HEALTHY FORESTS FOR CLEAN WATER

Did You Know?

We all need clean water to stay healthy, yet less than one percent of the water on earth can be used by humans as drinking water. Whether you drink water from a well or a municipal supply, forests keep that water clean and abundant. They do this by capturing rainwater and recharging underground aquifers. They also act as a natural filter as water moves over land, cleaning it of pollutants so it arrives at our lakes, rivers and streams in a better condition. We call this an ecosystem service — something our environment provides that people need, but don't have to pay for.

Natural Water Filter

Forests act as a natural water filter. When it rains, any water that does not soak into the ground becomes runoff and travels downslope to the closest stream, river or lake. As runoff travels it picks up nutrients from excess fertilizer and animal waste carrying that nutrient pollution into our waters, which is mainly nitrogen and phosphorus. All plants, including trees, use nitrogen and phosphorous for growth. But excess nutrients that get washed into streams, rivers and lakes support the growth of plants like algae. When there are a lot of pollutants in the water and an overgrowth of algae, it causes health concerns not only for the people who fish, swim or drink that water, but also other plants, fish, and insects that live in the water. Tree roots are an important mechanism for absorbing nutrient pollution before it reaches our waters.

A 2002 study by the Trust for Public Land and the American Water Works Association found that for every 10% increase in forest cover in the source watershed, treatment and chemical costs decreased by about 20%: *www.awwa.org/resources-tools/water-knowledge/source-water-protection.aspx*.

Similarly, a study of the High Rock Lake watershed in North Carolina showed water treatment costs trending lower in watersheds least 70% covered in forest: *ncforestservice.gov/water_quality/pdf/ForestsWaterQualityHighRockLakeWatershed.pdf*.

Green Swamp. Photo Credit: Misty Buchanan

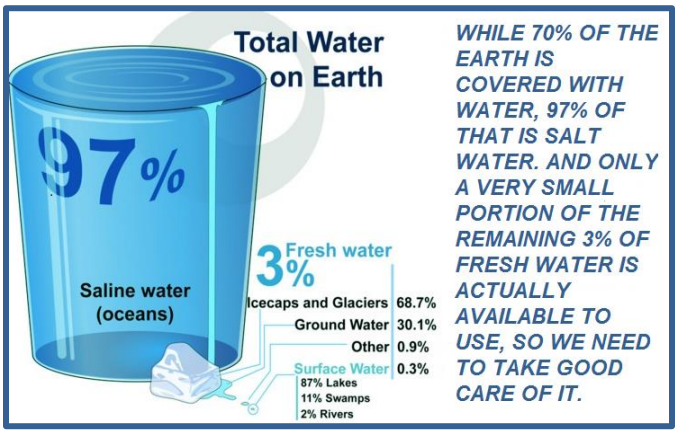
Rainfall runoff that flows over parking lots and roads also picks up oil, grease, trash or other pollutants. This rainfall runoff then flows into storm drains that flush the water directly to the stream, river or lake it drains to, without any treatment. But healthy forests, especially when properly managed and maintained, catch this runoff, slow its speed and allow pollutants to settle out. The trees in the forests also absorb some of the heavy metals, chemicals, and oil that come off pavement and other surfaces.

Keep Your Land in Place

Tree roots hold the soil in place, which reduces erosion and keeps the soil from washing into our waterways. Soil erosion, or sediment, is the number one type of water pollution in many places. Human activities like construction, plowing agricultural fields, or cutting trees can increase the amount of soil that enters our waters, when carelessly or unprofessionally done. Sediment in the water clogs the gills of fish and other wildlife. It also covers rocks in the bottom of streams and rivers which these animals depend upon, to hide amongst or to lay their eggs on. Sedimentation can reduce the life that the waters support. However, this type of pollution is easy to reduce simply by following best management practices for construction, farming and forestry. The easiest way to keep soil in place is by encouraging healthy trees to grow, especially along streams.

Abundant Water

Forests increase the amount of water that is available for human use, and reduce the amount of water that travels across the surface of the land. Not only do living tree roots hold soil in place but, as trees age, new roots grow and old roots die, creating small spaces (pores) in the soil, which allows water to soak and infiltrate into the soil. While all plant roots, even grasses, have this effect, tree roots extend further through the soil and are larger and decay more slowly, so even dead or declining tree roots contribute to long term soil stability and soil porosity. As forests are cut to build subdivisions and shopping malls, and soil surfaces are replaced with asphalt and concrete, less water is able to soak into the ground to fill underground aquifers and filter into creeks and streams reservoirs to supply drinking water for RI residents.



Less Flooding

The more parking lots, roads, buildings and grassed lawns within a community, the more water runs off the surface of the land to storm drains, retention ponds and streams, rivers and lakes. In fact, a one acre parking lot releases 36 times more water than one acre of forest (Changing Landscapes, USDA NA–TP–01–14 A3). The volume of water is not the only factor contributing to flooding, but the speed that the water reaches its destination increases the potential for flooding even more.

ESTIMATES FOR THE AMOUNT OF WATER A TYPICAL LARGE CANOPY TREE CAN INTERCEPT IN ITS CROWN, RANGE FROM HUNDREDS TO THOUSANDS OF GALLONS OF WATER PER TREE ANNUALLY DEPENDING ON SPECIES AND TREE AGE (LARGER TREES INTERCEPT MORE WATER).

Trees and their surrounding green spaces slow water flow so that the precipitation can infiltrate into the soil. But even water that does not soak into the ground is slowed on its way, so that peak flow is reduced and pressure on the banks of streams, rivers and lakes to hold all that water is eased. Large floods make the news and cause major economic damage. Small floods cause loss of property from erosion and can be an issue for those living near streams, rivers and lakes. As surface runoff is reduced and slowed, by plants and trees, flooding is also reduced.

Water Management

A watershed is the area of land that water travels across on its way to a stream, river or lake. What happens uphill, or upstream, in a watershed has an effect on everyone downstream. As Rhode Island continues to develop, it becomes more important that communities create a watershed plan that identifies how clean the water is, how the land is used and where water pollution is coming from. This type of plan identifies places in the watershed where forests, parks and other open places are needed and where they can be restored, and protected. Most watershed plans include a combination of protection and restoration measures. Protecting natural resources is more cost-effective than restoration but, unfortunately, such efforts often occur after significant impacts have already occurred. Working lands and undeveloped greenspaces allow people to work the land, explore the forests, play in the parks and exercise outside while the water is cleaned and replenished.

Wood River. Photo Credit: RIDEM

Forest Management

Well-managed forests provide many benefits for water, people and wildlife. An unmanaged stand of trees may have a high density, with too many trees crowded together. This means the trees grow more slowly as they must compete for a limited amount of soil nutrients, water and light. And that stress makes the trees more susceptible to diseases and pests. Crowded and stressed trees can also make it easier for wildfire to spread rapidly from tree to tree.

Managed forests not only contribute to clean water but can provide a source of income for landowners. Management can include commercial thinning, partial cuts or clear cuts. Foresters, management plans, and forestry best management practices are important to ensure that the trees, as well as the soil and water, are not damaged or degraded during such activities.

Healthy forests can look quite different from one another, depending on their age, the tree species composition, and how the different tree species grow. To benefit all types of wildlife, different types of forests at different stages of growth, from young to mature, are necessary. Removing or thinning the stressed, damaged and diseased trees from a forest gives healthy trees more room to grow, and the remaining standing healthy trees protect the water. Prescribed fire, or managed burns, reduce the growth of invasive plants and other competing vegetation. These management practices allow increased light and precipitation to reach the forest floor. As more light reaches the ground, native plant life such as wildflowers, shrubs and grasses can grow to provide food and shelter for large and small wildlife. Not only are forests important habitat but, when forests, green spaces and riparian areas are connected, they create paths that animals can use to move from one area to another.

Did you know? Rhode Island has *Forestry Best Management Practices for Water Quality Protection* available from RIFCO. As well as a Wetland BMP Manual from DEM's Office of Water Resources which addresses construction and disturbance around wetlands.

In Rhode Island, the Forest Stewardship Program works with landowners to support forest management. National and local efforts through the

Natural Resources Conservation Service (NRCS) and the RI Forest Conservator's Organization (RIFCO) also promote forest management on private lands.

Forest management practices, particularly timber harvesting, can cause soil disturbance, affect water quality, and contribute to pollution. *Forestry Best Management Practices for Water Quality Protection* outline how management practices must be accomplished to limit non-point source (NPS) pollution from forestry activities, but still allow low impact timber harvesting operations in forested wetlands. Before harvesting can begin in a wetland, the Division of Forest Environment's (DFE) Stewardship Forester reviews harvesting sites and wetland crossings. During or after a harvest, the Stewardship Forester returns to inspect the harvested wetlands and stream crossings; any violations, impacts, or incursions are reported to the DEM Freshwater Wetlands Program.

Forest management activities can be done without harm to water or soil where work carried out by professionals, from planning, to marking, to harvest.

Think About It

While technology can do many things, we should take advantage of the natural processes around us. Retaining trees and forested land does more than give wildlife a home, it provides the resources humans need to exist and to thrive. Forests do this more inexpensively than man-made infrastructure. Managing our forests responsibly, recognizing their value and including them in planning considerations is necessary for clean water, now and in the future.

WHAT CAN YOU DO?

1 GET EDUCATED! FIND OUT YOUR WATERSHED ADDRESS.

Go to the EPA site How's My Waterway and find where your land drains to — the name of the nearby river or stream. Where does it flow to? Is the river clean? Join a local watershed protection group or start your own with friends and neighbors and organize events such as trash clean-ups and tree planting

2 PLANNING TO HARVEST TREES NOW OR IN THE FUTURE? HAVE A PLAN!

Tree harvesting methods, including clear cutting, should not damage or impair wetlands or cause flooding. Forest management planning can minimize the amount disturbance by trails or roads within a forest area. Contact a professional Forestry Consultant to learn about forest management planning, how to create a plan for your property and utilize best management practices.

3 KEEP NATIVE TREES ALONG STREAMS TO PREVENT POLLUTION.

Whether harvesting timber or developing land for other uses, retain streamside protection zones of trees, shrubs, and natural groundcover to protect water from sedimentation and water temperature fluctuation, improving its quality. Follow the Forestry BMPs and guidance from RIDEM's Office of Water Resources.

4 PLANT A NATIVE TREE IN YOUR YARD.

Plant in your yard, in a nearby park, at your school — anywhere you can fit trees that will not impact overhead or underground utilities. If you live in a subdivision, adopt a native plants policy for common areas.

5 REMOVE INVASIVE SPECIES

Take out species such as bamboo, privet, English ivy or Japanese stilt grass that can harm the biodiversity of your forests.

6 CONTACT YOUR LOCAL GOVERNMENT PLANNING DEPARTMENT

Ask them about local conservation initiatives. Review their Comprehensive Plan to determine if it sets goals for forest and water protection — if not, suggest that they consider this key topic!

7 REPLANT URBAN AREAS

Does your town or city have a tree management plan? Do they know the tree cover amount (hint: it should be at least 40% or more for a minimally good canopy). Is your city or town a "Tree City USA"? If not, contact your city arborist, city manager or mayor to discuss how to better manage your urban forest and apply for Tree City USA recognition.

Trees along streams filter runoff and keep water cool for fish.

RESOURCES TO GET STARTED

Managing Small Woodlots:
https://ecosystems.psu.edu/research/centers/private-forests/news/managing-small-woodlots

Healthy Watershed Economic Benefits:
http://water/epa.gov/polwaste/nps/watershed/ecoben_factsheet.cfm

Center for Watershed Protection:
www.cwp.org/ 2013-04-05-16-15-03/watershed-planning

National Arbor Day Foundation – Tree City USA Program: *www.arborday.org/programs/treeCityUSA*

RIDEM Office of Sustainable Watersheds:
www.dem.ri.gov/programs/water/sustainablewatersheds/

RIDEM Office of Water Resources:
www.dem.ri.gov/programs/water/

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