Urban Forests Protect Our Streams

by Jim McGlone, Urban Forest Conservationist, VA Dept of Forestry, *(Conservation Currents, Northern VA Soil & Water Conservation District, 2006)*
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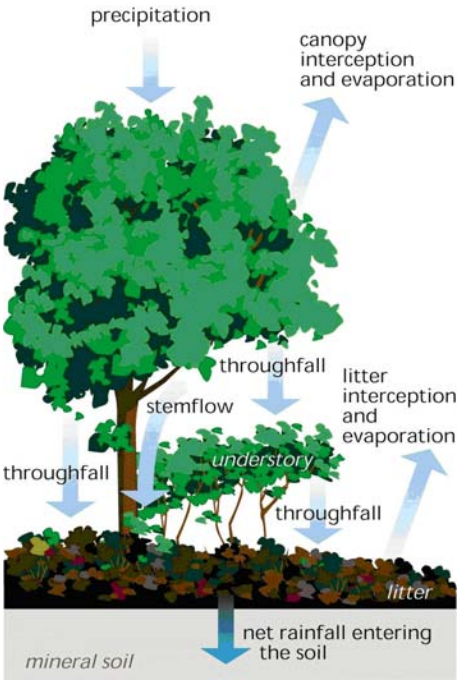
Earth is sometimes called the water planet. Huge areas of the planet are covered with water and that water is in constant motion. Flowing downhill in streams and rivers; circling in ocean currents; and cycling through the atmosphere to come down as rain and start its journey again. This last motion – coming down as rain – creates an intimate bond between the land and water. Streams evolve with their landscapes to handle the storm flows that come off the land. As we change the land, we change the storm flows and so affect streams.



Forests are unique in their ability to moderate storm flows. In a forest, only ten percent of the rainfall from a moderate storm (of a magnitude that occurs once every 1.5 to 2 years) actually reaches a stream as runoff. Tree leaves, twigs, branches, trunks, and stems, along with the forest floor litter, create an extensive surface area many times greater than the land area the forest covers. These surfaces intercept rainwater and allow much of it to evaporate before reaching the soil. Most of the rain that reaches the soil is held in the heavy organic layer and soaks into the ground. This ground water feeds the forest or seeps into the stream to keep it flowing between storms.

Unfortunately, forests are not compatible with many aspects of modern life – houses, roads, stores, offices, and ball fields are part of our communities. So we compromise. Much of the protection that forests offer to streams occurs in the 35 feet adjacent to the stream edge, beyond 100 feet the forest offers little added protection. Forested riparian buffers – forest strips along streams and other water areas – filter out sediment, pesticides, fertilizer and other things that wash off deforested upland areas. They also help infiltrate some of the runoff from these areas. By filtering and absorbing runoff, forested riparian buffers protect our streams. Since we can't have our forests intact and live here too, we try to protect forested riparian buffers where they exist and re-forest buffers where we can.

In rural areas, forest buffers do much to protect streams and reduce the effects on streams of changes in land use. However, in urbanized areas like Fairfax County, forested riparian buffers do not seem to provide as much of a beneficial effect as we would like.

Much of the pollution in Fairfax County streams is organic – nutrients, oil and grease, human and animal waste. Sediment – very fine soil particles – is inorganic and perhaps the greatest pollutant. Outside of tidal areas, stream bottoms should be made up of sand, gravel and other coarse material. The openings between particles are home to bacteria that consume the organic pollutants and clean the stream much like a fish tank's filter keeps the water in the tank clean. When sediment enters the stream it fills in these openings, eliminating habitat for the bacteria and reducing the stream's ability to clean itself.

Because of the relationship between sediment and other pollutants and its role in causing stream deterioration, sediment loads are a crude measure of stream health. Accotink Creek flows south through central Fairfax County, from the City of Fairfax and the Town of Vienna to Gunston Bay just below Fort Belvoir. Although 35 feet of forest buffers the creek for most of its length above Lake Accotink, the lake still received 35,000 cubic yards of sediment per year or approximately one dump truck of sediment every 2.5 hours between 1986 and 2002.

Illustration (top left) reproduced from *Stream Corridor Restoration: Principles, Processes, and Practices*, 10/98, by the Federal Interagency Stream Restoration Working Group (FISRWG). Photo (bottom right) courtesy of Fairfax County.

Why are forested riparian buffers failing to protect stream health in urban areas? Largely it is because urban storm water management bypasses the buffers. In an agricultural setting, storm water flows across the entire surface of the riparian buffer. In urban settings, stormwater is collected in a pipe and channeled directly to the stream. Because the storm drain connects our streets and parking lots directly to our streams, these areas affect our streams' health. In essence, these areas have become part of the stream corridor even though they are at some distance from the stream itself.

If urban forest buffers don't adequately manage stormwater, should we abandon them? No! Forested buffers provide wildlife habitat and critical corridors that connect larger areas of undeveloped open space. They are integrated with our stream habitats by providing shade to reduce water temperatures and leaves, which are food for the creatures at the bottom of the aquatic food chain. But we must recognize that past decisions about how we manage stormwater have made it necessary to broaden our definition of the riparian zone.

Stormwater drains are extensions of the natural stream network. So when we think about managing storm water by planting trees in the urban riparian buffer, we must also think about planting trees along the streets and parking lots that are drained by our man-made streams. Although trees planted over turf or pavement don't manage stormwater as effectively as forest, their ability to intercept and evaporate stormwater is greater than no tree at all. To the extent that street tree plantings can mimic forest settings by including shrubs and or mulch, their usefulness in managing stormwater can be improved.

The great thing about using trees to manage storm water is that they do so much more. Trees clean the air; improve property values; increase retail trade by making shopping areas more inviting; cool our planet, towns and houses; reduce winter heating and summer cooling costs; and much more. When it comes to the environment, trees are the ultimate multi-taskers!