NATURAL RESOURCES FACTS
THE UNIVERSITY OF RHODE ISLAND • COLLEGE OF RESOURCE DEVELOPMENT
DEPARTMENT OF NATURAL RESOURCES SCIENCE • COOPERATIVE EXTENSION

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WHAT IS A WATERSHED?

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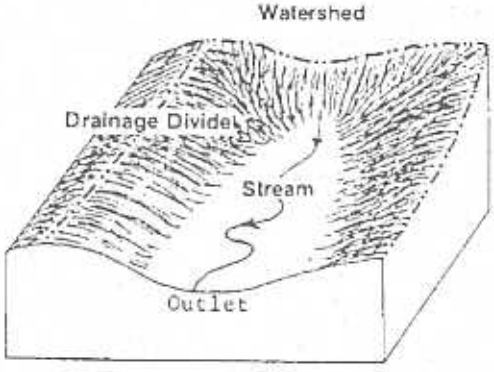
What is a Watershed?

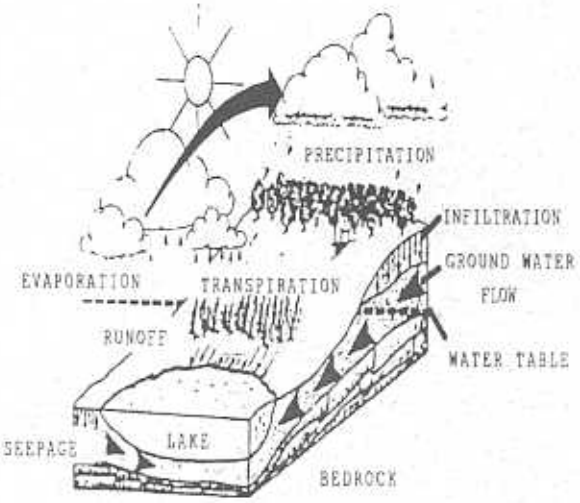
Not everyone lives next to a pond or stream but all of us live in a **watershed.** The watershed is the land area that drains to a common outlet, such as the outflow of a lake, the mouth of a river, or any point along a stream channel. A drop of water falling in a watershed that does not evaporate or is not used by plants, will leave the watershed at this outlet.

The outer boundary of a watershed, or **drainage divide**, is formed by the ridges and hills surrounding a waterbody and the location selected as the downstream outlet. Precipitation falling directly on the watershed boundary will be split between the watersheds on either side.



PARTS OF A WATERSHED

The watershed of most lakes and rivers consists of a network of intermittent drainages, man-made channels and storm drains, streams, wetlands, and the surrounding upland. At any point in the watershed, precipitation runs off the land surface and collects in these natural and man-made drainage pathways, following the lay of the land, or topography. Some precipitation seeps into the ground where it moves through soil and may emerge at a nearby surface waterbody; some infiltrates more deeply to replenish regional groundwater supplies.



Groundwater

A groundwater reservoir, or **aquifer**, is a geologic formation that can store and release large amounts of subsurface water. In Rhode Island, the most productive aquifers consist of deep sand and gravel deposits, commonly referred to as glacial outwash or stratified drift, where water is stored

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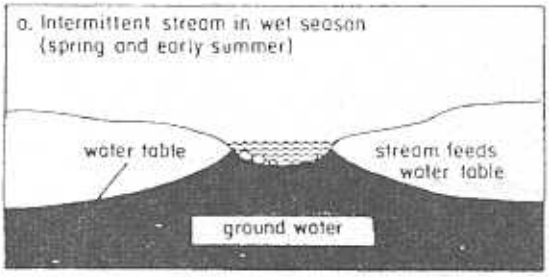
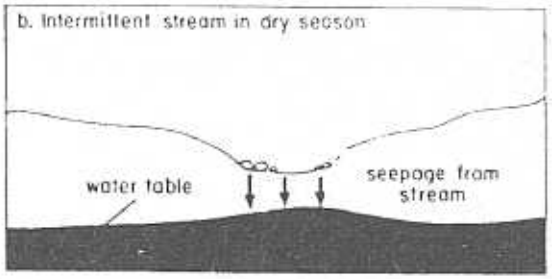
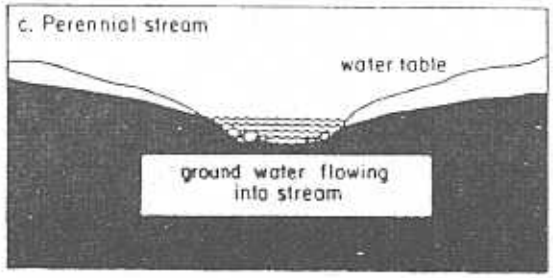
among the grains of sand. Groundwater reservoirs have their own watersheds, known as recharge areas, which consist of all the land contributing subsurface flow to a common location. The boundaries of a surface watershed and groundwater recharge area can, but do not always coincide.

In recharge areas surface waterbodies and groundwater are often interconnected. Occasionally, surface waters can provide a source of flow, or recharge, to the aquifer, especially when water tables are low (see Figure "b" below). When water tables are high, groundwater can flow into lakes and streams and help maintain surface water levels (see Figures "a & c" below). Lakes which seem to have no major inlet may be fed primarily by ground water. These waterbodies, known as seepage lakes, actually represent the elevation of the ground water table in the area.

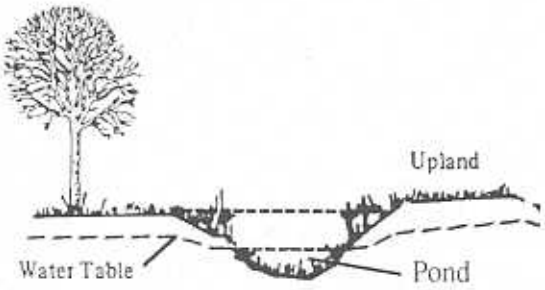






Wetlands

Wetlands, such as wooded swamps, marshes and bogs, have important hydrologic and water quality functions in addition to the fish and wildlife habitat value associated with these areas. Wetlands slow the flow of incoming water and temporarily store this water before slowly releasing it downstream. By metering flow, wetlands protect downstream areas from flooding. Slow movement of water through wetland vegetation also helps to settle sediments and remove certain pollutants, thereby improving water quality. When wetlands are filled or channelized these natural functions are lost.



Uplands

Uplands are the drier, well-drained areas of the watershed. Because uplands drain to, but are not connected to wetlands and other waterbodies by discrete channels, their importance in the watershed is often overlooked. Upland sites with sandy, coarse-textured soil readily allow precipitation to infiltrate, and thereby serve as important groundwater recharge areas. Uplands with fine-textured, less permeable soil may not provide significant groundwater recharge. Precipitation falling on these areas seeps into the shallow soil layers or moves slowly along the vegetated surface before collecting in intermittent drainageways and wetlands. When uplands are developed, this natural absorption and filtering process is bypassed. Precipitation falling on paved surfaces quickly washes downstream, carrying sediment and other pollutants, eroding streambanks and increasing flooding.

THE AQUATIC ECOSYSTEM

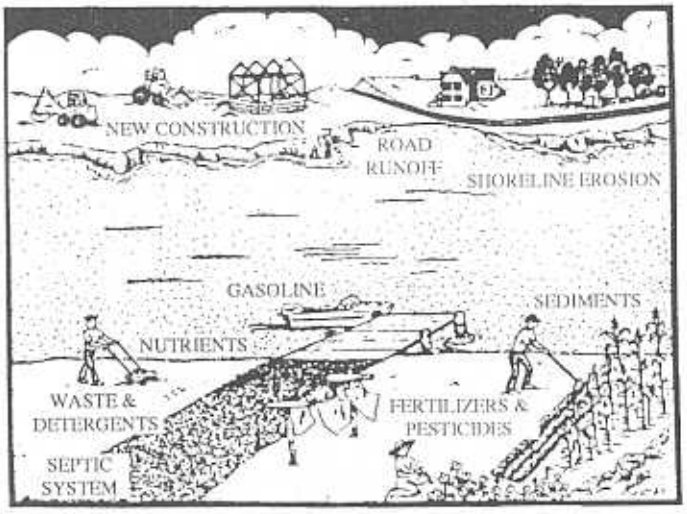
The watershed drainage network makes it possible for pollutants to reach a waterbody that may be located many miles from the pollution source. The same principle applies in groundwater recharge areas, except that subsurface water moves much more slowly than surface water.

The materials that reach a lake or river through the watershed affect the chemical and physical environment in which a complex association of plants, animals and microorganisms exist. This assemblage of interrelated organisms and their environment is the aquatic ecosystem. The watershed is part of this ecosystem and changes in the drainage

area will influence other parts of the ecosystem downstream.

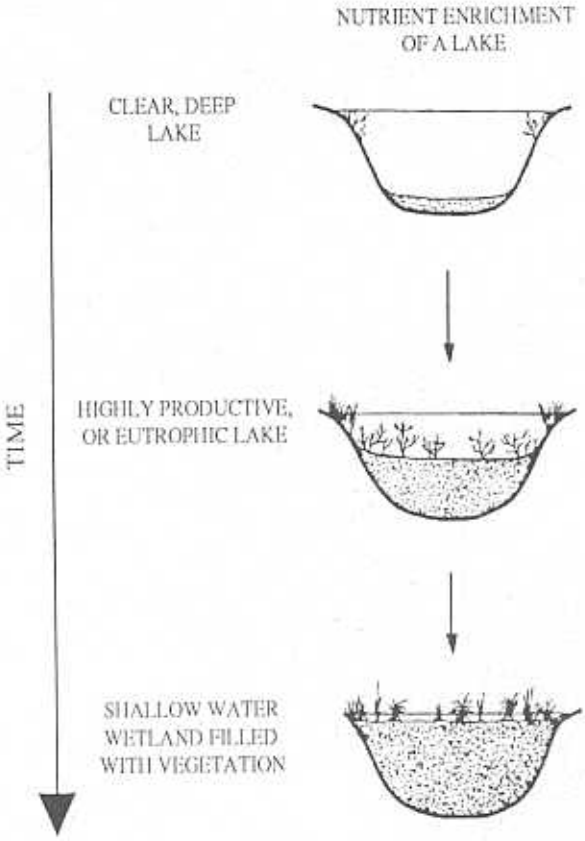
HOW PEOPLE AFFECT THE AQUATIC ECOSYSTEM

All of us living within a particular watershed have the ability to make changes in the environment which can intentionally or inadvertently affect aquatic ecosystems, even when activities are far from any shore. These changes include many common activities such as the construction of homes, roads and shopping centers, and growing crops, lawns, and livestock. These activities can change the pattern of water flow in a drainage network, increase the amount of water that reaches a waterbody and allow it to get there faster, without the opportunity for removal of pollutants by slow infiltration into the soil. Inputs of nutrients, sediment and toxic substances from these sources can seriously impair ponds, streams and groundwater resources.



NUTRIENT ENRICHMENT

Nutrient enrichment is a major threat to aquatic ecosystems. In undisturbed watersheds nutrient enrichment (eutrophication) is a very slow natural process. However, as the character of a watershed changes from forest to urbanized and agricultural land uses, increased runoff of nutrients increases the rate of eutrophication. In freshwater phosphorus is the most important nutrient in this process. As phosphorus levels within a lake rise, aquatic plant growth increases. Lush algal growth can reduce water clarity and cause the water to appear green and murky. Dense growths of rooted aquatic plants can make boating and swimming difficult or unpleasant. When aquatic plants die, their decomposition can reduce the amount of oxygen dissolved in the water. As lakes become more eutrophic, fish more tolerant of low oxygen conditions, such as carp, are favored.



WATERSHED MANAGEMENT PLANNING

Because rivers, ponds, wetlands and groundwater aquifers occur in watersheds that rarely follow political boundaries, these resources can be effectively protected only through a combination of State regulations, local land use controls and individual actions.

At the personal level, the first step is to recognize that our aquatic resources are vulnerable and that we, both individually and collectively, must assume responsibility for their care. This includes taking into account the effect each of us have on the watershed and the need to better balance our lifestyles with the needs of our aquatic resources.

STEPS INDIVIDUALS CAN TAKE TO PROTECT WATER QUALITY

- Properly maintain your septic system
- Use proper lawn maintenance practices: use water sparingly and fertilize carefully
- Establish or maintain a waterfront buffer of native vegetation along streams and lake shores
- Use pesticides properly or employ alternatives
- Use proper agricultural practices
- Properly dispose of household toxic materials such as paint, used oil, and cleaning agents
- Protect wetlands
- Avoid feeding waterfowl
- Protect soil from erosion by planting bare areas
- Actively support local, state, and federal laws which protect water resources
- Watchdog activities that have the potential to affect water quality
- Become actively involved in water resource issues in your community
- Support your watershed association, land trust, conservation commission, and other organizations working to protect water quality

For More Information:

The following series of fact sheets on water resources topics are available through the URI Cooperative Extension Service, 1-800-448-1011:

- Drinking Water Testing and Treatment Series
- Water Conservation Series
- Lake and Stream Water Quality Protection Series

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