Urban Landscapes and Watersheds

Our family recently went on a camping trip to Cumberland Island. You never know what the weather is going to do, so we came prepared with a big blue tarp that we hung above our tent. With rainclouds hovering overhead, we decided to check out the handy work of neighboring campers to see how our tarp stacked up. The rope, twine, cords, and straps that were used to raise these tarps resembled the work of industrious spiders. When you camp outdoors you quickly learn that a lot of water can fall out of the sky when it rains, and it is important to think about what happens to this water after it runs off your tarp.

In order to improve our understanding of the relationship between rainfall and land use, let's combine the lessons in "tarpology" that were learned on our camping trip with the word problems that come home nightly in my sixth grader's back pack.

Frank's wife and kids like to stay dry, so he purchased the biggest tarp he could find, a 20' by 50' monstrously ugly blue tarp. We know that a one inch rain event will deliver 623 gallons of water per 1,000 square feet. How much water ran off Frank's big blue tarp when one inch of rain fell on their campsite? If you dislike camping you might have guessed none because they stayed in a hotel. If you like camping and math you know that approximately 623 gallons ran off the tarp.

Let's bring these campsite lessons back home. The Athens-Clarke Stormwater Department reports that the average impervious area for a single family in the Athens area is 2,628 square feet. If no water evaporates, and the sidewalks, rooftops, and driveways that compose this impervious area how much water will run off the impervious surfaces from the average single family home in Athens when one inch of rain falls? The "mathphobe" will answer a lot of runoff, and sixth graders will know that there will be 1,637 gallons of stormwater runoff.

Impervious surfaces create a tremendous amount of stormwater runoff. Urban areas that have a high amount of impervious surface and a low amount of mature forestland are more likely to flood during high rain events.

Using simple watershed tools from a 1986 USDA-NRCS publication, Urban Hydrology for Small Watersheds we can learn even more about our interaction with watersheds. If we examine the same one inch rainfall event in the Athens area, we can estimate that one acre of forestland with clay soil will produce approximately 465 gallons of runoff. If you add a 5,000 square foot lawn, this runoff estimate increases to 484 gallons. However, adding the 2,628 square feet of impervious area of the average single family Athenian home increases the runoff estimate to 1,751 gallons. In other words, the average single family Athens home produces almost four times as much runoff as our forestland for an average rainfall event.

Why is it important to reduce our impact on the watershed? Why maintain urban forests, and other green spaces? What are the advantages of landscapes that reduce impervious foot print and/or improve infiltration? Practices like porous pavement, rainwater harvesting systems and rain gardens reduce runoff, and increase infiltration; this helps to prevent landscape and stream bank erosion, lengthen the time it takes for water to concentrate in streams, reduces property damage from flooding, aids in recharge of ground water, and helps to maintain flow in streams during dry cycles.

Designed landscaping—like this rain garden—can clean and reduce the amount of stormwater runoff entering our streams.

If you like trees, gardens, and green space, but don't like gullies, eroded stream banks, red streams, dry streams, flooding , or dry wells then you probably want to plant urban trees and to decrease the amount of impervious surfaces in your life.

The forested stream on the left is much better for the environment than the paved stream on the right. The trees around the forested stream increase water infiltration and decrease flooding and erosion.

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