

Penn State **Extension**

FROM THE WOODS

Watersheds

PENNSTATE



Cooperative Extension
College of Agricultural Sciences

AN EDUCATIONAL SERIES ABOUT FORESTRY FOR YOUTH

Pennsylvania contains almost 83,000 miles of streams, ranging from small trickles to large rivers. All of these streams are important because they provide water for people, farms, and industries. They are home to many kinds of wildlife and fish. Streams also give us great places to go fishing, swimming, and boating.

Streams receive water from the land that surrounds them. The land area through which any water moves or drains to reach a stream is called a watershed. Every watershed is unique,



Pennsylvania contains parts of six major watersheds, all of which eventually drain into the Atlantic Ocean. Locate the major watershed that you live in.

The Water Cycle in Pennsylvania

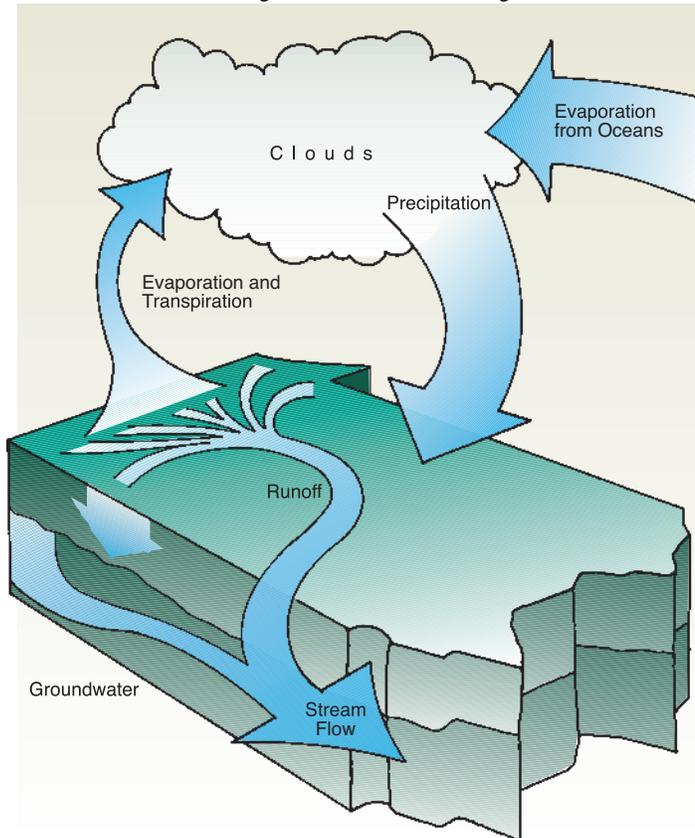


ILLUSTRATION: ADAPTED FROM GRAPHIC BY JAMES MCCLURE

Water is constantly moving within and between watersheds. In Pennsylvania, only about half of the precipitation that falls on watersheds ever makes it to a stream. The remaining half is either evaporated by the sun or used by growing plants.

and they range in size from a few acres to millions of acres. Anywhere you stand, you are within one small watershed that is also part of many larger watersheds.

A watershed's shape is determined by the surrounding terrain that forms its boundaries. Some watersheds may be steep and rocky, while others are flat or gently rolling. Some Pennsylvania watersheds are completely covered by forests, but most contain a mixture of farms, roads, towns, cities, and forests.

THE WATER CYCLE

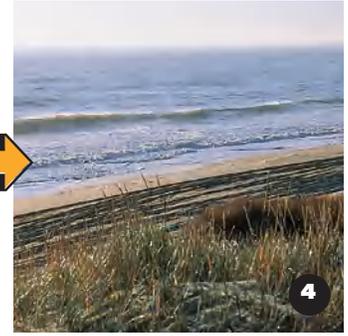
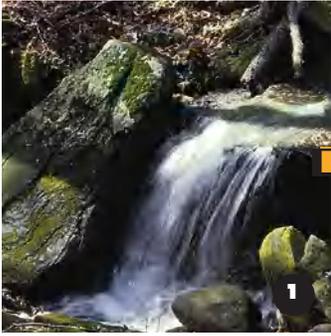
When water enters the watershed as rain or snow, it is called *precipitation*. Trees and plants use much of the precipitation and then release it back into the air as water vapor. This is called *transpiration*. The sun also *evaporates* (dries up) some precipitation before plants can use it. The pre-

cipitation that is not used by plants and does not evaporate travels to streams and is called *stream runoff*. The stream runoff from small watersheds feeds into larger streams and rivers. Eventually, it reaches an ocean. The sun evaporates some water back into the air as it flows in streams, rivers, and oceans. The water released back into the air by plants through transpiration and by evaporation combines to form clouds and more precipitation. This continuous movement of water from the air to a watershed and back to the air is called the *water cycle*.

WATER MOVES WITHIN THE WATERSHED

Precipitation follows many paths to reach a stream. In a forest watershed, most rain is quickly absorbed by the soil. This water then flows into the rock layers below the soil to

Water movement through a watershed



Within all watersheds, small streams (1) join together to form larger streams (2) and larger streams join together to form rivers (3). Rivers eventually empty into the ocean (4) where the water may stay for some time or evaporate and form precipitation. Some of this precipitation falls on the land and the process repeats itself endlessly.

become groundwater. Most small streams begin at places where groundwater comes to the surface as springs. Some precipitation water may flow to the stream through soil pores or through holes in the soil made by worms and decayed roots.

Some precipitation may flow quickly over the ground to the stream. This surface water movement is not common in forest watersheds because the soil quickly absorbs precipitation. In fact, in forest watersheds almost all of the water entering the stream during rainstorms comes from either groundwater or water moving through the soil. After rainstorms end, the amount of water in streams decreases. As water stops moving through the soil, the groundwater level drops. During dry weather, the stream is fed entirely from groundwater.

The movement of rainwater through soil and rock in forest watersheds controls the water quality in the stream. Stream water is clear because the trees and their roots hold

the soil in place and allow the soil to filter the rainwater. The layer of old leaves on the ground also helps to cushion the falling rain and prevent it from loosening and moving soil into the stream. Forest watersheds are an important source of clean water—in fact, they supply over 80 percent of our drinking water in Pennsylvania.

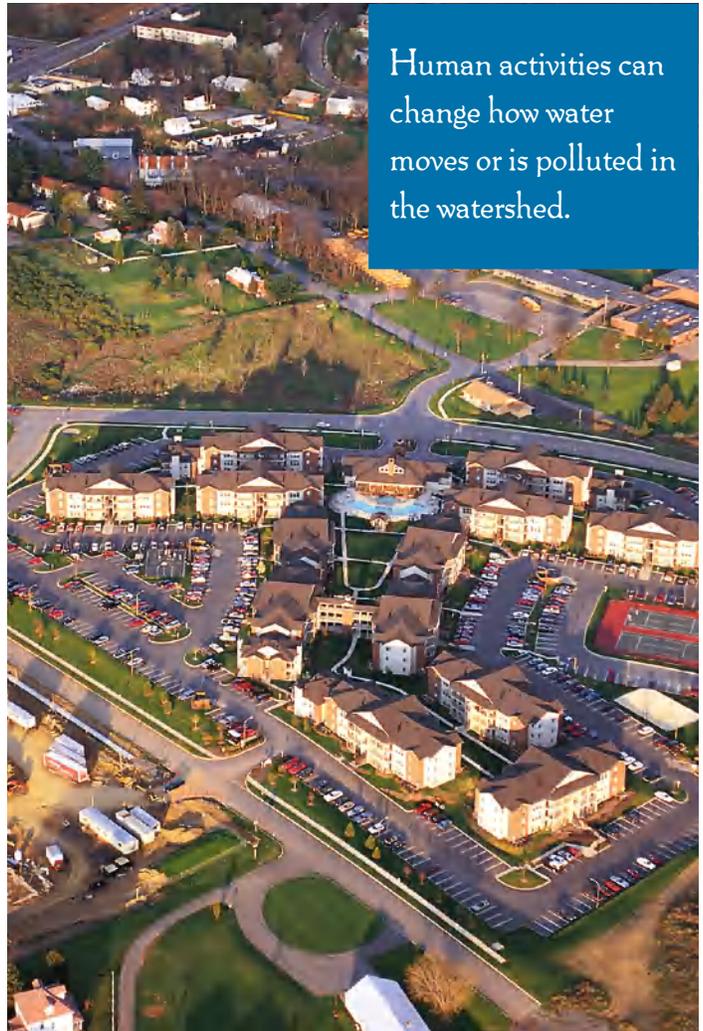
PEOPLE AFFECT WATERSHEDS

People can affect watersheds without even knowing it. Pollution produced by power plants, factories, and cars can travel through the air and settle on watersheds hundreds of miles away. Some air pollution can cause acid rain, which removes nutrients from the soil and causes water in streams to become more acidic. Acid rain has been linked to the death of trees and to the disappearance of native fish and other aquatic life in some forest watersheds in Pennsylvania.

Other human activities can change both the amount and quality of water in streams.

When forests are permanently cleared for homes or other land uses, the water cycle is altered. The large amount of

water that had been used by trees and plants now flows directly to streams. Streams may become muddy because



the soil is no longer covered by leaves and held in place by tree roots. If the forest is replaced with parking lots or driveways, rainwater can flow more quickly as surface runoff to streams, which may cause flooding. The increased surface runoff also means less water moves into the ground to supply streams with water between rainstorms. Streams also may become polluted by chemicals and wastes applied to the land or dumped directly into the stream.



Sportfishing is a popular activity carried out along the streams, rivers, and lakes of our watersheds. Anglers observe firsthand the effects of human activities on water level, water quality, and aquatic life.

PROTECTING WATERSHEDS

Any activity that takes place within a watershed can affect both the amount and quality of the water in a stream. Careful planning can usually reduce the harmful effects

of most activities. For example, maintaining a strip of trees or other vegetation, known as a buffer strip, along a stream helps reduce

pollution from surface runoff. Other practices, like the careful use of pesticides and fertilizers on farms and yards, also protect water-

sheds and streams. Everyone in the watershed must share in the protection of the resource.



Over 80 percent of our drinking water in Pennsylvania comes from forested watersheds.

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