

HEADWATERS

PUBLICATION OF MARYLAND SEA GRANT EXTENSION WATERSHED EDUCATORS

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GREETINGS LOYAL HEADWATERS READERS,

Summer is usually a good time to grab a good book and do some reading. If you can't make up your mind what author or genre to grab or you're running a little short on time, we offer the latest issue of Headwaters as a light and refreshing alternative. In this issue, you'll find out why ANREP membership has a lot to offer Extension professionals and then meet Kate and Kelly, our newest Sea Grant Extension co-workers. You can partake in the first in a series of articles on septic systems, learn about the global reach of Sea Grant programs, ponder what Maryland might look like in 2080, find out if all this rain is our new normal, and make plans to attend the SMANA social marketing forum in October. We hope you enjoy reading this edition of Headwaters!

The Maryland Sea Grant Extension Watershed Educators Team



Source: [Wikimedia Commons](#)

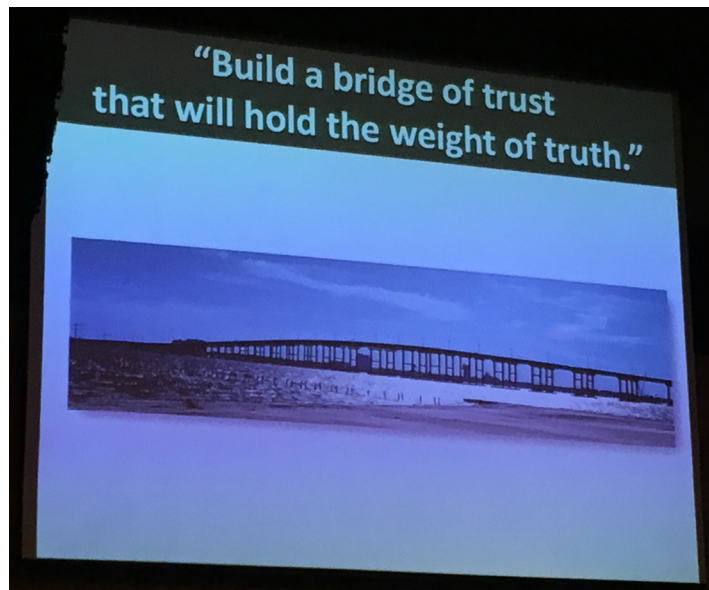




ANREP Membership has its privileges

+ JENNIFER DINDINGER

I first learned of the [Association of Natural Resource Extension Professionals \(ANREP\)](#) years ago from some UME forestry colleagues. In the early years of my Extension career I tried out a few other professional associations but never quite found what I was looking for. Many of my Sea Grant colleagues from other states also recommended ANREP because its mission most closely aligned with their programming. They were enthusiastic about the benefits of ANREP membership and the biennial conference so I checked it out. Fast forward to 2018 and I just attended my 3rd biennial conference!



My favorite slide from the 2018 ANREP Conference in Biloxi, MS.
Source: Jennifer Dindinger





“Indeed, this newsletter won the Bronze Award in the category of Newsletter/ Series of Articles in 2015!”

ANREP has so much to offer for those of us working in wildlife, forestry, watershed restoration, stormwater management, and related fields. Service opportunities include board or committee membership; professional development is rich in depth and breadth at the biennial conferences and through various webinars and initiatives throughout the year; and scholarship is available through poster sessions, conference presentations, and peer-recognition awards. Indeed, this newsletter won the Bronze Award in the category of Newsletters/Series of Articles in 2015! There are also scholarships to pursue outside professional development and a quarterly newsletter to which members contribute their programming successes and tools and even questions for each other.

The people of ANREP are really what keep me coming back every year. I value meeting like-minded people whose work focuses on educating clients about the value of surrounding natural resources and how to protect them, and learning from them about creative ways to improve my programming.

The 2020 ANREP conference has already been scheduled for May 3 - 6, 2020, at Sunriver Resort in Sunriver, OR. As an added incentive, during conference years the membership fee is included in your conference registration. If you have any questions about ANREP membership and its privileges, please [contact me](#) and consider joining!





Welcome Kate!

Welcome Kate!

Kate McClure recently joined Maryland Sea Grant Extension as a Coastal Climate Specialist. Previously, Kate held a John A. Knauss Marine Policy Fellowship in the U.S. Department of the Treasury's Office of Gulf Coast Restoration. In this role, she assisted with the administration of two grant programs resulting from the 2010 Deepwater Horizon Oil Spill by providing training and technical assistance for grantees on projects designed to improve the economy and ecosystem of the Gulf Coast.



Kate earned a Ph.D. in evolution, ecology and marine biology from Northeastern University in 2017. Her doctoral dissertation examined latitudinal variation in ecological communities on rocky shores in the Gulf of Maine, with a particular focus on the effects of air and water temperatures on the foraging and growth of a carnivorous intertidal snail. In addition to conducting research, Kate developed her





Welcome Kelly!

expertise in science education and environmental issues by working as an educator at the Boston Museum of Science and volunteering as a service project leader at the New England Aquarium throughout her tenure as a graduate student. Kate also holds a B.S. from the College of William and Mary, where she majored in biology and completed an honors thesis on invertebrate paleontology.

Welcome Kelly!

Kelly MacBride-Gill recently joined our Maryland Sea Grant Extension team as a Watershed Restoration Coordinator. Prior to joining the team, Kelly worked at Parks & People Foundation for five years, first as a volunteer coordinator who annually led over 2,000 volunteers in forestry and green space improvement projects, and later in providing one-on-one assistance with over 200 community greeners to help them create and maintain public green spaces.





Prior to her time at Parks & People she served as a Volunteer Maryland (AmeriCorps) member where she mentored 14 fellow AmeriCorps members, and as an AmeriCorps VISTA, cultivated new and existing relationships with faith groups through volunteer and fundraising opportunities at her host site, Habitat for Humanity Metro Maryland.

For her work with the AmeriCorps Alums Baltimore Chapter, Kelly received the 2014 Governor's Service Award for AmeriCorps Alums. Kelly is a certified Baltimore TreeKeeper and Weed Warrior, as well a member of the Baltimore City Forestry Board and Friends of Maryland's Olmsted Parks and Landscapes. Kelly holds a BA in Socio-Cultural Anthropology from the University of Maryland, and is looking forward to continuing her education. In her free time, Kelly likes finding new places to hike, interesting podcasts to listen to, and dogs to pet. Kelly's greatest past time is working on the family farm - ask for stories about cute turkeys!





Septic Systems - More than a Flush and Forget it Home Appliance

+ ANDY LAZUR



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As residents in the Chesapeake Bay watershed we all have an impact on its health, but have opportunities as stewards as well. Estimated to contribute 6% of the total nitrogen load to the Bay, septic systems are one of five nutrient source sectors identified in the Chesapeake Bay Total Maximum Daily Load (TMDL). This article is the first in a series and will introduce septic system function, processes, and importance to human health and the environment. Future articles will cover system types, specific maintenance, and stewardship practices.

Septic systems are a well-established and effective tool for treating waste for homes, businesses, churches and small communities. Currently 20% of households in the U.S. and over 420,000 homes in Maryland utilize this type of waste treatment. Treatment is a key word, since that is the primary function of a septic system. Interestingly, the term 'septic' does not accurately describe what a system is all about. The word 'septic' is from the Greek 'septikos' meaning rotten, and also refers to infection in medical circles. Its use is understandable given the unpleasantness and harmful makeup of human waste; yet the treatment contribution in protecting environmental and human health is the important point. We would do well to think of a septic system as an engineered appliance, and likely the most expensive one (\$8,000 - 11,000), that uses nature for treatment. By design, a septic system treats waste using a combination of natural chemical and biological processes where beneficial bacteria in the system and soil feed on the





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organics and nutrients. This bacterial decomposition of waste results in a reduced concentration of nutrients, such as nitrogen, and reduction or elimination of pathogens of concern to human health.

The essential components of a system are a tank, drainfield, and the natural soil under the drainfield. The tank, a watertight container constructed of concrete, fiberglass or plastic, is designed for temporary storage. The tank allows for settling to separate the solids, fats and grease from liquids, and for partial treatment of the solids. Conventional tanks have one chamber with a baffle to separate solids while advanced treatment systems, or best available technology (BAT), have several treatment chambers designed to enhance the natural processes mentioned earlier. Nitrogen reduction in a conventional tank is estimated at approximately 5% whereas BAT units can remove 55-80% or even higher with recent technological advances.

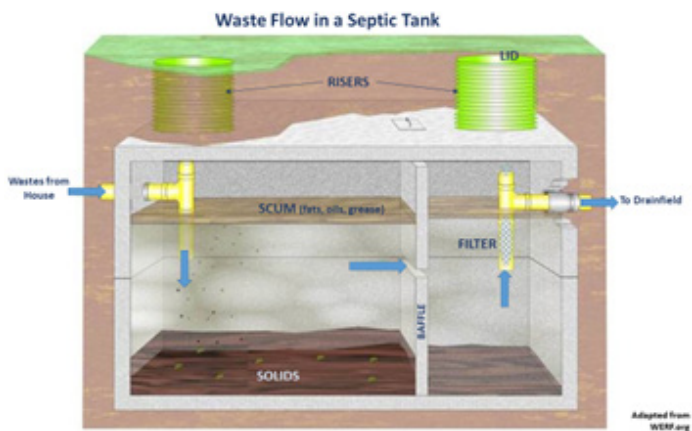


Diagram of a conventional septic system. Source: [Water Research Foundation](http://WaterResearchFoundation.org)



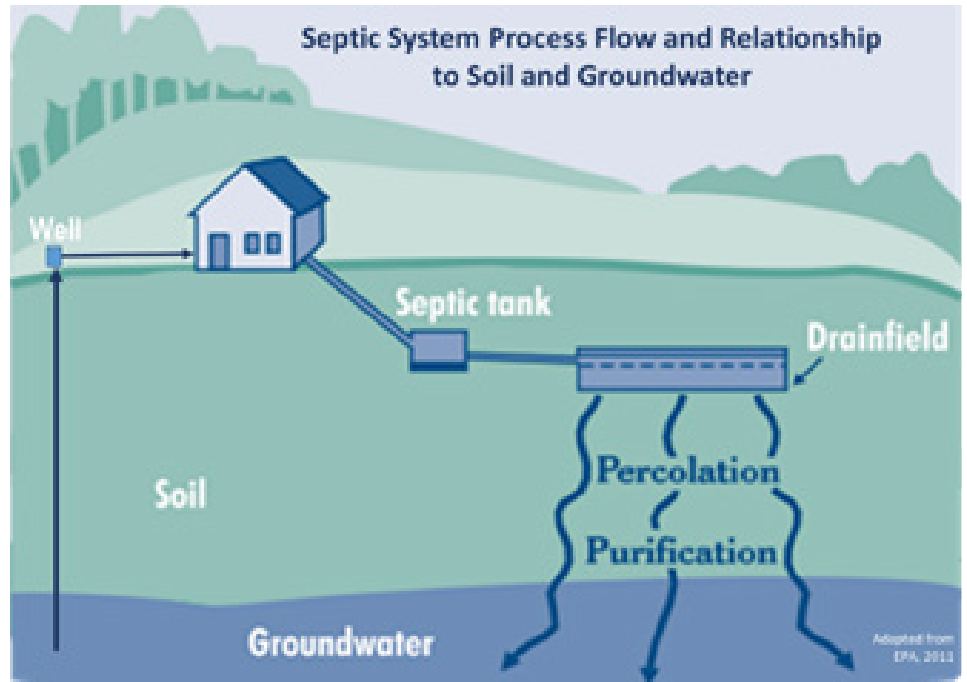


“Not only serving as a natural filter to reduce nutrient loads, the soil is also where pathogenic bacteria can be consumed by other bacteria or die off.”

The drainfield is the dispersal component of a system distributing the daily volume of liquid waste over a predetermined area of soil. A natural film of beneficial bacteria, or biomat, will form on surfaces within the drainfield and aid in treatment. Conventional drainfields have several trenches filled with gravel, plastic chambers, or polystyrene tubes to aid in wastewater dispersal and typically rely on gravity flow. Other types of drainfields include at-grade and sand mounds used in areas with marginal soil types and high water tables, and drip dispersal or irrigation. Once installed, proper drainfield operation depends on unrestricted wastewater flow. Homeowners can help maintain this by preventing soil compaction from vehicles, and blockage by roots from trees or shrubs.

Soil is integral to the waste treatment process. This is where the bulk of chemical and biological treatment and 20-40% of nitrogen reduction occurs. Not only serving as a natural filter to reduce nutrient loads, the soil is also where pathogenic bacteria can be consumed by other bacteria or die off. This role of soil in waste treatment emphasizes the importance of proper site selection to identify appropriate soil types and adequate vertical distances from the bottom of drainfield to impermeable soil layers or the water table.





Proper siting, care, and maintenance of septic systems is important to prevent groundwater contamination. Source: [U.S. Environmental Protection Agency](https://www.epa.gov/septic)

Understanding that treated wastewater eventually percolates down to groundwater and then is returned to surface via wells, it is important to be good stewards by valuing and caring for our systems.





Korea - Maryland Sea Grant Program Information Exchange

+ AMANDA ROCKLER

In June, the Maryland Sea Grant Extension Watershed Specialists met with a group from Korea Sea Grant to discuss our programs, our role in the local communities we serve, and issues and strategies related to community engagement.

The Korea Sea Grant Program (KSGP) established in 2000 by the Ministry of Maritime Affairs and Fisheries, was developed as part of the “Ocean Korea 21,” Korea’s comprehensive plan to improve management of coastal resources. Much like the U.S. Sea Grant College Program, the KSGP promotes marine research through education, outreach, and research support. Both programs share many commonalities such as working to build engaging and effective education and outreach programs within our local communities.

Despite differences in language and culture, both programs incorporate fundamental Extension pillars which include; building community trust, technology and knowledge transfer, and problem solving. Having experienced similar challenges, the group exchanged strategies for engaging new audiences, building community partnerships, and developing engaging outreach programs.





“Both programs share many commonalities such as working to build engaging and effective education and outreach programs within our local communities.”



Maryland Sea Grant Extension Faculty and Korean Sea Grant Faculty at Maryland Sea Grant on June 7, 2018. Source: Nicole Lehming, Maryland Sea Grant.





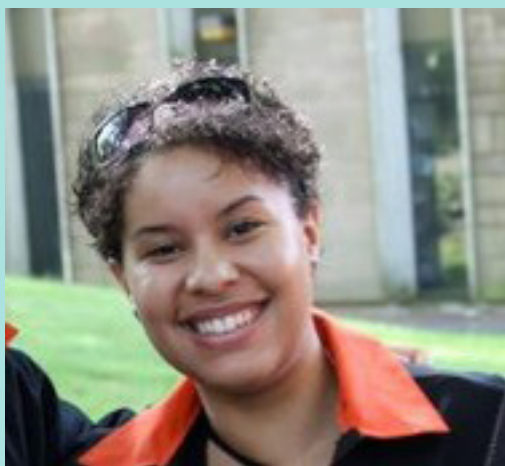
Central Maryland in 2080: Predicting the Future to Plan for Today

+ KELSEY BROOKS

When I was in graduate school I took an infrastructure planning seminar that asked us to envision what American society and its cities would look like in 2100. My paper incorporated all of my futurist preoccupations at the time: large, closed-system vertical farms; wide-spread stormwater and grey water capture and reuse; algae raised on degraded lands that produce hydrogen for fuel cell vehicles, the proliferation of 3-D printing for the production of goods, and the loss of major coastal cities to frequent storm surge and sea level rise. I did well enough on the assignment, but one of my professor's comments was that I was not, "creative enough."

With this background in mind I attended a workshop with a similar, albeit more focused, interest in the somewhat distant future organized by the Urban Resilience to Extreme Events Sustainability Research Network (UREx SRN). The meeting did not take quite as freewheeling an approach to the cusp of the next century as my coursework did; instead, it asked stakeholders to take into account the environmental challenges we expect to face and envision what a truly resilient central Maryland would look like in 2080.

Whether or not we were "creative enough" as a group was a question that permeated our discussions. We were prompted not to limit our suggestions to solutions we considered practical, but that raised a number of additional





“Ideally, the visions we developed could eventually lead to policies, plans, and projects that ensure a resilient future is one we can have.”

questions that were difficult to tackle: How unrealistic is too unrealistic? What constraints, if any, should be considered? How do we factor in what we know (or think we know) about human behavior? How do we do this, but ensure the future is also equitable when it is so unequitable today? But seriously, are we all going to have driverless cars and when is that going to happen?

Despite these questions, there were some recurring ideas that developed throughout the process. We suggested interventions that included the development of redundant water and power systems that operate at multiple scales; greater regional cooperation in the development and enactment of plans; improving access to and the functionality of open and green spaces throughout the region; and creating social systems that help protect those most vulnerable to a more unstable future.



Divers on Horseback

One of Jean-Marc Côté's "France in the Year 2000" illustrations, produced circa 1900. This was not one of the futures we envisioned for central Maryland in 2080. Source: [Wikimedia Commons](#).





We tried to predict how long it would take to institute these changes, what intermediate steps and resources would be necessary, and what barriers might exist to prevent their implementation.

Predicting the future is tricky business. When I wrote that paper for class less than 10 years ago, there was technology we have today that did not cross my mind (especially driverless cars). Still, it is difficult to reach a goal without a plan and, ideally, the visions we developed could eventually lead to policies, plans, and projects that ensure a resilient future is one we can have. In the short term, the next step for UREx SRN is to take the suggestions that were made and create models that will be used as the basis for a second meeting in the spring.



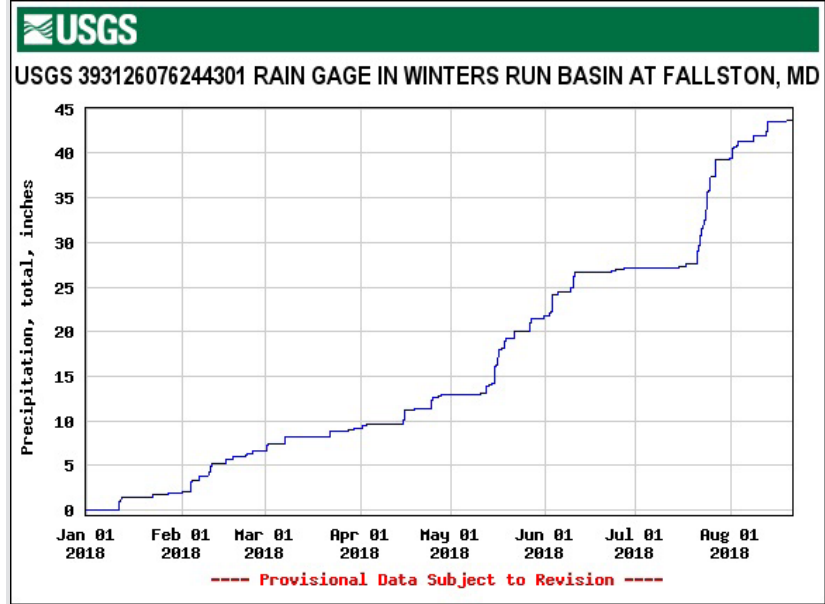


Our New Normal? I hope not.

+ ERIC BUEHL

Rain affects our lives in many ways. It can be the determining factor if we go to the beach, whether we have that weekend barbeque, even dictating what we wear or if we carry an umbrella. To certain generations, the great Johnstown flood of 1889 was a benchmark for how they perceived the power of precipitation. For a slightly younger generation, the Midwest flood of 1993 became the scale by which we measured the devastation that rain could cause. In more recent times, all we have to do is gaze around our own back yards to reset our perspective as we consider rain events that caused multiple floods in Ellicott City and in parts of Wicomico County or this summer's flows over the Conowingo Dam.

It seems that all you have to do is turn on the evening news and you will hear someone report that parts of Harford



U.S. Geological Survey rain gauge near Bel Air indicating that from January through late August, approximately 44 inches of rain fell, which is about a year's normal precipitation falling in less than eight months. Source: [U.S. Geological Survey](https://www.usgs.gov).





“The Midwest Flood of 1993 became the scale by which we measured the devastation that rain could cause.”

County were hit by a 100-year storm or that it was raining 3 inches an hour in Annapolis. What does all of that mean? This is where terminology counts because quite often terms are bandied about and have a tendency to cause confusion. Often misunderstood terms include duration, intensity, and frequency. The first two are fairly simple: duration is how long a precipitation event lasts (usually measured in minutes or hours) and intensity is the total amount of precipitation that falls during a given time period (usually described as the number of inches that fell in one hour). Frequency on the other hand seems to cause confusion.

Frequency has sometimes been referred to as return period and is used to indicate the likelihood (probability) that a storm or flood event of a particular intensity or duration might occur. In the case of a 100-year storm event, the implication is that it would happen, on average, once every 100 years. Unfortunately a literal interpretation of this idea is wrong since this is a probability. Not only is there a 100% chance of a 100-year storm occurring once in a 100 year period, there is also a 1% chance of it happening every year. To avoid this confusion, there has been a transition to the term Average Recurrence Interval or ARI, which the [National Weather Service](#) defines as the “average time between cases of a particular precipitation magnitude for a specified duration and at a given location.” The table below should help to clarify ARI and return storm events.





“So when it comes to precipitation, are things changing? The short answer is yes.”

ARI (years)	Probability of occurrence in any given year	Percent chance of occurrence in any given year
1000	1 in 1000	0.1%
500	1 in 500	0.2%
100	1 in 100	1%
50	1 in 50	2%
20	1 in 20	5%
10	1 in 10	10%
5	1 in 5	20%
2	1 in 2	50%
1	1 in 1	100%

ARI explained so even I can understand it! Source: www.earthzine.org

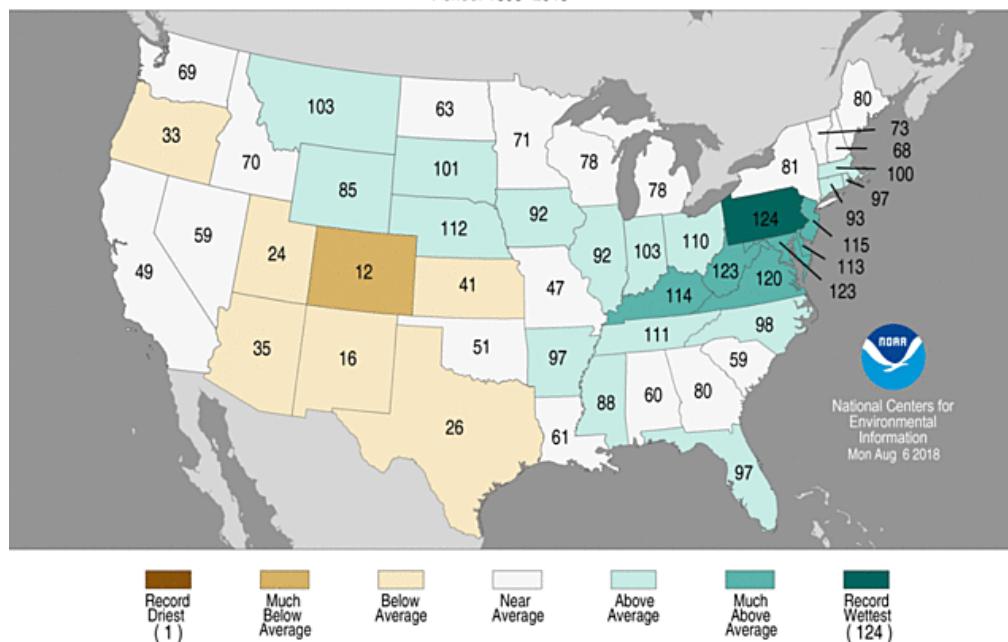
So when it comes to precipitation, are things changing? The short answer is yes. The Maryland State Climatologist Office has a [series of graphs](#) of observed climate change for Maryland and they show a trend of a 0.66 centimeter (0.26 inches) increase per decade in annual precipitation for Maryland since 1895. And the National Oceanographic and Atmospheric Administration just indicated that Maryland had its [second wettest January through July](#) on record since 1895.

The question is, will these changes in frequency, intensity, and duration become our new normal? I certainly hope not, but according to the 2017 National Climate Assessment’s discussion in [Chapter 7](#) on Precipitation Change in the





Statewide Precipitation Ranks January–July 2018 Period: 1895–2018



Maryland's ranking of 123 means that in 124 years of recordkeeping, only one other time period since 1895 was wetter. Source: [National Oceanographic and Atmospheric Administration](https://www.noaa.gov).

United States, it is anticipated that “atmospheric water vapor will increase with increasing temperatures, confidence is high that precipitation extremes will increase in frequency and intensity in the future throughout the CONUS (contiguous United States).” I guess I’ll need to change how I look at the radar map and the 7-day forecast from now on if things don’t change.





Social
Marketing
Association of
North America
Inaugural
Forum -
October 10th



SMANA

SOCIAL MARKETING
ASSOCIATION OF
NORTH AMERICA

Advancing Behavior Change for Social Good

Interested in the intersection of behavior change, health, and the environment? The Social Marketing Association of North America (SMANA) is partnering with the Behavior, Energy, and Climate Change (BECC) conference for this inaugural event, which will include multiple keynotes, a panel discussion, concurrent sessions, case study presentations, lightning talks, small group breakout discussions and a networking happy hour event. The half-day SMANA portion of the BECC conference will be held on October 10th at the Hyatt Regency Washington on Capitol Hill (400 New Jersey Ave NW).

Seating is limited so register early! <https://bit.ly/2Bzn0Cc>



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Headwaters is a publication providing information and resources for Extension and watershed protection professionals. It is a joint production of the University of Maryland Extension and Maryland Sea Grant Program. If you have any comments, questions, or ideas for Headwaters, please contact the Editor: Eric Buehl ebuehl@umd.edu

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Who's Your Watershed Specialist?

