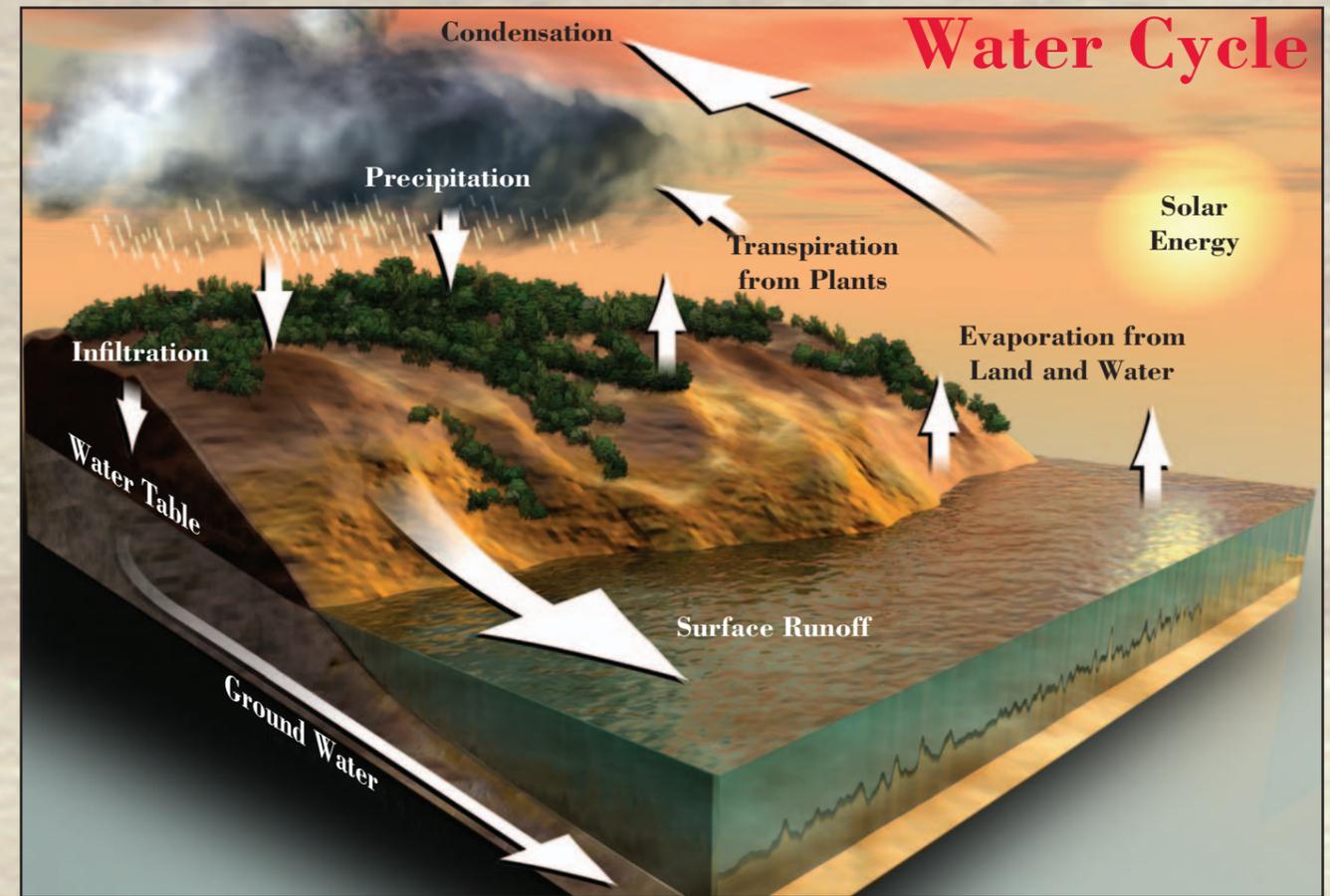
Forests protect watersheds, provide opportunities for recreation and settings for aesthetic enjoyment, serve as habitat for wildlife, and produce wood and other forest products. The forests of Delaware contribute greatly to the quality of life of the residents, making the State a better place in which to live.

Of the states along the Atlantic seaboard, Delaware is the least forested. Remarkably, forests still cover nearly 30 percent of the State, despite Delaware's agricultural history and the rapid conversion of forested lands to residential and other urban uses. Of the three counties in Delaware,

Sussex has experienced the largest loss.

Within a watershed, generally the stream channel and adjacent land areas can be divided into three zones: aquatic, riparian, and upland. The aquatic zone includes the stream and the area of the streambed that is normally underwater.

The *riparian* zone lies between the aquatic and upland zone and is an area of transitional vegetation influenced by its nearness to water. Upland areas adjoin the



Human activities can have a significant impact on the water cycle. When forests and other vegetation are removed and roads and buildings constructed, less precipitation can infiltrate the soil, and runoff increases.

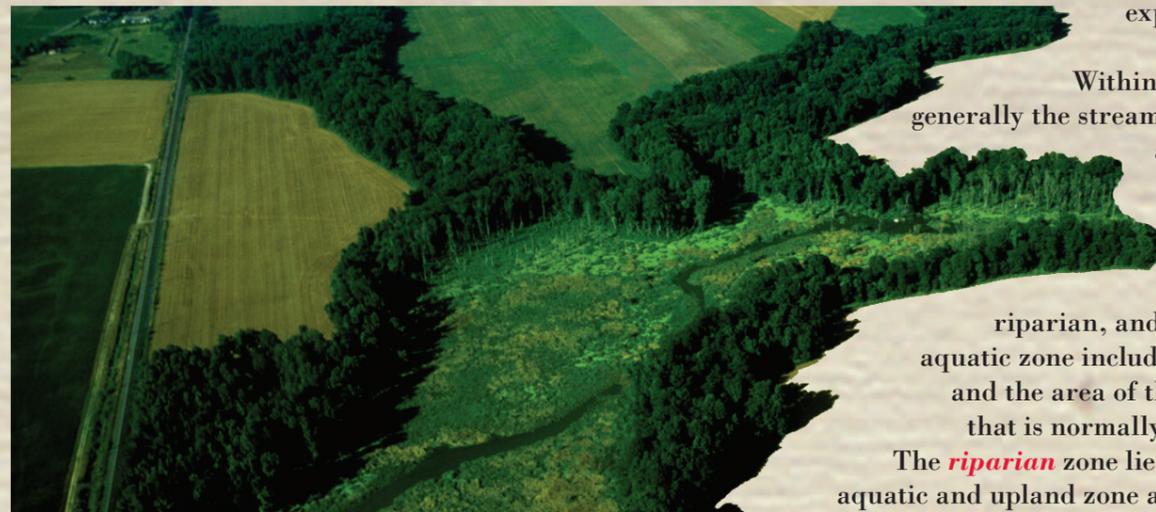
riparian zone and are usually characterized by vegetation and soils different from those in the riparian zone.

Many trees in Delaware grow along streams and serve as riparian buffers that protect and improve water quality and provide corridors used by wildlife. Research has shown that a buffer strip of trees between a stream and cropland provides an extensive list of benefits to both man and the environment. Because of their unique position between land and water, riparian forest buffers of sufficient width intercept sediment, nutrients, pesticides, and other materials in surface-water runoff, referred to as *non-point source pollution*, and reduce nutrients and other pollutants in shallow subsurface water flow. Woody vegetation in riparian buffers provides food and shelter for wildlife, helps lower water temperatures by shading the water-body, and slows out-of-bank flood flows. In addition, the vegetation closest to the stream or water-body provides litter fall and large woody debris important to aquatic organisms. Water *turbidity* is also re-

duced as the woody roots increase the resistance of streambanks and shorelines to *erosion* caused by high water flows.

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Forested corridors along streams filter surface runoff reducing the amount of pollutants entering the waterway.