

FROM THE WOODS

Watersheds

PENNSTATE

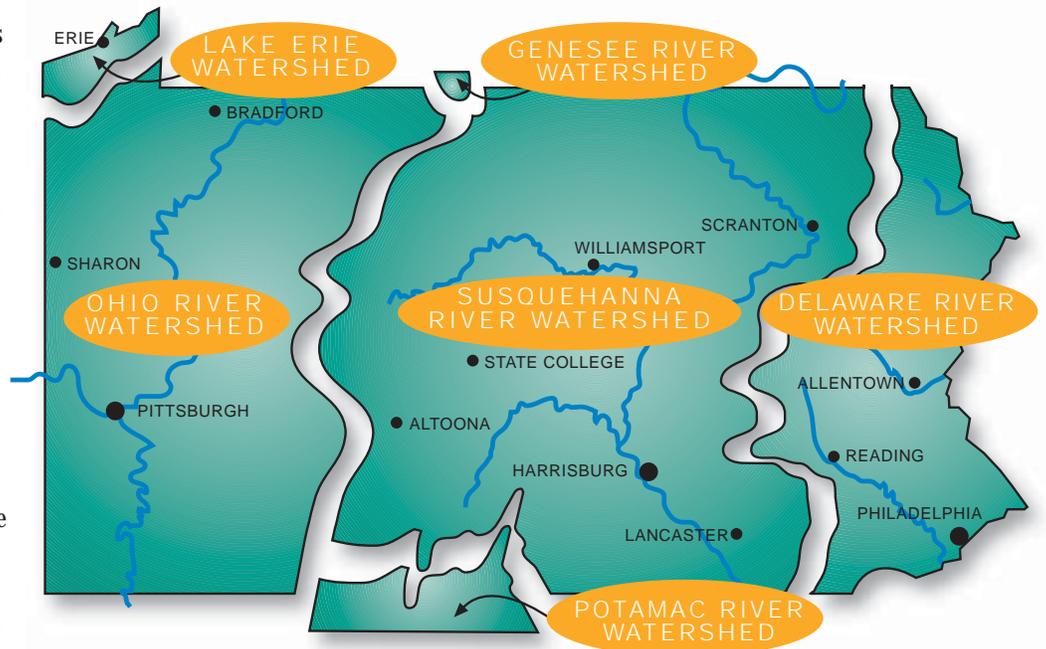


College of Agricultural Sciences • Cooperative Extension

AN EDUCATIONAL SERIES ABOUT FORESTRY FOR YOUTH

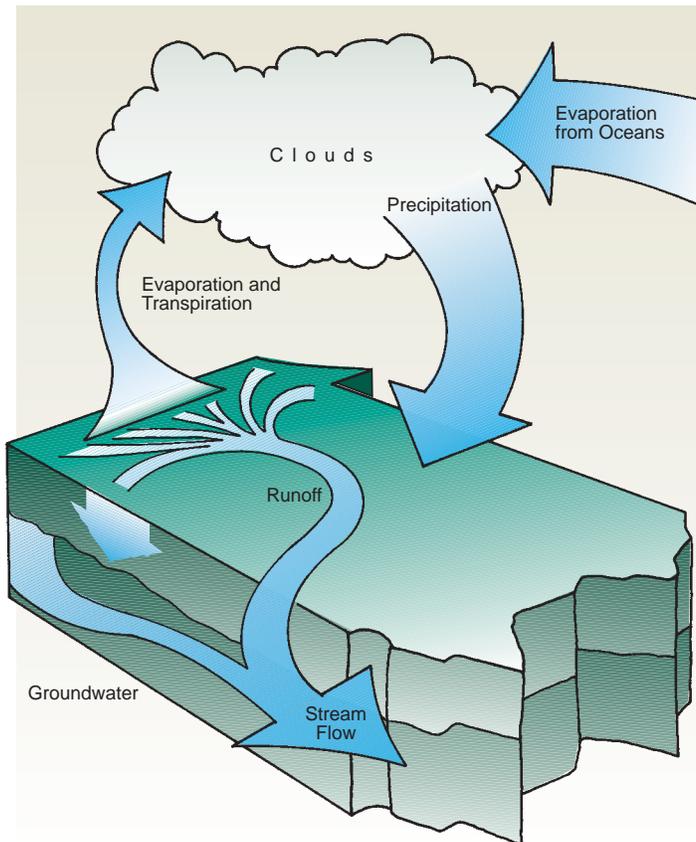
Pennsylvania contains almost 83,000 miles of streams, ranging from small trickles to large rivers. All of these streams are important because they provide water for people, farms, and industries. They are home to many kinds of wildlife and fish. Streams also give us great places to go fishing, swimming,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



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



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.

unique, 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

precipitation 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

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.

rock layers below the soil to 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 either from groundwater or from 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.

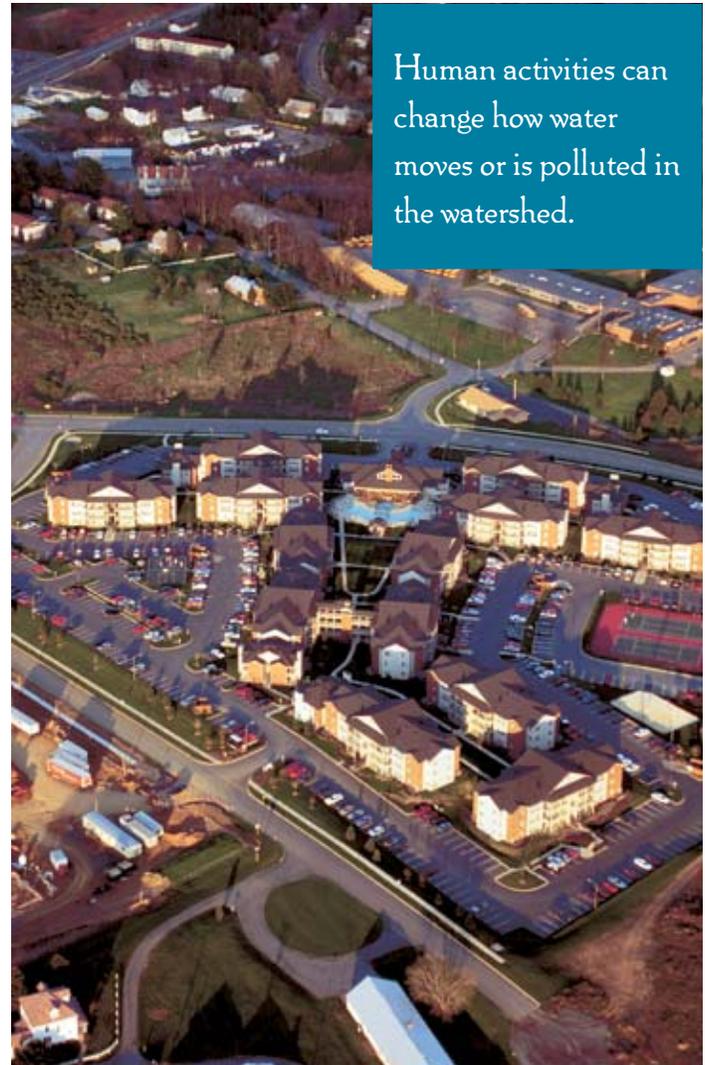
PEOPLE AFFECT WATERSHEDS

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



Human activities can change how water moves or is polluted in the watershed.

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 first-hand 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 watersheds 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.

Prepared by Bryan Swistock, water resources specialist, and Sanford S. Smith, natural resources and youth specialist.

Visit Penn State's College of Agricultural Sciences on the Web: <http://www.cas.psu.edu>

Penn State College of Agricultural Sciences research, extension, and resident education programs are funded in part by Pennsylvania counties, the Commonwealth of Pennsylvania, and the U.S. Department of Agriculture.

This publication is available from the Publications Distribution Center, The Pennsylvania State University, 112 Agricultural Administration Building, University Park, PA 16802. For information telephone (814) 865-6713.

Issued in furtherance of Cooperative Extension Work, Acts of Congress May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture and the Pennsylvania Legislature. T. R. Alter, Director of Cooperative Extension, The Pennsylvania State University.

This publication is available in alternative media on request.

The Pennsylvania State University is committed to the policy that all persons shall have equal access to programs, facilities, admission, and employment without regard to personal characteristics not related to ability, performance, or qualifications as determined by University policy or by state or federal authorities. It is the policy of the University to maintain an academic and work environment free of discrimination, including harassment. The Pennsylvania State University prohibits discrimination and harassment against any person because of age, ancestry, color, disability or handicap, national origin, race, religious creed, sex, sexual orientation, or veteran status. Discrimination or harassment against faculty, staff, or students will not be tolerated at The Pennsylvania State University. Direct all inquiries regarding the nondiscrimination policy to the Affirmative Action Director, The Pennsylvania State University, 201 Willard Building, University Park, PA 16802-2801, Tel 814-865-4700/V, 814-863-1150/TTY.

Produced by Information and Communication Technologies in the College of Agricultural Sciences