

# HEADWATERS

PUBLICATION OF MARYLAND SEA GRANT EXTENSION WATERSHED EDUCATORS

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## GREETINGS LOYAL HEADWATERS READERS,

Winter is an important season here in Maryland because the precipitation we're getting now helps to recharge our groundwater, which ultimately feeds our local streams during drier times. But with temperatures swinging back and forth from the teens one day to 60 degrees the next, it's hard to be sure it's really winter and decide whether you need to bundle up or put sunblock on; let alone figure out if you need to grab an umbrella or the snow shovel.

This issue of Headwaters shares a variety of information on lakes, precipitation, and stormwater, and the many ways we have chosen to manage them. We also share with you a delicious way to help clean up the Bay and how the word sustainable may be losing its sustainability. We know it's difficult to put your faith in a rodent for long term weather predictions, but with spring not far around the corner, why not just sit back and relax and take in all this issue has to offer. So here's lookin' at you Phil and thanks for the prognostication of only six more weeks of winter.



The Maryland Sea Grant  
Extension Watershed  
Educators Team

Photo credit: the Sun UK newspaper





# Rain Tax *Sturm und Drang*: Was the Fee Repeal Worth All the Storm and Stress?

+ KELSEY BROOKS



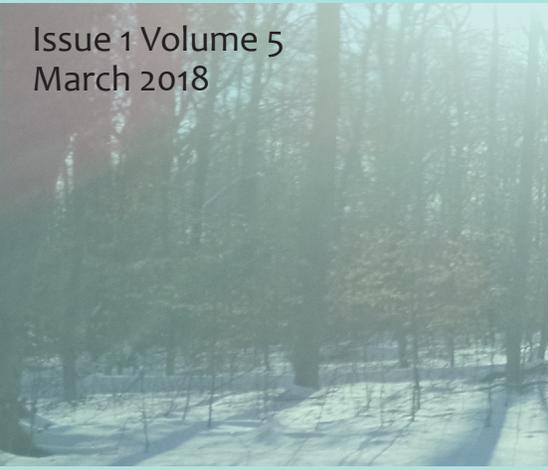
As an MS4 permit writer in Virginia in 2014, I was generally aware of the controversy surrounding Maryland’s “rain tax” and the role it played in Governor Hogan’s campaign and election. Since coming to Maryland, I have been working to better understand this state’s approach to urban stormwater management, including getting a better grasp on its political history. As Maryland approaches another gubernatorial election, it is interesting to look back and understand what the rain tax was (a service fee or utility), what the rain tax was not (a tax on the rain), and the impact the repeal had on Maryland’s jurisdictions. Was all that *Sturm und Drang* worth the final outcome?

What was the stormwater remediation fee? Maryland

House Bill 987 (HB 987), which passed in 2012, required Maryland’s Phase 1 Municipal Separate Storm Sewer System (MS4) municipalities to establish a dedicated funding source to administer, implement, and maintain a fully compliant stormwater management program. Under the bill, each permittee could determine how that fee would be implemented - flexibility that allowed Frederick County to meet the letter of the law by passing a flat one cent fee on all eligible properties. For permittees that already had a fee in place, such as Montgomery County, the bill did not require any significant change.

What did not change with the repeal of HB 987? The repeal of HB 987 in 2015 did not change the MS4





“The repeal of HB 987 in 2015 did not change the MS4 municipalities’ regulatory requirements or the cost of meeting those requirements.”



Stormwater fees are used to support the implementation of infrastructure, such as bioswales. Baltimore County phased out its stormwater fee in 2017.

municipalities’ regulatory requirements or the cost of meeting those requirements.

What did change with the repeal of HB 987? The repeal made having a dedicated stormwater fee optional instead of mandatory. HB 987 was replaced by Senate Bill 863, which instead required each Phase 1 MS4 municipality, including those that have maintained

a stormwater remediation fee, to submit a “financial assurance plan” for approval to the Maryland Department of the Environment (MDE) every two years. These plans are publicly available through MDE’s website.

What was the outcome? As of February 2018, three of the ten Phase I MS4 municipalities do not have a stormwater fee: Carroll County (which never





established a fee), Baltimore County, and Harford County. Regardless of whether a Phase 1 MS4 locality repealed its fee, the cost of stormwater infrastructure is still funded primarily through public dollars either from the county's general fund or through state and/or federal grants.

So about that Sturm und Drang? Maryland's current program is more in line with the other Bay states and the District, which allow municipalities to adopt stormwater fees or utilities, but do not mandate them. Many localities throughout the Bay find these fees necessary to fully fund the adequate implementation and

maintenance of stormwater programs without cutting or underfunding other programs. Other localities find the fees give them more tools to meet the unique, diffuse challenges of urban stormwater management from incentivizing homeowner practices through fee credits, to funding grants nonprofits can use to implement small-scale practices, to the novel private-public partnership Prince George's county has pursued.





# Build It and They Will Come!

+ JACKIE TAKACS



This past December, the Smithsonian Environmental Research Center (SERC) hosted the third Patuxent River Conference, better known as PAXCON. The conference’s goals are to understand, share, and promote the health and future of the Patuxent River by connecting scientists, natural resource managers, government and municipal staff and officials, educators, and the public from every county along or working within its watershed. This year’s conference explored four important river and watershed stories: invasive species, habitat restoration, living shorelines, and stormwater best management practices. It was my privilege to participate on the Living Shoreline Expert Panel session with colleagues Sadie Drescher from the Chesapeake Bay Trust and Bhaskar Subramanian from the Maryland Department of

Natural Resources.

The panel was asked to talk and answer questions about education and outreach, technical assistance, and funding related to living shorelines. When I’m out in the field, I often hear the same questions from private landowners . . .

*How do I save my property? What is a living shoreline? How much will it cost? How much effort will it be? Critical Area what?*

Unfortunately, most private waterfront landowners only see their property shrinking – slipping into the water – and that is often their main focus and concern. They don’t understand that their shoreline (and fabulous views) are (or should be) dynamic environments that move and shift, attenuate wave energy, trap sediments,





“Unfortunately, most private waterfront landowners only see their property shrinking - slipping into the water.”

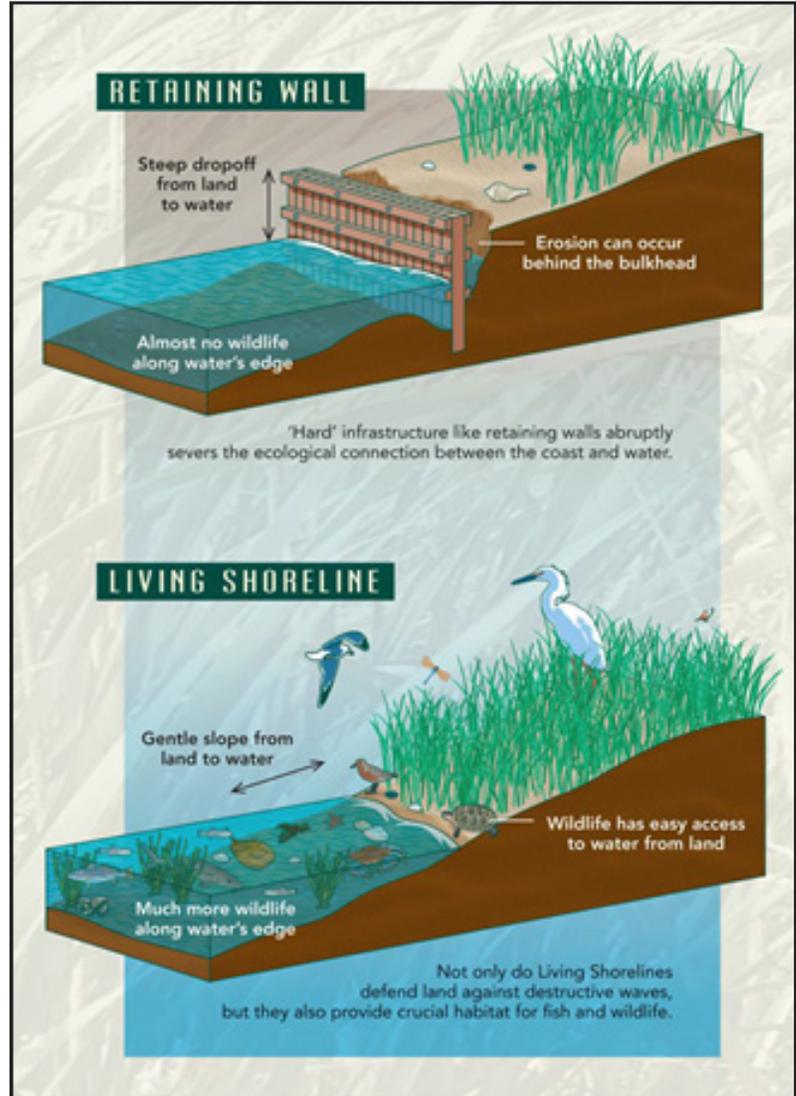
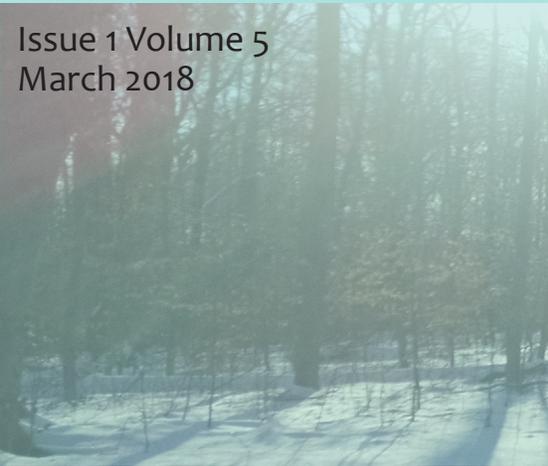


Image credit: Frank McShane





### Know the Rules

Improvements to protect a person's property against shoreline erosion **must consist of marsh creation or other nonstructural shoreline stabilization measures**, i.e. Living Shorelines that preserve the natural environment unless a Waiver is obtained.

Living shorelines Regulations

MDE

### Know the Name

"Living shorelines are the result of applying erosion control measures that include a suite of techniques which can be used to minimize coastal erosion and maintain coastal process. Techniques may include the use of fiber coir logs, sills, groins, breakwaters or other natural components used in combination with sand, other natural materials and/or marsh plantings. These techniques are used to protect, restore, enhance or create natural shoreline habitat."

MDDNR

and provide habitat for a variety of organisms. They want the erosion control, they want it cheap and easy (not that any shoreline project is either of those), and they want everything else to work itself out.

To them I say – let's look at the research!!

Our panel started with a presentation by Dr. Rochelle Seitz on two research projects she and her colleagues from the Virginia Institute of Marine Science conducted on the ecological benefits of living shorelines.

Their first study (Lovall et al. 2017) examined the effects of shoreline development on benthic infauna (organisms, like clams and worms that burrow into the sediments) and predators. This study documented the infaunal

density, diversity, and biomass and predator abundance at 45 sites along the Patuxent River that represented bulkhead, riprap and natural marsh shoreline types. Some of their findings indicated that: 1) there are differences in infaunal diversity and feeding modes among shorelines; 2) natural marsh have higher infauna biomass and greater abundance of predators (such as spot and blue crab); and 3) in already degraded ecosystems like the Patuxent, hardening shorelines may likely provide poor habitats leading to losses at higher trophic level. They further suggest limiting shoreline hardening until their effects are more understood and promoting marsh habitats (natural or those associated with living shorelines).





Davenport et al. 2017. Living shorelines support nearshore benthic communities in upper and lower Chesapeake Bay. Online, Estuaries and Coasts. <https://doi.org/10.1007/s12237-017-0361-8>

Lovall et al. 2017. Benthic communities and trophic structure at altered shorelines in a depauperate estuary. Bulletin of Marine Science 93(3): 715-741. <https://doi.org/10.5343/bms.2016.1076>

The second study (Davenport et al. 2017) examined the effects of living shorelines on benthic community structure over time at two project sites of differing scale (150m and 30m in length). They used the Before-After-Control-Impact (BACI) approach to collect benthic infauna, water quality, and sediment samples. Their findings suggested that living shorelines can alter infaunal community composition – mirroring that of their natural control marshes. They also note that living shorelines may boost infaunal density and biomass and when adapted to site conditions, can aid in meeting multiple coastal management goals, including erosion reduction, benthic habitat provision, and trophic transfer.

So as I read it:

IF: Natural marshes = better habitat than hardened shorelines = more infauna = more fish and crabs

AND: Living shorelines = natural marshes over time

THEN: Living shorelines = better habitat than hardened shorelines = more infauna = more fish and crabs

To quote the end of Dr. Seitz' presentation . . .

“Living shoreline: if you build it, they will come”

This will be my new approach on my next site visit.

To get more information about PAXCON and upcoming conferences, sign up at [www.paxcon.org](http://www.paxcon.org).





# The Perfect Storm for Lake Ontario

+ JEN DINDINGER

Over the holiday break I traveled to upstate New York to visit friends and attend a wedding. Setting aside the question of who has a wedding in freezing temperatures, I was able to visit with a dear friend and Sea Grant colleague who has been working on the politics and science around lake level management for Lake Ontario.

What is lake level management? That's what I asked too. I'm a salt/brackish/tidal water girl who, until recently, didn't understand anything about fresh water and the Great Lakes and the economic, social, and environmental considerations of how lake levels are managed. I have barely dipped my toe into



Map of the Great Lakes Basin with drainage area in green. Credit: Detroit office of the US Army Corps of Engineers, made available via Wikimedia Commons.





“Unfortunately, the winter of 2016/17 had been a warm and wet one so water levels in the lake were already higher than normal when the spring rains hit.”

this world (yeah, sorry) but what little I’ve learned is fascinating.

Back in the 1950s, the International Joint Commission (IJC, includes U.S. and Canada) decided on a lake level management plan that would benefit hydroelectric power generation and shipping interests in the St. Lawrence River (just downstream from Lake Ontario), and also reduce flood risk to lakeshore communities. The plan, called “Plan 1958-D,” kept water levels in the lake within a four-foot range regardless of annual weather conditions. It may be obvious to some, but because the Great Lakes are freshwater they get all of their inputs from rain, stormwater, and groundwater, and lake levels are maintained through dam releases downstream. This

plan, while great for economic and social concerns, did not really take into account any environmental considerations. Maintaining water levels within a four-foot level meant that local wetlands did not get as much flushing as they needed so stagnation and nutrient accumulation started to occur. However, it did mean that anyone could build along the lakefront (houses, marinas, water intake plants, businesses, etc.) just outside that four-foot range and feel confident that they would not get flooded.

Fast forward to the 1990s and the conflicts worsened. More seasonal cottages were converted to year-round residences, recreational boating increased, and residents became more environmentally aware (any of this sound familiar?). In 2000, the IJC proposed another plan with four options to attempt





Major erosion and property damage along the shoreline of Lake Ontario. Photo credit: Coastal Flooding Survey Project, Cornell University and New York Sea Grant.

to address all of these concerns but the public was not in favor of any of them. In 2014, the IJC proposed another plan for lake level management that incorporated more environmental concerns and presented it to the federal governments of the U.S. and Canada.

And there “Plan14” sat until the end of 2016, when it was suddenly approved by the U.S. government. The

plan was put into place on January 1, 2017. This new plan does not maintain lake levels within the four-foot range... instead, outflow from the dam between Lake Ontario and the St. Lawrence River is able to be adjusted based on certain high and low “triggers” that change seasonally. To complicate matters, the IJC Board of Control for Lake Ontario must agree unanimously on any deviations from the Plan; otherwise, no dam releases are





Flooding at Arney's Marina located in Wayne County, NY.  
Photo credit: Kevin Penney

allowed and lake levels stay where they are.

Unfortunately, the winter of 2016/17 for the entire Great Lakes basin had been a warm and wet one so water levels in the lake were already higher than normal when the spring rains hit. And hit they did...for months. By the time the triggers were reached that might lead to some relief for lakefront communities, downstream

communities along the St. Lawrence River were already experiencing record flooding. Any additional water sent their way would only lead to more devastation. Outflow was able to be increased a small amount but the continuing rain meant that the reduction in the lake level was not really noticeable. The result was sustained shoreline flooding and erosion. Some marinas and businesses were flooded out for the entire boating season. Lakefront





residences couldn't access the lake or sometimes even their property and some lost several feet of shoreline and/or entire homes. Septic system drainfields were inundated and massive chunks of debris were washed into the lake.

When all of the flooding started, guess who got many of the phone calls? My dear friend at New York Sea Grant (NYSG). Because Sea Grant is known as a trusted neutral party, people knew they could call her to get reliable information and honest answers. Except no one really knew yet whether the massive flooding was caused by the change in lake level management, the extreme winter and spring weather conditions, or a combination of both.

New York Sea Grant  
and Cornell University

initiated a survey of flooded waterfront residents and embayment properties to collect information about flood damage. This information will help create a record of the event, allow for consistent, lake-wide reporting, and identify key vulnerable areas for future coastal flood events. Much of the work NYSG is helping with now is related to resiliency training for local governments, planning for post-disaster recovery, and flood resiliency planning.

There are no definitive answers yet about how to solve the lake level management issues, but NYSG is working directly with communities to help them adapt and thrive in these changing conditions. That is one of the reasons I love working for Sea Grant...we bring science to help people solve real-world problems now and in the future.





# Sustainable is Not Good Enough

+ AMANDA ROCKLER

“If nature is left to itself, fertility increases. Organic remains of plants and animals accumulate and are decomposed on the surface by bacteria and fungi. With the movement of rainwater, the nutrients are taken deep into the soil to become food for microorganisms, earthworms, and other small animals. Plant roots reach to the lower soil strata and draw the nutrients back up to the surface.”

– Masanobu Fukuoka, Japanese Farmer, author of *The One-Straw Revolution*

January 12 and 13th, the CASA Future Harvest Conference was held in College Park. Enticed by an agenda filled with renowned speakers on soils and regenerative farming, I applied and received a generous scholarship from the University of Maryland Extension’s Sustainable Agriculture Research and

Education program to attend the conference. Along with networking amongst energized farmers and environmentalists, I gained some valuable insights into regenerative soil practices.

As someone who has a degree with the word ‘sustainability’ in it, people often ask me, “What does that word even mean anymore?” And they have a point. Have we already exceeded the Earth’s carrying capacity? Have we surpassed the point of sustainability? Again and again at the Future Harvest Conference, I heard this common theme, the word ‘sustainability’ no longer holds much meaning for people.

The Food and Agriculture Organization (FAO) predicts that with the current rate of soil degradation, all of the world’s topsoil could be gone in 60 years and with





“The word ‘sustainability’ no longer holds much meaning for people.”



Visitors looking to pick up plants at the University of Maryland Ag Day will soon realize that healthy soils are important. Photo credit: Edwin Remsburg

it - farming. Sustainable, it seems, is not enough. Tim LaSalle, Ph.D., co-director of the Regenerative Agriculture Initiative at California State University Chico, has said that, “in order to keep the natural cycles healthy - like water and carbon - so that land can keep growing food and keep carbon and the climate in balance, ‘regenerative farming’ is the

way forward.”

Rebuilding soils using ‘regenerative farming’ was a common theme throughout the conference. Gabe Brown, keynote speaker and North Dakota rancher, and Nicole Masters from Integrity Soils based in New Zealand, both made convincing linkages between soil, and micro gut bacteria, and outlined several





advantages to regenerative farming, including:

- increased capability for carbon sequestration;
- improved soil health;
- reduced amounts of sediment and agricultural waste entering the waters;
- cleaner watersheds, lakes, and streams;
- enhanced crop resilience to rainfall fluctuations and mitigate water damage to crops, land, and surrounding infrastructure;
- increased profits, cost-effective soil management and improved farming practices;
- better crop yields & nutrition.

Armed with this new information, I went home from the Future Harvest conference, equipped and ready to rebuild topsoil on my tiny piece of land. With the goal of helping to restore the natural cycles and helping Mother Nature to rebuild my topsoil so that I am no longer just sustaining, but regenerating.





# Slurping Our Way Toward Meeting TMDL Goals

+ MATT PARKER, SEA GRANT AQUACULTURE BUSINESS SPECIALIST

[mparke11@umd.edu](mailto:mparke11@umd.edu)  
301-868-8780 ext. 428



Many approved methods for reducing excessive nutrients in the Chesapeake Bay focus on interception of nutrients before they enter our streams and rivers, thus preventing them from entering the Chesapeake Bay. However, what do we do about those nutrients which do reach the Chesapeake Bay? Let's consider an unlikely hero which we can use as an additional tool in our best management practice (BMP) toolbox, the mighty oyster. These delectable creatures growing in the Chesapeake Bay filter water in order to obtain nutrients to grow. Seeing the potential for these mighty filter feeders to remove excess nitrogen and phosphorus from the water through their normal feeding habits, an EPA Expert Panel was convened by the Oyster Recovery Partnership in 2015. Since that time the group of experts have researched and

discussed the likelihood of using oysters as a credit towards meeting the Total Maximum Daily Load (TMDL).

The panel has looked at the amount of nitrogen and phosphorus in oyster tissue and shell, along with nitrogen which could be removed from the water through denitrification associated with oyster reefs in the Chesapeake Bay. In the fall of 2015, the Expert Panel issued its first report outlining nutrient reduction effectiveness for the nitrogen and phosphorus stored in oyster tissue. Utilizing a conservative approach and existing scientific data they determined the tissue assimilation capacity of various sizes of diploid and triploid oysters ranged from 110-1,477 pounds of nitrogen and 22-154





“These delectable creatures growing in the Chesapeake Bay filter water in order to obtain nutrients to grow.”



Matt Parker (right) and his son Broughton, along with Bill Cox of the Honga Oyster Company (left) and Dr. Suzanne Bricker from NOAA are taking oysters back to the lab for tissue testing. Photo credit: David Harp, the Bay Journal.

pounds of phosphorus per one million oysters, respectively. In December 2016 the Chesapeake Bay Program approved the panel’s recommendation and added aquaculture oyster tissue as an approved BMP for crediting towards the TMDL. Since 2017 the panel has been evaluating the science for nitrogen and phosphorus assimilated in shell along with associated denitrification in areas

which grow oysters. They are also evaluating how to credit oysters grown in oyster sanctuaries and the wild fishery. Do your part to help reduce nutrients in the Chesapeake Bay by eating Maryland Aquaculture Oysters.

More information about the panel’s recommendation and future work can be found here:

<https://go.umd.edu/fsm>





# Only Rain Down the Drain

+ ERIC BUEHL

In one form or another, Mardi Gras has been celebrated along the Gulf Coast since the late 1600s, signaling the beginning of Lent. Serving as a state holiday since 1875, the City of New Orleans and Mardi Gras have a long-celebrated history; one of both revelry and religious significance. And as Rex, King of Carnival, leads the procession of krewes through the city on Fat Tuesday, who would have thought that the city's storm drain infrastructure would be celebrating long after the revelers returned home?

located at their outlets. Pollutants often include nutrients, sediment, oil from automobiles, bacteria, and trash. Sometimes what gets into a storm drain system can come directly from precipitation such as nitrogen, while other times, human activities are directly responsible, including things such as not cleaning up pet waste or not properly disposing of trash.

In a survey of 95 California communities in 2013, the Natural Resources Defense Council estimated they spent \$428 million annually to clean up trash along local waterways and beaches, clean out storm drain systems, install and maintain stormwater trash capturing devices, and sweep streets. In fact, the City of Los Angeles has a total maximum daily load (TMDL) for trash and

Storm drain systems help to convey runoff from one place to another, usually with the intention of managing localized flooding, creating safer travel conditions, decreasing erosion, and so on. Unfortunately storm drain systems often convey a host of pollutants to the waterbodies





“Storm drain systems do not discriminate on what they take in and try to transport downstream.”



A series of nets used in a storm drain system in California to prevent trash from reaching local streams and the coast. Photo credit: Stormwater Systems, Inc.

is required to decrease the amount reaching local waterbodies. Now consider places in the Chesapeake Bay watershed like Baltimore City. Their Department of Public Works lists that they maintain over 1,100 miles of storm drain with more than 52,000 storm drain inlets and despite their best efforts to stay on top of maintaining this system to keep pollutants out of the Bay, Baltimore, like Los Angeles, has a TMDL to reduce trash and debris for

certain tributaries that empty into the city’s harbor.

So what is the connection between Mardi Gras, New Orleans, and storm drain systems? Just prior to this year’s Mardi Gras celebration, [NOLA.com](http://NOLA.com), an online companion of the Times-Picayune, reported that 46 tons of Mardi Gras beads had been found in clogged storm drain catch basins in parts of New Orleans and needed to be removed (along with other debris). Not only does this





Need we say more? Photo credit: NOAA BWET Program on Twitter

highlight how storm drain systems do not discriminate on what they take in and try to transport downstream, the city's Public Works Department is considering what to do, including temporarily blocking storm drain inlets to keep more beads out.

Here are four simple things you do to keep trash and pollutants out of our storm drain systems and decrease the impact on local waterbodies:

1. Do not litter.

2. Pick up and properly dispose of pet waste.

3. Do not over-fertilize and sweep up any excess that gets on your sidewalk or driveway.

4. Do not wash your car on the street or in your driveway. Wash it in a grassy area or use a car wash that recycles its water.

So in order to help keep infrastructure maintenance costs down and to help clean up our waterways, keep your Mardi Gras beads around your neck and practice the slogan, "Only rain down the drain."



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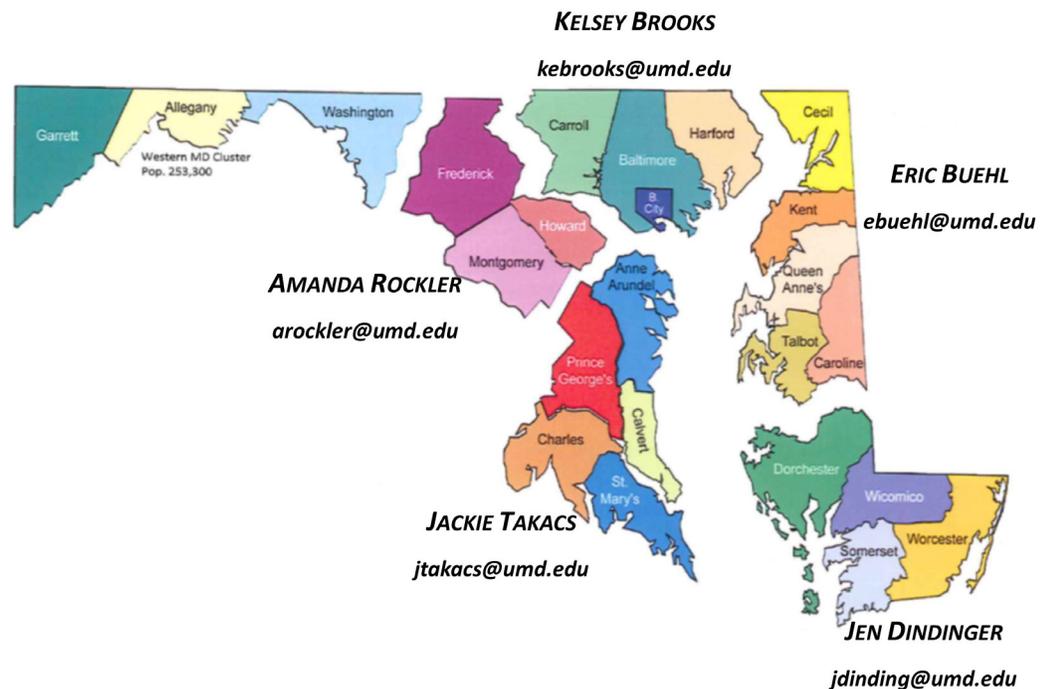
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Headwaters  
Sea Grant Extension Program  
7998 Regents Drive  
College Park, MD 20742

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