

HEADWATERS

PUBLICATION OF MARYLAND SEA GRANT EXTENSION WATERSHED EDUCATORS

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DEAR HEADWATERS READERS,

Fall, a time of school buses, sweaters, shorter days, and everything pumpkin-spiced. It's a wonderful time of year when the leaves begin to change and our thoughts turn to upcoming holidays with family and friends. Unfortunately this issue of Headwaters has nothing to do with any of those things so I'll get right to the point: water quality is important to us all, whether you're sailing on or in it, so read on and you'll find a new way to see what the water is like in your area or learn a new way or two that you can protect our precious groundwater. Did you know that rain gardens are helping to decrease climate-related impacts or have you always wanted to know how to winterize your rain garden? We may not have pumpkin-spice but we do have the latest on rain gardens in this issue. And other than sea monsters, have you ever wondered what Lake Champlain and the Chesapeake Bay have in common or what **our** favorite trees are? Well wonder no further, because we answer all that and more in this issue of Headwaters.



Source: E. Buehl

Thanks for taking the time to read this issue and we'd love to hear from you about the articles.

Sincerely,

The Maryland Sea Grant Extension Watershed Educators Team





Climate Pressures and Green Infrastructure - A Local Case Study

+ AMANDA ROCKLER

Stormwater green infrastructure (GI) is a living network that connects natural areas and waterways. GI generally utilizes small stormwater best management practices to treat stormwater through a system of processes including evaporation, transpiration, and infiltration. GI aims at slowing down and treating stormwater as close to the source as possible rather than with more traditional approaches such as stormwater ponds or grey infrastructure. Stormwater GI can also help to deal with current and future climate pressures such as increased precipitation and heat island effects.

In a new Montgomery County, MD case study (Guise, Rockler, Shirmohammadi, and Pavao-Zuckerman) published in the *Journal of Water Resources Planning and Management*, the relationship between GI and climate was examined using a paired watershed approach. One watershed had existing stormwater GI, including swales and bio-retentions, and the other traditional watershed had detention ponds.

Using U.S. Geological Survey monitoring information in the Soil and Water Assessment Tool (SWAT), various future climate scenarios were tested on each watershed. Results of the study found that the watershed with GI was able to handle more increased precipitation events than the conventional watershed, but in large rain events, both watersheds were unable to effectively manage large amounts of water.





“...we need to be prepared to handle more frequent and more intense rain events.”

In the end, planning for more intense weather events will be critical for stormwater management green infrastructure in the future and we need to be prepared to handle more frequent and more intense rain events.

The full article entitled “Assessing Watershed-Scale Stormwater Green Infrastructure Response to Climate Change in Clarksburg, Maryland” is available through the Journal of Water Resources Planning and Management, DOI: 10.1061/9780784479018, through [Pavao-Zuckerman’s website](#).



GI rain garden at work in a 1 inch rainstorm.
Source: A. Rockler





What Would Bernie Do?

+ JACKIE TAKACS

As I look back over a 2+ decade career, I can't help but wonder at times if my words have fallen on deaf ears or if I have made any difference. If you're an avid reader of Headwaters, you're likely part of our environmental choir and know that for the past several years our program and team has participated in funded research, done educational programs, and produced various written materials around the areas of watershed restoration and climate change. But there are times when I start to doubt my work so that's when I ask myself, "What would Bernie do?" By that I mean the Honorable Bernie Fowler and his famous wade-in. Bernie is my living Chesapeake Bay historical barometer who grew up knowing a different Chesapeake Bay than I have ever seen, but a Bay I hope my children will see. The big difference between Bernie's childhood Chesapeake and today's Chesapeake, 10 million more people and all the infrastructure that is needed to support them.



To recharge and refocus, I took a trip to Greenland and Iceland this summer and had the opportunity to see firsthand some of the [impacts of climate change](#) and get a unique local perspective on infrastructure. Iceland and Greenland have a combined population just over 2% of that of the Chesapeake Bay watershed and are definitely feeling the effects of global climate change. Iceland loses about 15 square miles of glacier-covered area annually and Greenland loses 142 billion tons of ice a year. These losses are impacting the local flora and fauna and contributing to sea level rise across the globe.





“...there are times when I start to doubt my work so that's when I ask myself, 'What would Bernie do?'"



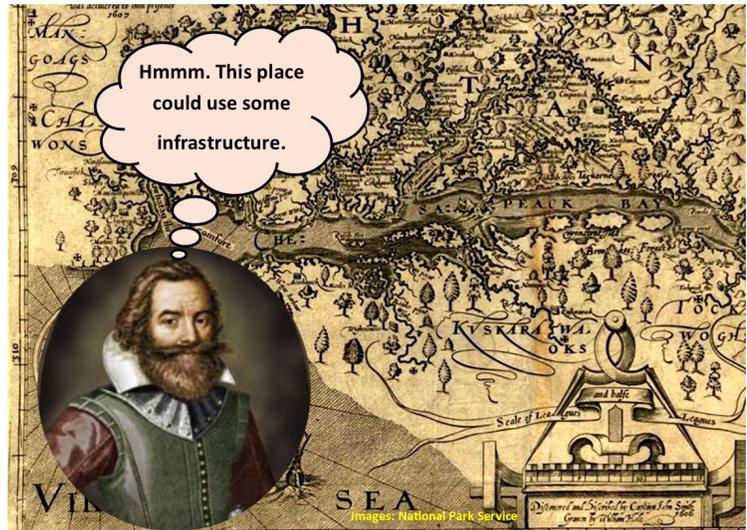
Svinafellsjokull Glacier in Iceland is one of many they monitor with regard to climate change and the amount of "retreat" that is occurring. Source: J. Takacs

It was during a 4-day hike in the back country of Greenland that really made me appreciate how pristine our watershed may have looked when Captain John Smith set sail up the Chesapeake (minus the acres of deciduous forest, of course). We had a Danish guide that took our group over 10 miles to our camp, over terrain that most likely has only ever seen a few hundred footprints.

My trip happened to coincide with Today Show weather anchor Al Roker's visit to report on the melting glaciers and President Trump's talk about buying Greenland. It was the President's talk about buying Greenland that excited our Danish guide. I was surprised and wanted to know why would he want the United States to purchase Greenland? "Infrastructure" was his reply, he was hoping for more roads and wanted more infrastructure. As I choked on the



“We need to be aware of the environmental consequences of what we do on our landscapes...”



water I was drinking, water that was scooped directly out of the river we were camping on, all I could imagine was Captain John Smith sailing up the Chesapeake and turning to his first mate and saying, “You know what this place needs . . . infrastructure.”

I’m not saying infrastructure in itself is bad, but poorly designed and poorly managed infrastructure can’t be good. My hope is other areas of the world not only use the Chesapeake Bay watershed as a model for how to do restoration, but that they also use us as a model for what not to do. We need to be aware of the environmental consequences of what we do on our landscapes and that we need to pay to maintain our infrastructure.

As someone who has explained the signs of climate change that are all around us (*hello sea level rise, increased coastal*





"Thank you to all of you out there that spread the word and work to clean up our watershed."

flooding, saltwater intrusion) and who understands the impacts humans have had, and continue to have on not only the Chesapeake Bay watershed but on environments thousands of miles away, our job can be frustrating. But seeing some of these impacts firsthand and knowing the positive approach Bernie has taken inspires me to continue to share information and to say, "Thank you to all of you out there that spread the word and work to clean up our watershed." That's because over the years, that's what Bernie has taught me to do.



The Honorable Bernie Fowler who started engaging the public about Chesapeake Bay water quality with his first Wade-In event back in 1988. Source: David Harp





Our Favorite Trees

+ ERIC BUEHL

Our Favorite Trees

As Watershed Specialists, we spend a lot of time helping people decide which species of trees might be best for a particular project based on a variety of factors including sun, soils, and size. Every now and then, people will also see if they can add their favorite tree to the project. Now the number of reasons why people like a particular tree is probably rivaled by the number of grains of sand on the beach and there's not enough room in this article to list them all. But this got me to thinking; we spend so much time talking to other people about trees, I wonder what our favorite ones are? Well, below is the answer to that very question. And after reading this, drop any one of us an email and let us know what your favorite tree is and why.

Amanda - Paw Paw (*Asimina triloba*)

As an eastern North American native species, not only does Paw Paw have a very distinctive flower, it produces one of the largest edible fruits of all our native trees. The main reason this is Amanda's choice of favorite native tree is that her son loves the fruit! And because of recent interest in Paw Paw fruit, it has earned the nickname Hipster Banana.





“The number of reasons why people like a particular tree is probably rivaled by the number of grains of sand on the beach...”

Jackie - Red Maple (*Acer rubrum*)

Red Maples live up to their name: they give us that first shimmer of red in early spring with its flowers and seeds and wraps up the year with fiery red leaves in the fall. Even though its nickname is Swamp Maple, Jackie appreciates Red Maples not only for their color, she’s actually made syrup from its sap!



Kelsey - Willow Oak (*Quercus phellos*)

A tree she grew up with in her home state of Michigan, Kelsey’s favorite is the Willow Oak. This fast growing species produces plenty of acorns which keeps the squirrels busy, it also casts a great shadow on her apartment, something she appreciates during the summer months.





"This tall growing tree is important to a number of birds and butterflies."

Jennifer - Tulip Poplar (*Liriodendron tulipifera*)

Earning its name from a coffee-cup sized flower that people don't often see since they're so high up in the tree, the Tulip Poplar is Jen's favorite. This tall growing tree is important to a number of birds and butterflies. And its cat-shaped leaf reminds her of the two felines that are really in charge of her house.



Credit: E. Buehl



Credit: S. Nix / E. Buehl

Eric - Black Gum (*Nyssa sylvatica*)

My fave is the Black Gum. I grew to appreciate it over time because of the wide variety of conditions it grows in. And when people tell me they love the red color of a Burning Bush, which can invade natural areas, I often suggest that plants like Black Gum not only have a beautiful red color, they produce flowers and fruit that are beneficial to native insects and animals.



Credit: A. Hodges



Credit: M. Beziat





Dispatches from Sea Grant Academy

+ KELSEY BROOKS

Over the last year, when I told friends and family that I was attending a program called “Sea Grant Academy” they were usually confused and had follow up questions. Questions like, “What is Sea Grant?” or just “Can you say that again?” For those reading that are also confused, Sea Grant Academy is a two week training program for new Sea Grant faculty and staff from across the country. As a Maryland Sea Grant Extension Agent, attending Sea Grant Academy was an opportunity to better understand the program at a national level and learn some relevant program planning techniques and skills.

Beyond that (or maybe to that end), the academy was also a great opportunity to learn more about the other state Sea Grant programs. Every Sea Grant program focuses on coastal and/or freshwater resource management issues, which can vary substantially across the country. However, there are also many similarities to the issues we are all facing, especially in urban stormwater management. During the second week of the program, held in late September, we traveled to Burlington, VT and I was able to see this first hand.

Sea Grant in Vermont is focused on Lake Champlain and there are some interesting parallels between the lake and the Chesapeake Bay. Both waterbodies have large land to water ratios. The Chesapeake Bay’s is 14 to 1 (the largest for any coastal estuary) and Lake Champlain’s is 18 to 1, an attribute that increases the complexity of addressing stormwater and runoff issues. Both waterbodies have nutrient impairments.

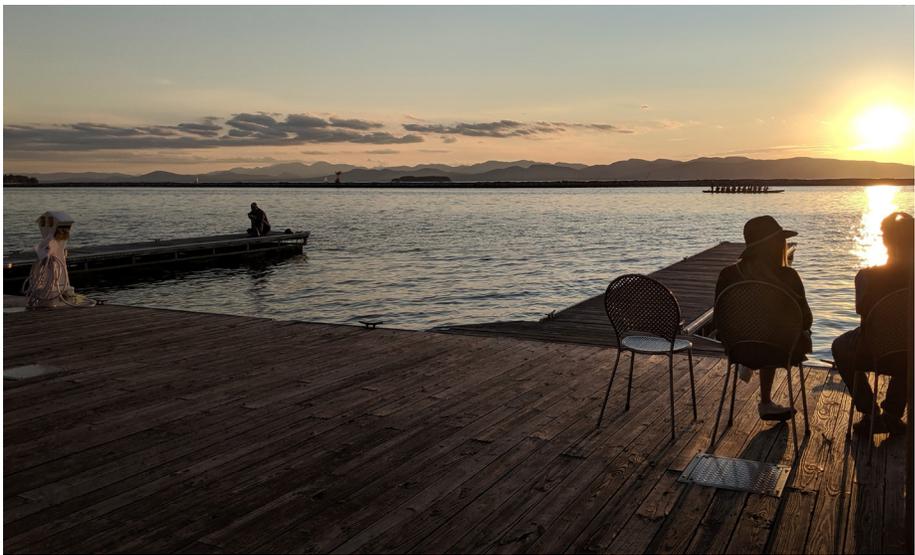




"...there is a network of practitioners throughout the country with interesting ideas trying to address the same issues that we are working on here."

As a freshwater system, Lake Champlain's primary issue is phosphorous, while we are also concerned about nitrogen in the Bay region. Both waterbodies also have multiple jurisdictions that drain to them. For the Chesapeake Bay that is six states plus DC, while those managing Lake Champlain have to contend not only with multiple states (New York and Vermont), but also multiple countries, since the lake and the watershed extend into Quebec, Canada.

With those similarities in mind, I was able to take away information about a number of projects and programs that could easily be ported from Vermont to Maryland with little modification. If nothing else, the trip and the program were a good reminder that there is a network of practitioners throughout the country with interesting ideas trying to address the same issues that we are working on here.



Lake Champlain at sunset. Source: K. Brooks.





Rain Garden Winterization

+ KELLY MACBRIDE-GILL

As the weather gets colder, it's time to prepare your rain garden for the winter. In many ways, rain gardens need similar care to any garden and taking these steps now will keep your rain garden in good shape and make care in the coming spring easier. Late fall is the best time to start winterization as plant activity is slowing down as they head into dormancy, but the ground hasn't frozen and it's still nice to be outdoors. In addition to tending to the plants, you'll need to take care of the rain garden structure as well.

Here are some suggestions for making your rain garden winterization plan:

- Remove any weeds from over the summer. Catch them now before their seeds drop and create more work for you in the spring.
- Determine if your perennials need dividing (UME factsheet on [Dividing Herbaceous Perennials](#)).
 - For blooming perennials, fall is the ideal time of year to do it. Either replant these clumps if there is space in the rain garden, add them to your garden beds, or gift them to another gardener (look for local plant swaps to find other gardeners to trade with).
 - For non-blooming perennials, such as grasses, plan to separate them in the spring.
- Overall, prune sparingly in the autumn and then again more thoroughly in early spring. This can help to protect the plants from cold damage.
- Replenish the mulch as needed. You want a mulch layer at least 3" thick over the whole rain garden. As you add mulch,



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"avoid the temptation to shovel excess snow into the rain garden as the weight can compact the soil and compromise drainage."

be careful to keep the ponding area of your garden cleared to a minimum of 6" deep.

- Check the berm surrounding the rain garden for any breaks or erosion. Repair by replacing the soil and adding a fresh layer of mulch.
- Rake out leaves that have collected. A layer of accumulated leaves can keep your rain garden from draining properly.
- Keep an eye out for any cool-season weeds that may appear in the late fall and continue to weed those out.
- Over the winter, even though the plants are dormant, your rain garden will continue to let stormwater runoff soak in. But avoid the temptation to shovel excess snow into the rain garden as the weight can compact the soil and compromise drainage. Instead, pile snow at the head of the rain garden so that as it melts the water flows in.



Like any other type of home landscaping or garden bed, rain gardens need maintenance too.
Source: E. Buehl.



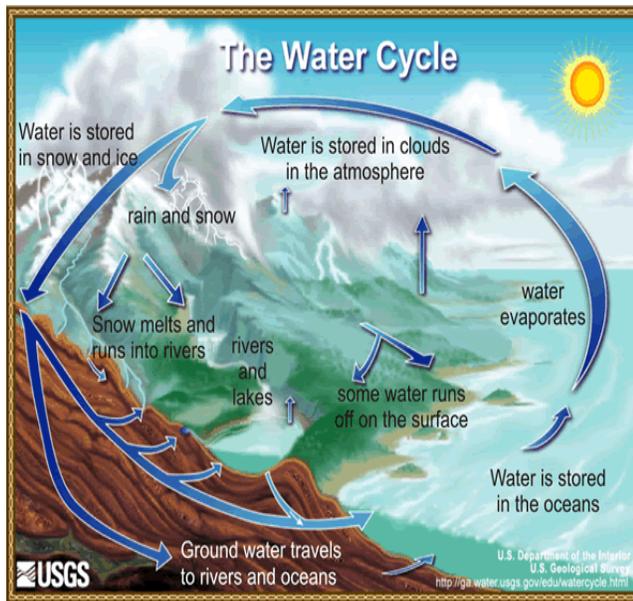
Our Water - It Is All Connected and More Reasons To Protect It

+ ANDY LAZUR



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In the last issue, we discussed the significance of groundwater and how our water resources are interconnected. This principle of connection is critically important to all of us since we rely on ground and surface waters for drinking. About 80% of Marylanders are supplied with drinking water from surface sources such as reservoirs and the remaining population (approximately 1.2 million) are supplied either from public or private wells.



The hydrologic or water cycle relates how water is continuously moving above, on, and below the land surfaces. Precipitation enters both ground and surface waters and carries with it much of what is on the land's surface or in the soil including the

many contaminants from human activities. Surface water can become groundwater and groundwater can supply streams and rivers. Since our drinking water comes from both sources, understanding this connection accentuates the importance of stewardship practices to conserve and protect these resources. Fortunately, attention to the health of the Chesapeake Bay in recent decades has empowered a growing segment of the





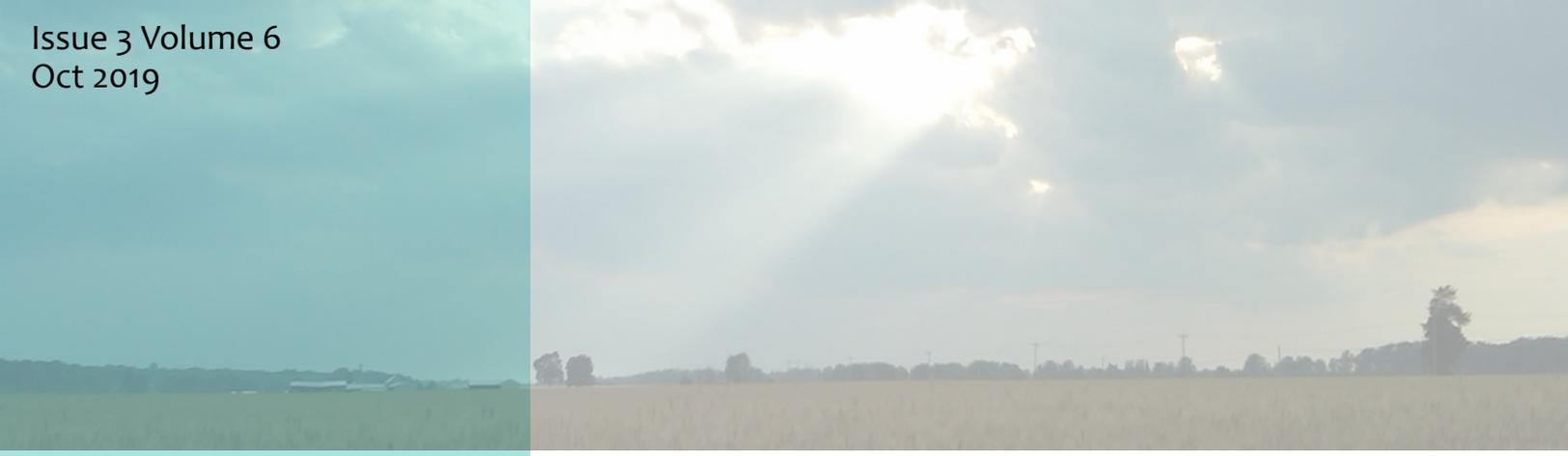
“Understanding this connection accentuates the importance of stewardship practices to conserve and protect these resources.”

public to be more informed and engaged in stewardship practices that aid in conserving and protecting a variety of surface waters including streams, rivers, and the Chesapeake Bay. Also fortunately, these practices also help protect our groundwater resource.

In addition to the many stormwater stewardship practices that the other *Headwaters* authors and their partners are involved in e.g. rain barrels and gardens, conservation landscaping, tree planting (visit the [Watershed Protection and Restoration Program webpage](#) for more information), the following are other recommended practices that we can implement to protect groundwater.

- Use high efficiency appliances and fixtures like front loading clothes washers, low-flow faucets, and low-flush toilets to reduce the water volume entering sewer or septic systems
- Limit water use by taking shorter showers, turning off water when brushing teeth, and fully loading appliances (dishwashers and washing machines)
- Use mulch around landscaping to reduce watering needs
- Properly store and dispose of household chemicals such as cleaning products, fertilizers, paints, pesticides, prescription drugs, and petroleum products. Do not dump them down the drain or toilet or on the ground
- If you have a well, use a state-certified lab to test water annually for bacteria and nitrate, which can be signs of fecal contamination





"all water is ultimately recycled, and therefore many of the choices we make day to day can impact water quality"

- Pump septic tanks at least every three to five years or as determined by a service provider
- Protect septic drainfields from traffic, tree or shrub roots, and excessive water runoff

The water cycle also demonstrates to us that all water is ultimately recycled, and therefore many of the choices we make day to day can impact water quality and further both environmental and public health.





Water Quality and Sailing

+ JENNIFER DINDINGER



The summer is over, the log canoe season has ended, and the bruises are healing. It's a labor of love to sail and maintain a Chesapeake Bay Log Canoe...the crew are always worried that something will break or that last year's repair won't hold. Or that another boat might collide with yours and deny you victory. (Ahem, *Island Blossom*).

Something else that should be on the minds of log canoe sailors all season is water quality. These vessels are very "tippy" and can capsize quite easily. Every race weekend sees at least one capsize, and often more. Thus, it is important that we know what's in the water before we leave the dock.

This summer, I relied on the [ShoreRivers water quality monitoring program](#) and the [Swim Guide](#) app to stay informed about bacteria counts in the rivers. ShoreRivers sampled for enterococci bacteria, commonly found in human and animal waste, at 28 locations around the Shore where people might come in contact with the water, such as informal swimming beaches or boat ramps. Log canoes race in the Chester, Tred Avon, Miles, and Choptank Rivers, and ShoreRivers had sampling sites near all of our race locations.

I checked the app before every race weekend so I could know if the bacteria concentration near our race location was higher than the safe threshold for swimming. If so, we took extra precautions about water exposure and rinsed off





"I checked the app before every race weekend so I could know if the bacteria concentration near our race location was higher than the safe threshold for swimming."

right away after racing. If the site had passed and the bacteria concentration was safe for swimming, we had one less thing to worry about.

Log canoe racing is always unpredictable, but knowing about the water quality on race weekends was a small way to manage some of that uncertainty. I look forward to using the app again next season, whether for racing or just enjoying time on the water in the Land of Pleasant Living.



The log canoe *Edmee S.* capsized somewhere in the Tred Avon River. Source: J. Dindinger.



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