



Tree Conservation Notes

Athens-Clarke County Community Tree Program

Trees and Water Quality

Trees Function to Improve Water Quality

Trees function in several ways to provide significant improvement in water quality. They intercept rainfall, take up water through their root systems, hold the soil, and shade streams. Consider the following facts.

- Because of impervious surfaces like pavement and rooftops, a typical city block generates more than 5 times more runoff than a woodland area of the same size.
- Impervious surfaces, such as roads, parking lots, and rooftops do not allow rain to infiltrate, or soak into the ground.
- Storm drains are used to carry large amounts of runoff from roofs and paved areas to nearby waterways.
- Stormwater runoff carries pollutants such as oil, dirt, chemical, and lawn fertilizers directly to streams and rivers.
- Storm sewers concentrate runoff, which gathers speed and power to erode soil.
- Water quality suffers when runoff is channelized.
- Natural terrain, such as forests, wetlands, and grasslands, is porous and varied.
- Water in natural terrain slowly filters into the ground.
- Trees absorb water-polluting nitrates, phosphorus, and potassium.
- Trees process, through uptake by roots, 5 gallons of water per week plus 5 gallons per caliper inch. For example, a 2" caliper tree needs 15 gallons ($5+(5 \times 2)=15$) weekly.
- A mature baldcypress tree can absorb 880 gallons per day, depending on the soil type and saturation.
- A typical community forest of 10,000 trees will retain approximately 10 million gallons of rainwater per year.

Water quality can be improved by:

- Bioretainment—the storage of rainfall on leaves, branches, and trunk bark.
- Retaining natural forested areas with a complex of trees and understory plants.
- Planting canopy trees along with understory trees, and maintaining those trees in good health.
- Practicing integrated pest management (reduction in use of chemicals).
- Composting of yard waste and use as mulch to improve water infiltration.
- Vegetating bare spots with herbaceous plants, shrubs, and trees.

Stormwater Management Using Trees

To use trees efficiently to improve water quality and manage stormwater runoff, implement the following conservation and landscaping techniques.

- Select tree species with architectural features that maximize interception, such as large leaf surface area and rough surfaces that store water.
- Plant trees in small groves where possible.
- Plant low-water-use tree species where appropriate and natives that, once established, require little supplemental irrigation. In bio-retention areas, be sure the species can adapt to standing and fluctuating water levels.
- Increase tree canopy by planting more large-crowning trees.
- Match trees to rainfall patterns so that they are in-leaf when precipitation is greatest.
- Plant broadleaf evergreens where appropriate, and avoid shading south-facing windows in the winter to maximize solar heat gain.
- Improve the maintenance of existing trees.
- Plant more trees in appropriate areas such as parkways, boulevards, parking lots, traffic islands, swales, median strips, and residential “rain gardens.” This will aid the retention/detention and infiltration/filtration processes.

Bioretainment

As mentioned previously, bio-retainment is the storage of rainfall on leaves, branches, and tree trunk bark. Bioretainment is influenced by—

1. Character and magnitude of the rainfall event.
2. Tree species and their structure.
3. Weather.

In other words—

- Trees will retain more water during a 1-inch rainfall event that lasts 2 days than one that lasts only 2 hours.
- Tree structure and leaf and bark surface area differ by species and each one controls the flow and storage of rainwater uniquely.
- Temperature, relative humidity, net radiation, and wind speed control the length of time rainfall is retained in storage.

References

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