

RESEARCH INDICATES THAT LEVELS OF IMPERVIOUS SURFACES ABOVE 12 TO 15% RESULT IN SERIOUS IMPACTS TO WATER QUALITY.

(Worthley, 2003)

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Programs and activities are available to all persons without regard to race, color, sex, disability, religion, age, sexual orientation, or national origin.

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for assistance with pest management within your woodlands, and the URI Cooperative Extension GreenShare Program for assistance with pest management on landscape and garden plants. See the contact information at the end of this factsheet.

- When planting new trees, grasses, or other vegetation, plant native, pest-resistant species. Refer to URI Cooperative Extension GreenShare's Sustainable Trees and Shrubs manual available by calling (401) 874-2900 or on-line at www.uri.edu/ce/factsheets/sheets/sustplant.html. You can also contact the Rhode Island Wild Plant Society for a list of native plants at (401) 783-5895 or on-line at www.riwps.org.
- Purchase only the amount of fertilizer and pesticides needed and use these products according to the directions specified on the manufacturer's label.
- Properly dispose of leftover products at Rhode Island's Eco-Depot (401) 942-1430 extension 241 or give to others who can use them.
- Fill fertilizer spreaders or pesticide sprayers on an impervious surface away from a drinking water well or surface water body. If spills occur, clean up promptly and do not allow them to wash away with stormwater.
- Store and apply fertilizer and pesticide products away from a drinking water well or surface water body.

Where do I turn for more information and help?

RI DEM Division of Forest Environment

- (401) 647-3367 • www.dem.ri.gov
- To talk with a state service forester about protecting soil and water resources, including nutrient & pest management, within your woodlands.
- Obtain a list of consulting foresters & licensed wood operators; *Best Management Practices for Rhode Island: Water Quality Protection and Forest Management Guidelines*.

URI CE Home*A*Syst Program

- (401) 874-5398 • www.uri.edu/ce/wq
- Publications and information on landscaping for water quality protection and stormwater runoff management, available on-line. *Home Landscape Improvements for Water Quality Protection*, available on-line http://www.uri.edu/ce/wq/has/html/has_landpubl.html.
- Publications and information on the proper use, storage and disposal of household hazardous products and fuels, and protecting private wells, available on-line.
- Obtain *The Rhode Island Home*A*Syst Handbook, An Environmental Risk Assessment Guide For The Home*.

URI CE GreenShare Program

- (401) 874-2900
- www.uri.edu/ce/ceec/greenshare.html
- Factsheets on Integrated Pest Management, nutrient management on landscape & garden plants, and soil testing, available on-line www.uri.edu/ce/factsheets; *Sustainable Trees and Shrubs Manual*, available on-line www.uri.edu/ce/factsheets/sheets/sustplant.html.

USDA Natural Resources Conservation Service

- (401) 828-1300 • www.ri.nrcs.usda.gov
- Obtain the *Soil Survey Map of Rhode Island* and assistance with the identification of and information about the soils on your property; technical assistance with conservation planning and practices; and local conservation district contacts.

URI College of Environment and Life Sciences, Department of Natural Resources Science

- Rhode Island Critical Resources Atlas Map and Orthophotos available on-line, www.edc.uri.edu
- Watershed Hydrology Laboratory - The Role of Riparian Buffer Zones in Watershed Nitrogen Cycling; www.uri.edu/cels/nrs/whl
- Rhode Island Vernal Pools; www.uri.edu/cels/nrs/paton

The Rhode Island Wild Plant Society

- (401) 783-5895 • www.riwps.org
- List of native plants; official RI Invasive Species Council list of invasive plants; special programs, affiliations & newsletter.

RI DEM Office of Water Resources

- (401) 222-3961
- Permitting: (401) 222-2306
- Freshwater Wetlands Page www.dem.ri.gov

RI Coastal Resources Management Council

- (401) 783-3370 • www.crmc.ri.gov

The RI Eco-Depot, Household Hazardous Waste Disposal

- (401) 942-1430 x 241
- www.rirrc.org/site/ecodepot/eco_main.asp

Providence Water Supply Board

- (401) 521-6300
- www.provwater.com

USDA Forest Service, Northeastern Area, State and Private Forestry

- www.na.fs.fed.us
- Links to Durham, NH Field Office (603) 868-7600
- www.fs.fed.us/na/durham
- Information on Watershed Program, Forest Stewardship, Conservation Education, on-line library.

A Forest Landowner's Guide to Internet Resources: States of the Northeast

- www.na.fs.fed.us/pubs/misc/ir/index.htm
- Publications and fact sheets for: Riparian Forest and Wetland Management; Forest Management Planning & Stewardship; Miscellaneous topics include building a pond, and water and the forest.

Reference:

- Wildland Watershed Management*, second edition, Donald R. Satterland, Paul W. Adams, 1992.



WHAT IS A RIPARIAN BUFFER AREA?

An area of trees and shrubs located adjacent to or up-gradient from surface water or groundwater resources. Riparian Buffer Areas are critical for the following reasons:

- Provide shade along shoreline areas, keeping water temperature cooler and improving habitat for aquatic life.
- Reduce pollutants in surface runoff, subsurface flow, and in shallow groundwater.
- Improve, restore, or maintain aquatic and terrestrial habitat.

For more information about Riparian Buffer Areas see the website www.uri.edu/ceis/nrs/whl and the list of resources at the end of this factsheet.

Working for Clean, Plentiful Water

Forests are critical in sustaining the natural balance of the water cycle and protecting watersheds. Forests act like sponges when it rains or when snow melts - soaking up the water and filtering the nutrients that can pollute water resources. The abundance of live vegetation (and their root systems), along with decaying leaves and plant matter on the forest floor (duff layer), hold the underlying soil in place. This is crucial in preventing soil erosion and sediments from entering surface waters and "choking" the wide variety of aquatic plant, animal and other species that live there.

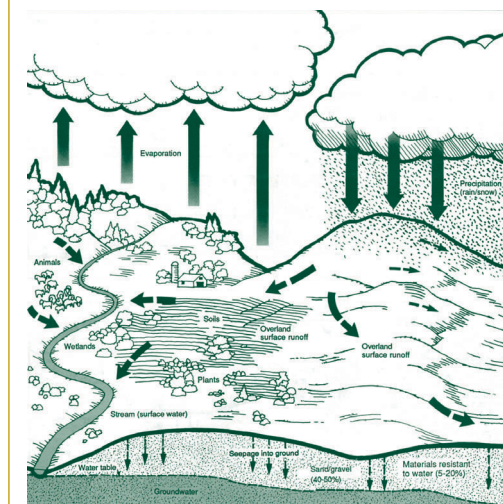
Forest disturbance occurs naturally through storms, fire, episodes of disease or insect infestation, as well as through natural tree death due to old age. Forests can also be carefully managed by humans to provide valuable timber and other forest products, and for public water supply management and protection. In fact, water supply managers often selectively harvest trees to increase water yields in reservoirs while preserving the benefits of a forested watershed. In Rhode Island, The Providence Water Supply Board (PWSB) owns more than 17,000 acres of land upon which it practices forest management to safeguard the state's largest public water supply. The PWSB provides over 60% of the state's drinking water.

However, when forest disturbance or loss is widespread and "unchecked" without proper forest and soil conservation practices and techniques, or landscape-wide planning, the results can be:

- A large scale increase in soil erosion and sedimentation to water resources
- Water quality degradation
- An altering of the water cycle which can impact water quantity and distribution

How exactly do forests sustain the natural balance of the water cycle?

Due to the amount of vegetation (tree canopy, under story growth, decaying leaves and plant matter, tree and plant roots, etc.) forests can accept and slowly release tremendous amounts of rainfall and snowmelt over a long period of time. While some precipitation and snowmelt travel over the forest floor, draining directly to surface water bodies such as streams and ponds, much of this water soaks into the ground where it is stored in the soil and/or percolates down to the groundwater. This is commonly referred to as groundwater recharge.



Over a slow, gradual period of time groundwater will drain towards surface water bodies such as streams and ponds. This is usually the reason why streams have a certain amount of water in them during dry periods. In other words, forests deliver a slow, steady supply of water to our streams, rivers, ponds, lakes and coastal ponds. Groundwater movement to streams and rivers sustains these water resources and aquatic ecosystems during dry periods without rain or snowmelt.

As watersheds become developed, urbanization and an increase in impervious surface areas - like parking lots, driveways and rooftops will change the water flow in the environment.

RHODE ISLAND VERNAL POOLS

If you have areas with ponded surface water in your woodlands that are wet during the winter and early spring but typically dry up in the summer, it is probably a vernal pool. By definition, vernal is a word that is typical or suggestive of spring. Vernal pools vary in size from a puddle to several acres. These areas provide spring breeding grounds for frogs, salamanders, toads, and insects. These pools may also be home to rare, endangered and other sensitive species.

Some signs to look for include areas where

- *Trees have water marks*
- *Leaves are matted down and darkly stained*
- *Small dips or depressions occur*

There should be little to no disturbance within 50 feet of a vernal pool, which includes the construction of access roads, use of heavy equipment, and tree harvesting.

For more information on Rhode Island's Vernal Pools see the website www.uri.edu/cels/nrs/pton and the list of resources at the end of this factsheet.

Impervious surfaces cause much of the precipitation to run off quickly into surface waters and can result in:

- Overall reduction in groundwater recharge
- Long-term lowering of groundwater tables and loss of stream flow during dry weather
- Increased erosion of stream banks
- Increased water quality impacts caused by pollutants associated with urban runoff
- Flooding—especially more frequent “flash” flooding

Where are the water resources on my property?

To gain an understanding of how water moves on your property, take a walk outdoors-- including the areas right around your house and other buildings. You may want to do this during different times of the year - during the wet season and during the dry season--to get a feel for how water flow changes throughout the seasons.

If you sketched your property on the attached Woodland Area Map sheet or have another property map, you may want to take it along and:

- Note areas of surface water on your property. Are there places that are seasonally wet? Are these areas of standing water, or are they small stream channels that only flow in spring?
- Note areas of natural or other vegetation around surface waters. Are these vegetated areas intact? What is the condition of these vegetated areas?

Are there signs of erosion in these vegetated areas?

- Note areas where soil erosion occurs. Where does the eroded soil end up? In a surface water body? At the bottom of a hill in the yard? Out in the street and/or in a storm drain?
- Note how water moves from impervious areas around your home and driveway. Does it drain to surface waters or storm drains, or is it allowed to puddle on the ground and slowly seep in to recharge the groundwater?
- Note areas where rain or snowmelt flow over the ground surface and create channels in the landscape. Does stormwater enter into surface waters or storm drains?

Protecting your water quality

The following activities are things you can do to promote a clean and sustainable balance of water resources on your property and the surrounding landscape.

Use the *Record of Woodland Area Plans and Activities* sheet to record actions you plan to take and develop a time frame for accomplishing activities. Refer to the list of contacts and resources listed at the end of this factsheet for specific information and assistance with these activities.

- Reduce stormwater runoff and encourage rain and snowmelt to infiltrate through the soil. This can be achieved by following some of the remaining activities listed below. For assistance with specific practices, see the list of contacts and resources listed at the end of this factsheet.
- Leave existing trees, shrubs, and other vegetation intact to serve as a Riparian Buffer Area near surface waters and wetlands. If there is currently little to no vegetation in these areas, consider re-establishing with native plants.
- When building or renovating your house and yard, consider limiting the amount of impervious surfaces that may result. This includes roof areas, paved driveways, parking areas, patios, etc. Consider using permeable pavement options such as crushed stone where applicable.
- Establish trees, plants or other vegetation next to driveways, parking lots and buildings to absorb runoff from these areas. Take care not to introduce invasive species.
- Limit the amount of land disturbing activities. Protect bare soil from erosion and sedimentation through vegetative plantings (grasses, groundcovers, trees, shrubs), the use of mulches, temporary cover crops, and other erosion, sediment and runoff controls as needed.
 - Bare soil can result from
 - Removal/loss of trees, shrubs, crops & other vegetation, or disturbance from mechanical equipment
 - Uncontrolled grazing
 - Land clearing and new construction
 - The placement of topsoil or other fill material
- Locate roads and trails across the slope or on the contour as much as possible and divert road runoff into level, well-vegetated areas rather than into stream channels, other surface waters or storm drains.
- In environmentally sensitive areas, establish narrow access paths only, and place along the contour to minimize soil erosion.
- In areas where the soil contains a lot of fine silt (feels like talcum powder, not much grit or sand), or where slopes are steep, or runoff from rain and snowmelt creates rills and gullies, structural practices such as constructed berms (diversions, water bars, etc.) and waterways (vegetated or stone-lined channels designed to handle a certain flow rate of stormwater) may be necessary. This is especially prevalent where access roads have been established.

What else can I do to protect water quality?

Proper Use, Storage, and Disposal of Hazardous Products

The improper use of hazardous products in and around the home can have an impact on water quality. Improper maintenance of motorized equipment can result in gasoline or oil leaks. As little as one gallon of gasoline can contaminate groundwater above health advisory levels. Petroleum products contain toxic chemicals, including benzene, which is known to cause cancer. Gasoline may also contain additives like MTBE, which is highly soluble in water, and once in the groundwater, can move quickly and be very difficult to clean up. The proper use, storage and disposal of these products are critical for protecting water resources.

Proper Use of Fuels and Petroleum Products

- Store only small amounts of fuel in a well-ventilated space away from the house and in an UL-approved or original sale container.
- Use all stored fuel for machines by the end of each season, making disposal unnecessary.
- Examine storage containers and machines often for leaks and repair promptly.
- Do not fill machines with fuel near surface waters and private wells.

Minimize Fertilizer and Pesticide Use

- Test your soil. Supplemental fertilizers should only be used when soils are lacking in necessary plant nutrients and at certain times when the application is most critical or beneficial to the plants. Contact RI DEM Division of Forest Environment for assistance with nutrient management when establishing and maintaining new tree stands or vegetated openings within your woodlands. Contact the URI Cooperative Extension GreenShare Program for assistance with soil testing and nutrient management on landscape and garden plants. See the contact information at the end of this factsheet.
- Consider using nonchemical, low-toxicity, or other Integrated Pest Management techniques (biological, mechanical and cultural controls) to prevent and control pests. Contact RI DEM Division of Forest Environment

ABOUT RHODE ISLAND WETLAND LAWS...

The State of Rhode Island, in keeping with federal laws, protects wetlands, surface waters and other water resources and regulates the type of activities that can occur in and around these areas. In addition, some communities have established local wetland protection ordinances. The RI DEM Division of Forest Environment monitors timber harvesting practices through the Intent to Cut process. This includes timber harvesting operations in forested wetlands within approved Best Management Practice guidelines and monitoring by the Division of Forest Environment. Contact them for more information about forest management practices within wetland areas and to obtain Best Management Practices for Rhode Island: Water Quality Protection and Forest Management Guidelines. This manual was developed specifically to address water quality protection during forest management operations and include guidelines for temporary stream crossings (streams less than 10 feet in width), filter areas, buffer zones, re-establishing vegetation, etc.

Consult local and state regulations prior to undertaking any other work within wetland areas or the jurisdictional perimeter zones. You may need to obtain a permit to make other improvements and you may need the help of a natural resource professional. As required, permitted modifications or work in wetland areas should be done in phases. This will help to limit the amount of disturbance created in the buffer area during rain events and periods of seasonally high water. Contact the RI DEM Office of Water Resources and/or the RI Coastal Resources Management Council (for coastal areas) for additional information about Rhode Island's water resource laws. Refer to the end of this factsheet for contact information.

