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.

Rainfall runoff that flows over parking lots and roads also picks up oil, grease, trash or other pollutants. This rainfall runoff then flows into stormdrains 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 NC. 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. Trees' support roots are larger and they 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 the underground aquifers that supply drinking water for over half of NC’s 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 stormdrains, 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, the speed that the water reaches its destination increases the potential for flooding even more.

**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 North Carolina’s population continues to increase, 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.
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, such as pine beetles. Crowded and stressed trees can also make it easier for wildfire to spread rapidly from tree to tree.

Removing or thinning the stressed, damaged and diseased trees from a forest gives healthy trees more room to grow, and 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 for wildlife but, when forests, green spaces and riparian areas are connected, they create paths that animals can use to move from one area to another. 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.

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. Registered 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.


Forest management activities can be done without harm to water or soil. The Forestry Best Management Practices (BMPs) are measures to implement for protecting water and conserving soil. In North Carolina, there are also Forest Practices Guidelines (FPG) rule standards that must be met.

Below are some examples of fundamental BMPs for timber harvesting operations:

1. Always leave a protective streamside management zone (SMZ) along each side of intermittent streams, perennial streams, or other permanent bodies of water. The SMZ should capture and filter sediment, provide shade to the stream, stabilize stream banks, and conserve the natural ground cover material. Refer to the FPG rules for requirements of SMZs.

2. Lay out, construct and maintain logging roads, skid trails, and log deck landings to minimize soil disturbance and erosion. Limit the slope grades of roads and trails. During logging, apply leftover logging debris on top of skid trails and decks to naturally cover and protect the soil. Avoid spilling or leaking oil, fuel, or other contaminant fluids.

3. Avoid crossing streams with machinery whenever possible. This is a FPG requirement. If a crossing must be installed use bridgemats, if possible, for temporary access. If a culvert is needed, use a pipe diameter large enough to handle storm flow and avoid stream blockages. Promptly stabilize and cover any exposed soil at the crossing and on each approachway.

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 cfpub.epa.gov/surf/locate/index.cfm
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 cause flooding or make floods more severe. Forest
management planning can minimize the amount of roads
within a forest area. Contact a professional with the North
Carolina Forest Service 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 fluctuations,
improving its quality. A wide buffer is better but even
some trees along a stream are better than none at all.

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
utility lines or underground pipes. 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.

ON-LINE TOOLS TO GET STARTED

North Carolina Green Growth Toolbox offers many
ideas: www.ncwildlife.org/Conserving/Programs/
GreenGrowthToolbox.aspx
Tools for Managing Your Rural or Urban Forest:
www.ncforestservice.gov
Interactive River Basin Map: Find your watershed
address: www.eenorthcarolina.org/riverbasins-
interactive.html
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
Piedmont Together offers goals and strategies for
communities: www.piedmonttogether.org

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

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