Got mud?

Stormwater, homeowners, and conservation districts

Karen Ogden and Logan Freed

The American lawn, a symbol of economic success for some and ecological scarcity for others, presents a complex challenge in water management. A quick-draining yard and flowerbeds are to be envied, even if the surface runoff causes flooding downstream. On one thing, most can agree, mud is trouble.

Conservation Districts across the Country work to protect soil and water resources from countless ways they can be impacted. Urban development with concentrated stormwater flows, impervious surfaces, and construction site runoff demands intervention to keep rainwater clean and infiltrating the ground instead of flowing across it to enter streams. Agricultural operations place demands on soil health and water supply, challenges met through careful planning and best management practices including cropland and animal grazing rotations. Non-point source pollution, the cumulative effect of rain washing over human modified watersheds, can be managed through small actions taken by many.

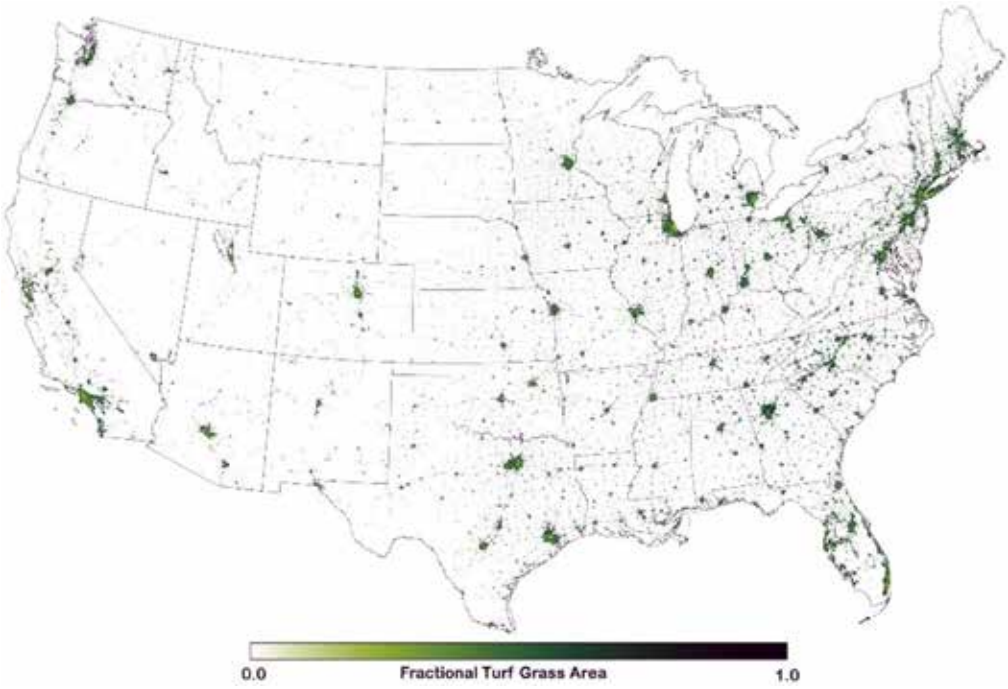

Figure 1. Distribution of the fractional turfgrass area (percent) in the conterminous U.S. (Milesi et al.)

The lawn dilemma

Turfgrass covers an astounding 40 million acres in the United States, which equates to two percent of the land area, making it the largest irrigated crop in the country (Milesi et al. 2005). From a soil and water conservation perspective, lawns pose significant problems, particularly for stormwater management (Figure 1).

Years of regular mowing compresses once-organic rich, spongy soils into a dense, impenetrable cake. This compacted soil is layered with a mat of thatch further restricting the downward movement of water and topped with three inches of uniformly cut turfgrass. These conditions encourage rapid downhill water movement (Figure 2).

Consider a spot in a lawn where grass just won't grow. During a rain event, a large puddle grows then slowly recedes to expose a muddy ditch surrounded by clumps of sickly grass. Homeowners often try to remedy the problem by spreading more seed or fertilizer, which float and are whisked away by the next rain, joining other non-point source pollutants.

Conservation District staff are trained and well-practiced at viewing landscapes through the lens of water flow. It is a skill homeowners can learn by simply walking in their yard while raining and observing. Of course, rain falls from the sky, but where do surface flows enter the yard? From the street, coursing off a driveway or patio, or jettisoned from a downspout? Once in the yard, find where the surface flow leaves the yard, does it collect in one area, or does it seemingly vanish? Mentally map the movement of the water then sketch it on paper or digitally. This can be useful in planning your near and long-term landscaping projects.

Environmental and economic impacts

Turfgrass lawns contribute to several environmental issues, including flooding, water pollution, resource depletion, biodiversity loss, and high maintenance costs. Surface runoff from lawns carries fertilizers, pesticides, soil, and other pollutants into waterways. Excessive water use through irrigation depletes

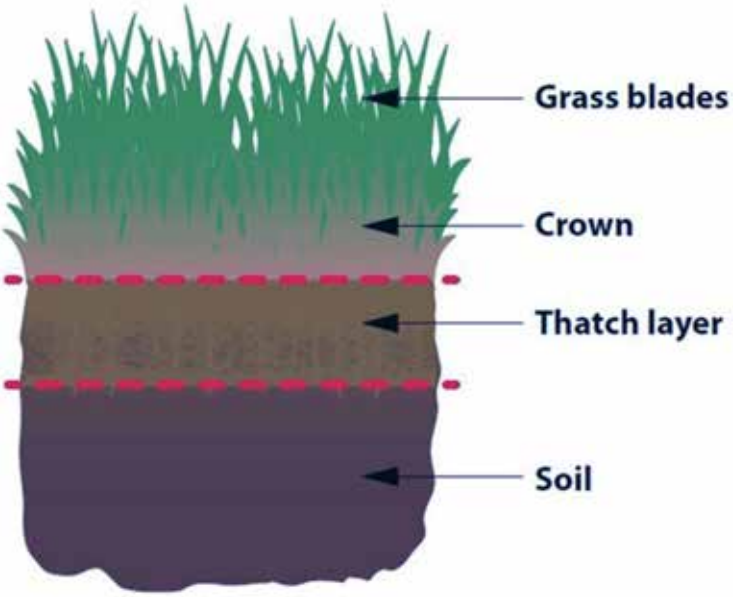

Figure 2. Anatomy of turfgrass. https://www.calgary.ca/water/programs/lawn-care.html

Figure 3. Photo of eroding streambank. (Reische)

groundwater resources while providing little or no habitat value for native wildlife. Turfgrass cannot support the insect diversity or biomass needed to sustain healthy populations of birds, amphibians, reptiles, or mammals. During heavy rains, manicured grass areas tend to produce more surface runoff and less water infiltration into soil, increasing the volume in creeks and streams. The storm flows fill channels to bank full, saturating the finer sediments that have been laid down over centuries. Eventually the saturated slurry collapses into the stream and is transported downstream (Figure 3). This process results in property loss and degraded water quality.

Native trees and plants: Nature's water managers

To address water management, we have at our service a remarkably effective nature-based water management system. Consider comparing stormwater runoff of an acre of turfgrass and acre of forest, nearly twice as much water would run off the grassed site (https://tinyurl.com/RunoffCoefficients). Without question, trees are the best way to encourage infiltration and then transport excess water from the ground into the atmosphere through transpiration, or tree exhalation.

A mature oak tree moves nearly 110 gallons of water each day (Ozcelic 2017). Its root structure, extending 10 to15 feet below the surface creates channels through which water can flow from the surface. The roots themselves grow and shed material that feeds a community of microorganisms increasing the organic component of soil that can hold or store water. Trees, oak trees in particular, are a workhorse in the yard. They move water, store carbon, cast cool shade, and provide habitat for insects and their furry or feathered consumers. In fact, a single mature oak tree can provide food for over 500 species of caterpillar (https://tinyurl.com/OakDiversity): a smorgasbord for hungry nestlings and adult birds (Figure 4).

Maybe there is not enough space for a tree in that bare trouble spot or where

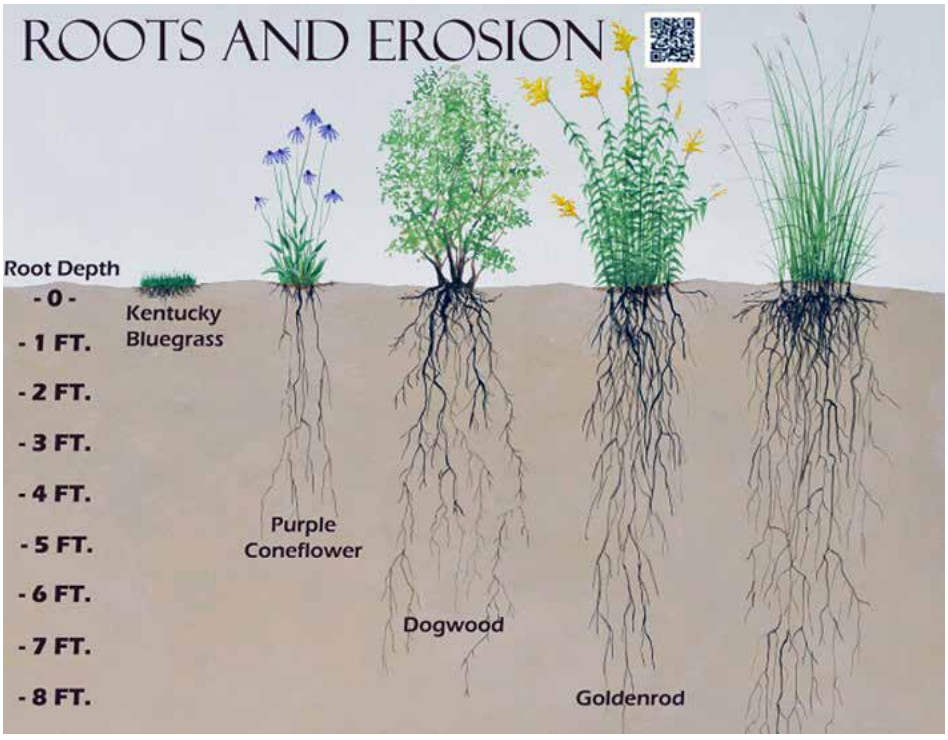

Figure 4. Descriptive diagram comparing the roots of turf grass to native plants. https://www.lovgov.org/services/parks-recreation/parks-facilities/parks-reservation-spaces/mehaffey-park/mehaffey-park-arboretum

the water courses off the roadway. It's not good practice to plant a tree at the base of downspout, so what else can be done?

Think native. Plants and shrubs that were present in your region before colonization are perfectly adapted to the climate and soils in your yard. These plants can thrive in occasionally flooded areas and create beautiful, low-maintenance spaces. These conditions are tough for most ornamental varieties, but home to native species.

Transforming the wet, problem area into a native planting, whether a seeded buffer strip or a formal bed, will address the mud problem and create beautiful spaces that appeal to people and pollinators alike. To get a native planting or seeding off to a good start, the aggressive turfgrass species must be removed or killed. Start with a blank slate for the best chance of success.

Removing turfgrass is challenging and there are several approaches to suit personal values or priorities. Manual removal by scraping or digging out the grass and root mass is hard work but effective. Be aware of the erosion potential of unvegetated areas. Another option is to smother the grass under cardboard or a tarp, after thoroughly wetting the area. Leave in place several weeks, depending on weather conditions.

If downspout volume is the issue, a rain garden may be the solution. Rain garden design and installation is a bit more complicated than a native planting but is a doable DIY project and can become the focal point of your yard. The most important elements in rain garden construction are (1) correct sizing and location, (2) soil amendments for best infiltration, and (3) species selection for changing water levels. Rain garden guides that provide step-by-step instructions for designing and installing rain gardens are plentiful. This one is created by Wisconsin Department of Natural Resources and provides a great starting point: https://tinyurl.com/RainGarden-How-toWI.

For those with larger areas of manicured lawn who want to reduce mowing, manage water, and enhance the surrounding ecosystem, a native meadow may be the solution. But first, manage your expectations. Meadows are dynamic systems, slow to establish, and changing in composition and appearance year by year. Native grasses are the foundation to a low maintenance meadow with flowering forbs more an accent rather than centerpiece. As with tree planting initiatives, lawn to meadow programs are often available in areas with dense residential areas.

Turf to meadow conversions usually begin with the application of an approved herbicide, precisely following label instructions. This method of site preparation has the added benefit of maintaining soil cover by the dead grass and thatch which also discourages germination of weed seeds remaining in the soil. After turf kill, no-till drill seeders cut a furrow through the thatch and deposit native seed mixes. Once established, native plantings must be monitored for competition from invasive, non-native plants.

Support: Sustainable landscaping

Across the United States, local, state, and non-governmental organizations are advancing or partnering to plant trees. Whether individual yard trees, street side or urban plantings, even large area conversions from turfgrass to woodland, there is often a program available to help. These initiatives are becoming competitive, a good sign of increasing public awareness of changing climate and the value of trees. For example, Pennsylvania's Watershed Forestry program of the Department of Conservation of Natural Resources has offered lawn to habitat grants since 2020. In its first five years, over 500 private landowners in southeastern Pennsylvania requested assistance from the program. Your local Conservation District may be able to direct you to the best fit tree planting program.

Volume and water quality issues in surface water reflect the cumulative effect of activities in the watershed. Point discharges, agricultural operations, and urbanization are major contributors, as is the American lawn and the industry that supports it. As an alternative and sustainable practice, homeowners can naturalize their yards incrementally or all at once with support from local Conservation Districts and networks of non-profit organizations working toward healthier ecosystems.

References

Milesi, C., C.D. Elvidgeb, J.B. Dietzc, B.T. Tuttled, R.R. Nemania and S.W. Runninge. 2005. *A Strategy for Mapping and Modeling the Ecological Effects of U.S. Lawns.* International Society for Photogrammetry and Remote Sensing.

Ozcelik, M.S. 2017. "Daily transpiration of a single sessile oak measured by the tissue heat balance method." *European Water* 59: 255-259. Retrieved March 18, 2025, from https://www.ewra.net/ew/pdf/EW_2017_59_34.pdf.

Karen Ogden and **Logan Freed** are dedicated individuals of the Bucks County Conservation District, combining their experience to further watershed and conservation initiatives

Karen works as the watershed specialist, sharing her expertise with a M.S. in biology coastal zones from the University of West Florida. Her background includes water quality data collection, environmental education, natural resource management, and consulting on environmental impact assessments.

Logan is the administrative assistant and conservation specialist. A graduate of Delaware Valley University with a B.S. in Conservation and Wildlife Management and a minor in Media and Communications, Logan interned with the District in 2023 before transitioning to a full-time role in 2024. She supports administrative functions while contributing to watershed and conservation projects.

.