From Shore to Shore

A publication of the University of Minnesota Extension Water Resources Team

Winter 2015 | Issue #119 | www.shorelandmanagement.org

Residents' Roles in Stormwater Mitigation

By Doug Malchow, University of Minnesota Extension, Rochester Regional Office, 507-280-5575, malch002@umn.edu

As a resident of Minnesota, whether rural or urban, you can play multiple roles in mitigating the impacts of stormwater runoff to our lakes, rivers, and streams. Not only can you personally install practices such as rain gardens, rain barrels, shoreland vegetation, or agricultural buffers, but you can also keep an eye on larger construction and post-construction projects in your area.

Stormwater often contains excess nutrients, sediment, toxic metals, chemicals, litter, and other constituents that can affect human and environmental health. Poorly managed stormwater can alter the infiltration rates and the natural flow of surface water, leading to floods, erosion, and harm to aquatic ecosystems.

Stormwater mitigation related to quality and quantity is mandated by federal regulations under the Clean Water Act and is administered by the Minnesota Pollution Control Agency (PCA). In urban or densely populated areas the PCA allows cities, townships, and public institutions to discharge stormwater to surface waters of Minnesota via a Municipal Separate Storm Sewer System (MS4) permit. To obtain the MS4 permit, the PCA requires the applicant to develop a plan that includes public education, the use of best management practices (BMPs) to control stormwater runoff quantity and quality, and ongoing maintenance of the BMPs.

In rural areas, however, the situation is different. The PCA requires a Construction Site Stormwater Runoff Control permit for **all construction activities with land disturbance of one acre or more**. The permit requires the development of a stormwater runoff control plan that uses best management practices, especially green infrastructure, to reduce or hold steady the stormwater runoff pre- and post-project. The plan also needs to include an ongoing management plan. However, upon completion of the construction activity, the permit is considered fulfilled, and unfortunately, no mechanism is in place to encourage or enforce the continuation of the project's stormwater runoff control. If ongoing maintenance is not practiced, the efficacy of the BMPs employed in the project may be reduced or the practices may completely fail.

Your role as a resident of Minnesota is to make sure that your township or county is aware that projects that disturb one or more acre of land: a) are required to have a site plan detailing the runoff control measures during construction phase, b) have an ongoing stormwater management plan in place post-construction, AND c) have a plan that is being followed, not only in the short-term, but in the long-term as well. ■

Calendar of Events

For the most current calendar items and more details, visit ww.extension.umn.edu/environment/water/calendar/.

Septic System Homeowner Operation and Maintenance Education (HOME)
Date: March 14
Location: Windom Farm and Home Show, Windom, Minn.
Contact: Doug Malchow, 507-280-5575, malch002@umn.edu

Linking Land Use and Water Quality: An interactive workshop designed for local community leaders
Date: March 26
Location: Fulda, Minn.
Contact: Karen Terry, 218-770-9301, kterry@umn.edu

Shorelines and Clean Water
Date: April 9
Location: Windom, Minn.
Contact: Karen Terry, 218-770-9301, kterry@umn.edu

Inside...

Antibacterial Products in Septic Systems

Article courtesy of the University of Minnesota Onsite Sewage Treatment Program, www.septic.umn.edu

An onsite sewage treatment system or "septic system" is a very effective way to safely recycle household wastewater back into the natural environment. A soil treatment based onsite system will remove all pathogens and most of the nutrients contained in wastewater if it is properly designed, installed, operated and maintained. "Operation" refers to everything we do or put into the system.

To achieve proper treatment, a septic system is very dependent on millions of naturally occurring bacteria throughout the system. We add many of these good bacteria through the wastes and materials typically found in wastewater. Anaerobic bacteria in the septic tank decompose organic materials in the wastewater and aerobic bacteria in the soil destroy disease-causing pathogens.

The use of antibacterial or 'disinfectant' products in the home can and do destroy good and bad bacteria in the treatment system. Normal use amounts of these products will destroy some beneficial bacteria but the population will remain sufficient and recover quickly enough to not cause significant treatment problems. Excessive use of these products in the home can cause significant and even total destruction of the population. Often the use of a single product or single application will not cause major problems but the accumulative effect of many products and many uses throughout the home may add up to an excessive total and cause problems.

More research is needed to determine 'what is excessive?' and which products are more or less harmful to systems. Recently many products are being marketed as "antibacterial". Consumers and on-site professionals working to diagnose treatment system problems have many questions about individual products. Questions like 'how antibacterial is antibacterial?' and 'which products are better or worse than others?' are a couple of them.

Several professionals have reported problems with low or no bacterial activity in systems and upon the removal of antibacterial products from the home, beneficial bacterial activity returns and desired treatment functions resume. These products affect all treatment systems but because of special attention being paid to new 'alternative' treatment technologies now being introduced into the on-site industry, it is possible that some systems may be more affected by fluctuating bacterial numbers due to antibacterial products than other systems. More research needs to be done on this as well.

What are these antibacterial products we are talking about? They include: 'antibacterial' hand soaps, tub, tile and shower cleaners, drain cleaners, toilet bowl cleaners, laundry bleach products, and others. Also included are 'antibiotics' that may be prescribed for medical treatment. These are products that are found in nearly all homes. They often carry a "safe for septic systems" statement printed on the label. The question may be "How Safe?"

The University of Minnesota Extension Service Septic System Owner's Guide suggests the following to improve septic system performance:

- Do not use 'every flush' toilet bowl cleaners
- Reduce use of drain cleaners by minimizing the amount of hair, grease, and food particles that goes down the drain
- Reduce use of cleaners by doing more scrubbing with less cleanser
- Use the minimum amount of soap, detergent and bleach necessary to do the job. Frequent use of detergents with bleach additives is excessive amounts of bleach.
- Use minimal amounts of mild cleaners, as needed only
- Route chlorine-treated water from swimming pools and hot-tubs outside of the septic system
- Dispose of all solvents, paints, antifreeze, and chemicals through local recycling and hazardous waste channels
- Do not flush unwanted prescription or over the counter medications down the toilet

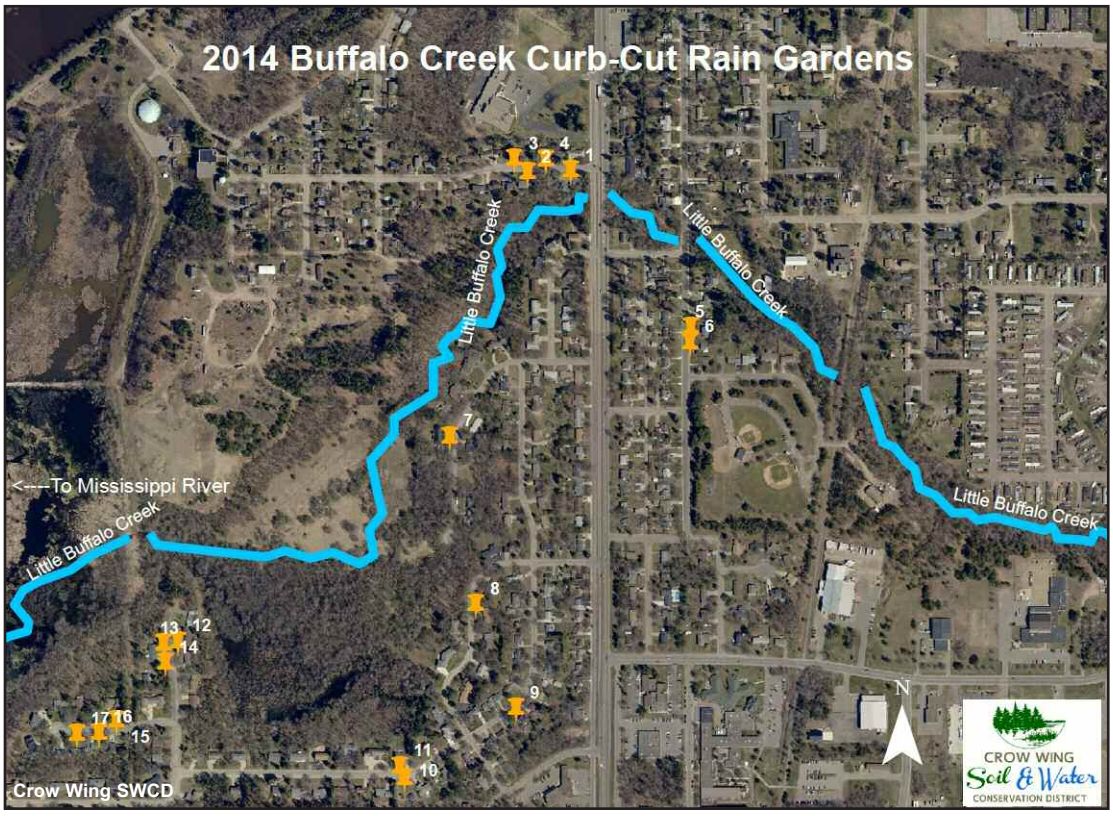
All of the practices above work toward preventing the loss of beneficial bacteria throughout the system. Bacterial additives (enzymes, starters) are not necessary and will not compensate for excessive use of antibacterial products.

It might be that in an effort to be "super clean" and protective of the families' health through the use of antibacterial products in our homes, we might compromise our health in another way – by damaging our on-site sewage treatment system! ■

Cities Make Progressive Efforts to Protect the Mississippi River

By Eleanor Burkett, University of Minnesota Extension, Brainerd Regional Office, 218-828-2326, burke044@umn.edu

Approximately 10% of the first 400 miles of the Mississippi River is owned by cities, whose infrastructure includes a lot of hard surfaces that reduce infiltration and increase the amount of stormwater runoff that carries pollution into the river. Local officials in communities along this corridor from Bemidji to Little Falls have questions about how they can protect and improve water quality. Specifically, they need to know the most cost-effective way to reduce polluted runoff into the Mississippi River in compliance with Minnesota state requirements.



Little Buffalo Creek watershed rain garden project: areas highlighted in yellow show rain garden project sites.

Crow Wing Soil and Water Conservation District (SWCD) contracted HDR Engineering, Inc. to help answer these questions for the City of Brainerd in 2012. They studied the Little Buffalo Creek Watershed, which runs through commercial, industrial, and residential areas of the city before it joins the Mississippi River. The study assessed soils, spatial data, and land use, and used local knowledge to identify areas ripe for pollution reduction practices. Prioritization of these practices was determined with a cost analysis that factored in construction, project life, and pollutant removal over the life of the practice. This study and the final report, which was funded through the University of Minnesota Central Region Sustainable Development Partnership, provided information that city engineers and council members needed for choosing practices that were prudent and cost-effective.

As a result of this study, 17 filter gardens were planted in 2013 in the Little Buffalo Creek Watershed, reducing the amount of nutrients, sediment and stormwater runoff entering the river and creating habitat for birds, bees and other wildlife. The Clean Land and Water Legacy helped to fund these projects with a matching grant. SWCD partnered with the City of Brainerd, Central Lakes College, Crow Wing Master Gardeners, and landowners. For more information about this project visit: http://z.umn.edu/cwswcdlittlebuffalocr. The following year, a similar study was done in the neighboring City of Baxter in the Whiskey Creek Watershed.

In 2014, the Mississippi Headwaters Board contracted with HDR Engineering, Inc. to assess water quality and stormwater runoff for Bemidji, Grand Rapids, and Little Falls. This created a consistent process and a decision-making tool for cities located on the first 400 miles of the Mississippi River corridor. A Clean Water Legacy grant application has been submitted by the Mississippi Headwaters Board to replicate this process for more cities within the headwaters region. ■

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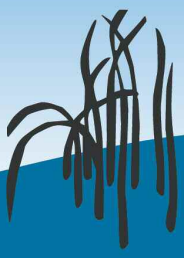

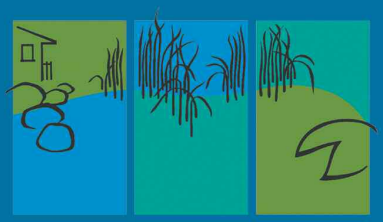

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A publication of the Water Resources Team, dedicated to educating Minnesota citizens about water resources issues to improve water quality, habitat, and aesthetics of our lakes and rivers.

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Sea Grant Minnesota

University of Minnesota Extension

Success! Common Carp under Control in Riley Chain of Lakes

Article courtesy of the Minnesota Aquatic Invasive Species Research Center, www.maisrc.umn.edu

Work in the Riley Purgatory Bluff Creek Watershed District culminated this fall with the exciting announcement that common carp in one of their sub-watersheds, the Riley Chain of Lakes, is under control. Work continues in the other sub-watershed, Purgatory Creek.

Nearly a decade of basic and applied research has gone into this project to understand common carp, a ubiquitous invasive species that infests many lakes, wetlands and rivers across southern and central Minnesota, including the metro area. This long-term project, which required cooperation from numerous partners, worked not just to understand common carp, but to use this knowledge to advance control efforts.

The common carp, which was originally introduced to the U.S. following citizen requests in the 1870s, was seemingly able to take hold due to its high fecundity, low mortality rates, resilience, and ability to exploit productive and degraded waters for reproduction. By uprooting plants and releasing nutrients from sediments, carp further degrade water quality and waterfowl habitat.

Despite the pervasive presence of common carp in Minnesota, it – like all species – has weaknesses. A team of researchers, led by Dr. Peter Sorensen and Dr. Przemek Bajer, has been researching how carp movement and distribution can be used for control.

Through the use of radio-telemetry to track individual fish, researchers found that carp are widely dispersed throughout lakes in the summer and fall, but begin aggregating in mid-December. These aggregations, which appear to be a social behavior, can be targeted with seine nets for removal. Researchers are still unsure how carp determine where to gather; there is no discernible difference in temperature or dissolved oxygen in the area they choose. As evidenced in Lake Riley, seining can be extremely effective: 90% of the carp population was removed this way.

During the winter, researchers use antennae and receivers to track fish (known as "Judas fish") that have been implanted with radio-tags. When conditions are appropriate and the fish are densely aggregated, the scientists then work with commercial fisherman to place nets under the ice, surround the fish, and remove them. Carp are highly sensitive to sound and will avoid the nets if targeting is imprecise or too noisy, or if the nets get caught on debris. They also seem to learn to recognize fishers, so the technique must be deployed strategically.

In order for seining to have long-term, sustainable effects on carp and water quality, Sorensen, Bajer, and their colleagues have determined that adult fish removal needs to be part of an integrated approach that also includes biocontrol using native bluegill sunfish that consume carp eggs and larvae, as well as aeration to prevent winterkills and keep bluegills alive. This approach – known as Integrated Pest Management – was developed and implemented for carp on the Riley Chain of Lakes and has successfully kept the carp population under control. It was the early success on that project that inspired the creation of the Minnesota Aquatic Invasive Species Research Center by Sorensen and will help guide future research and management plans for other Minnesota watersheds.

Congratulations to all the researchers and partners who have worked on the project, including the managers and staff of the Riley Purgatory Purgatory Bluff Creek Watershed District, Lake Riley Improvement Association, CH2M Hill Engineering, Barr Engineering, the City of Eden Prairie and private citizens. The Minnesota Environment and Natural Resources Trust Fund and the Riley Purgatory Bluff Creek Watershed District funded this critical work. Stay tuned to our website (www.maisrc.umn.edu) for more updates as we continue work on common carp in the Purgatory Chain of Lakes in 2015. ■