



Red spotted newt, Garrett County, MD.
Photo by Krisztian Varsa

HEADWATERS

PUBLICATION OF MARYLAND SEA GRANT EXTENSION WATERSHED EDUCATORS

INSIDE THIS ISSUE

- + FINDING THE FOOD-WATER CONNECTION: INTEGRATING URBAN AGRICULTURE AND URBAN STORMWATER
- + DESIGNING RAIN GARDENS OF THE FUTURE
- + MARINE EDUCATORS FROM AROUND THE WORLD CONVERGE IN ANNAPOLIS
- + THE GRASS IS GREENER...IN COLLEGE PARK
- + FROM RESEARCH AND DEVELOPMENT TO IMPLEMENTATION: REDESIGNING LIVING ROOF SUBSTRATE

DEAR READERS:

This summer, [Toledo, Ohio](#) reminded us that water quality is deeply tied to human health. Despite decades of efforts to reduce non-point sources of pollution in Ohio, a deadly blue-green algae bloom formed in close proximity to a drinking water source, causing residents to live without clean water for days. Although it is unusual to affect so many people (upwards of half a million with this bloom), it is typical that Lake Erie has toxic blue-green algal blooms.

It is often challenging for us as scientists and practitioners to communicate the connection between actions in the upland and the resulting consequences downstream. Non-point sources of pollution do not often draw the attention of national news coverage for human health concerns.

Yet, we continue to strive to give all residents of the Chesapeake watershed a chance at clean water, to live without fear of repeating Toledo, and safely live with, and adjacent to, a healthy Chesapeake Bay. Unique and effective approaches, based in sound watershed and social science, will help move us closer to our goal.

Visit our website for more on the Watershed Stewards Academy at www.extension.umd.edu/watershed.

Sincerely,
The Maryland Sea Grant Extension Watershed Educators Team





FINDING THE FOOD-WATER CONNECTION: INTEGRATING URBAN AGRICULTURE AND URBAN STORMWATER

+ AMANDA ROCKLER

+ CAN URBAN FARMS OFFER AN EFFECTIVE MECHANISM FOR STORMWATER MANAGEMENT?



In 2009, the United Nations reported that the population in urban areas had surpassed the population living in rural areas for the first time in human history. Driven by this global shift from rural to urban life, significant research and resources are being dedicated to better understanding the intersection of long term food systems and environmental health in urban areas.

Traditionally, farming has been considered discordant with cities. However, in order to answer increasingly complex environmental and infrastructure challenges, urban farming may have vast untapped possibilities in our urban spaces. Indeed, access to local foods like fresh produce have been linked to decreasing the epidemic rates of obesity, diabetes and asthma among low-income populations often

located in these urban areas (CDC 2000).

Meanwhile, as more urban space is developed, the shift from grey infrastructure to green infrastructure has changed stormwater implementation in the urban landscape. Scientists, planners, and practitioners have just begun to scratch the surface of the economic, social, and environmental benefits that both urban agriculture and sustainable stormwater provide.

Recently, the Watershed Protection and Restoration Program teamed up with the University of the District of Columbia (UDC) Causes Program on an exciting endeavor to explore the relationship between urban agriculture and urban stormwater. The project





“Scientists, planners, and practitioners have just begun to scratch the surface.”

will be a pilot to showcase the relationship between urban living, agriculture, stormwater, and community. The urban agriculture component will focus on food production in raised beds and community engagement. The stormwater management aspect will examine on-site water management and seek to reduce street flooding and combined sewer overflow (CSO) events. The anticipated benefits of integrating urban agriculture and urban stormwater include improved water and air quality and mitigated climate change impacts in a community negatively impacted by environmental justice issues.



an agriculture and stormwater runoff. The team will continue to develop a creative site design and community engagement plan for the pilot site. Be sure to check back in for regular updates on this exciting endeavor.

In September, the UDC and UMD team will be presenting a four hour workshop at the H2O Water Summit in Asheville, North Carolina on





DESIGNING RAIN GARDENS OF THE FUTURE

+ JENNIFER DINDINGER

+ CLIMATE CHANGE AND ENHANCED NITROGEN EFFICIENCY DRIVE RAIN GARDEN DESIGN RESEARCH



We talk a lot about how climate change will impact sea level and the coastline, but changing rainfall patterns can affect stormwater management practices as well. Specifically, stormwater practices like rain gardens can become overwhelmed with more frequent and intense rain events and cease to be effective.

With this in mind, the UMD Sea Grant Extension watershed team partnered with New Jersey Cooperative Extension and New Jersey Sea Grant Consortium to research ways to improve rain garden design for the future. The project, titled “Evaluation of Climate Resilient Stormwater





“Science is the backbone of our educational efforts”

Management Practices for the Mid-Atlantic Region,” includes a literature review, updated rain garden design standards, and two training workshops.

As with all Extension programs, science is the backbone of our educational efforts. For this project, we will first review the scientific literature to understand what advances have been made with respect to the design of rain gardens in changing climate patterns. We will also investigate existing designs to enhance the nitrogen removal capacity of rain gardens. Further, the team will estimate costs associated with enhanced nitrogen removal and resilient designs.

Armed with the latest science, our partners at Rutgers University will establish design standards and specifications for rain garden systems modified

for climate resiliency and enhanced nitrogen removal.

And finally, together we will conduct design workshops to share with professionals in both states the updated design standards and specifications. The team will also survey attitudes toward altered or enhanced systems and identify the barriers to implementing these systems.

This research is ongoing and is estimated to be complete by the end of 2014. Stay tuned to future issues of *Headwaters* to learn about the results!





MARINE EDUCATORS FROM AROUND THE WORLD CONVERGE IN ANNAPOLIS

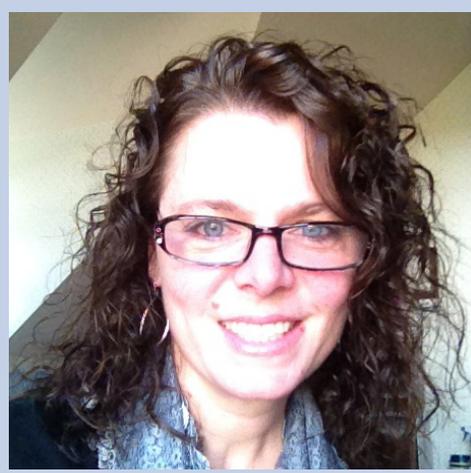
+ JACKIE TAKACS
+ THE NATIONAL MARINE EDUCATORS ASSOCIATION (NMEA) ANNUAL CONFERENCE HOSTED OVER 340 FORMAL AND INFORMAL EDUCATORS FROM 32 STATES AND 8 COUNTRIES

This past July, the Mid-Atlantic Marine Education Association (MAMEA) played host to over 340 formal and informal educators from 32 states and 8 countries at the National Marine Educators Association (NMEA) Annual Conference held in Annapolis, MD. Don't let the name mislead you – we do more than just oceans!!

NMEA is a dedicated, influential member-based organization of classroom teachers, informal educators, university professors, scientists, and more from around the world working together to advance the understanding and protection of our freshwater and marine ecosystems. From scientists working in the deep sea to students studying underwater archeology in the Great Lakes, NMEA members are dedicated to making known the world of water, both fresh and salt (www.marine-edu.org).

option of 45 or 105 minute presentations on topics that ranged from citizen/student science to university based research projects, from program development to messaging and evaluation, and from watershed hydrology to coral reef ecology – just to name a few. Conference goers had the privilege of hearing keynote and plenary addresses from experts in the fields of ocean science and education research - deep-sea explorer and conservationist, Dr. Edith Widder, associate professor of earth & planetary sciences at Washington University, Dr. Michael Wysession, and the former director of the National Science Foundation and professor emerita and distinguished university professor at University of Maryland College Park and

With over 110 concurrent sessions, this year's conference offered participants the





“NMEA is powered by 17 individual, regional chapters.”

Johns Hopkins University Bloomberg School of Public Health, Dr. Rita Colwell. Special events took the group to the National Aquarium, the United States Naval Academy, and the Port Annapolis Marina. It was five days of intense, non-stop (and fun) professional development.

NMEA is powered by 17 individual, regional chapters who provide the on-the-ground efforts that support and promote local and national marine and aquatic education initiatives. For less than lunch at Panera (\$10), consider joining MAMEA – you won’t find a better deal! MAMEA’s members come from Delaware, Maryland, Virginia, North Carolina, the District of Columbia, and adjoining states.

They include individuals whose work and interests encompass:

- Classroom/formal education at all levels
- Informal education at museums, aquariums, zoos, science centers, and research facilities
- Basic and applied scientific research on marine and aquatic topics
- Business related to education, science, and aquatic environments
- Government agencies – local, state, and federal – with responsibilities in education, environment and science issues





“Consider joining MAMEA – you won’t find a better deal.”

Membership benefits include: Masthead, our electronic newsletter that keeps you current on news, information, resources and upcoming marine education events; Professional development opportunities through regional annual conferences or state supported mini-conferences; Conference

scholarships and \$1000 mini-grants for education projects; and opportunities to be recognized by your peers for outstanding work in the field.

For more information you can contact me or visit MAMEA on the web at www.mamea.org.



Field trip opportunities took participants creek snorkeling in the Gunpowder Falls, fossil hunting along the beaches and cliffs of the Chesapeake, kayaking through our marshes; setting sailing aboard a skipjack; and working the water on a crab boat.





THE GRASS IS GREENER... IN COLLEGE PARK

+ KRISZTIAN VARSA

+ UNIVERSITY OF MARYLAND TURFGRASS RESEARCH FACILITY OFFERS SEPTEMBER STORMWATER WORKSHOP

Take a moment and imagine the most iconic crop of the Chesapeake Bay watershed. Delicious sweet corn? Empire state apples? Hay and alfalfa? Although these are certainly iconic, they are no longer the dominant crop here. Turfgrass is now the largest single crop in the Chesapeake watershed, having tripled in area in the last three decades, with 7% of the watershed's land use devoted to home lawns. So, to say turfgrass is important to the Bay's long term health is a major understatement.

Agriculture, the Research Facility's four buildings house classrooms, research labs, conference space, and a greenhouse. The 35 acre facility in the northern portion of the campus hosts four full-time researchers in the fields of soil fertility, turf disease, plant physiology, and entomology. The breadth of the research at the facility is expansive, but the researchers are increasingly being called upon to help drive policy decisions and best management practices for water quality for the Chesapeake Bay.



The University of Maryland's Paint Branch Turfgrass Research Facility is improving our understanding of turfgrass and the relationship between turfgrass and clean water. Developed in cooperation between the Maryland Agricultural Experiment Station and the U.S. Department of



“The breadth of the research at the facility is expansive.”



Current research at the turfgrass facility related to stormwater investigates watering practices, fertilizer application, turf mix selection, and lawn mowing. These variables contribute to the density, weed intrusion, infiltration capacity, and overall health of a turf lawn.

For example, researchers have several plots dedicated to learning about weed intrusion as it relates to lawn mowing technique and blade height. Learn about mowing techniques for stormwater and much more at the Field

Workshop for “Reducing Lawn and Fertilizer Use and Stormwater Runoff” on September 17, 2014. The day-long workshop at the Paint Branch Turfgrass Facility will focus on reducing lawn fertilizer use and stormwater runoff. The Research Facility’s own Mark Carroll shares, “this field workshop is unique because of its focus on turfgrass water quality issues and the fact that it represents the collective the efforts of turfgrass scientists from Maryland, Virginia and Pennsylvania.”

For more information and to register for the workshop please visit: [Turf Grass Research Facility Field Workshop for Stormwater](#).





FROM RESEARCH AND DEVELOPMENT TO IMPLEMENTATION: REDESIGNING LIVING ROOF SUBSTRATE

+ SARAH LANE, UMCES & MICHAEL FURBISH, PRESIDENT OF FURBISH

+ TWO MARYLAND PROGRAMS COME TOGETHER TO REDUCE URBAN STORMWATER

Two years ago, Maryland's Innovative Technology Fund partnered with living roof experts Furbish and Wye Research and Education Center's Dr. Andrew Ristvey to develop a low-carbon green roof substrate. Lab analyses and growth chamber analysis of experimental blends was performed by PhD student Whitney Griffin, now the Director of Environmental Stewardship with Furbish.

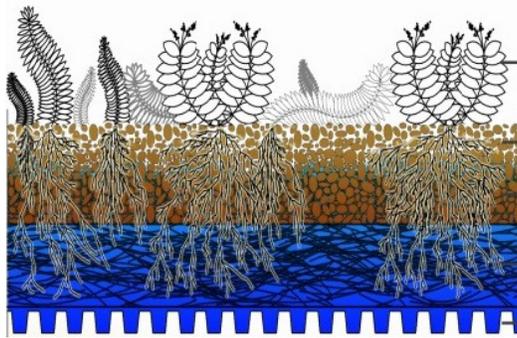
Lab analyses demonstrated that **crushed brick substrate** maintained particle size and physical structure through freeze-thaw cycling common to the Mid Atlantic winter. Lab tests also confirmed these media had adequate water holding capacities. Growth chamber analysis showed excellent plant growth in brick-based media, and carbon analysis demonstrated the



media contained 98% less carbon than traditional heat-expanded media. Platform-scale analysis quantified the stormwater retention capacity of the brick-based media. About half of the storm events monitored created runoff. For events that did result in runoff, brick-based media retained at least 60% of the event, with the exception of Hurricane Sandy. Seven of the 10 runoff-producing events retained at least 80% of the rainfall.



“Growth chamber analysis showed excellent plant growth”



This research contributed to the development of EcoCline, an innovative green roof system that maximizes stormwater retention with the lowest carbon footprint in the market. EcoCline establishes a new standard for light-weight greenroofs with exceptional plant performance and habitat creation.

Dundalk Marine Terminal (DMT) on the Patapsco River, adjacent to Colgate Creek. This project will install 50,000 square feet in both a retrofit application on the existing Maintenance and Repair building (30,000 sq ft) and a new build application on a Terminal Storage Shed (20,000 sq ft).

The Chesapeake and Atlantic Coastal Bays Trust Fund will provide \$648,000 in a grant to the Center for Watershed Protection to work with Maryland Port Authority and Furbish to install two ultra-light-weight green roofs at the

The Innovative Technology Fund, a partnership between Maryland DNR, the University of Maryland, and the Environmental Protection Agency, is continuing to accelerate Bay restoration through





“The Trust Fund allows Maryland to accelerate Bay restoration”

the development of new technologies. In 2007, State leaders in Maryland took a bold step in their efforts to restore the Chesapeake Bay with the creation of the Chesapeake and Atlantic Coastal Bays Trust Fund

(Trust Fund). The Trust Fund allows Maryland to accelerate Bay restoration by focusing limited financial resources on the most effective non-point source pollution control projects.



HEADWATERS

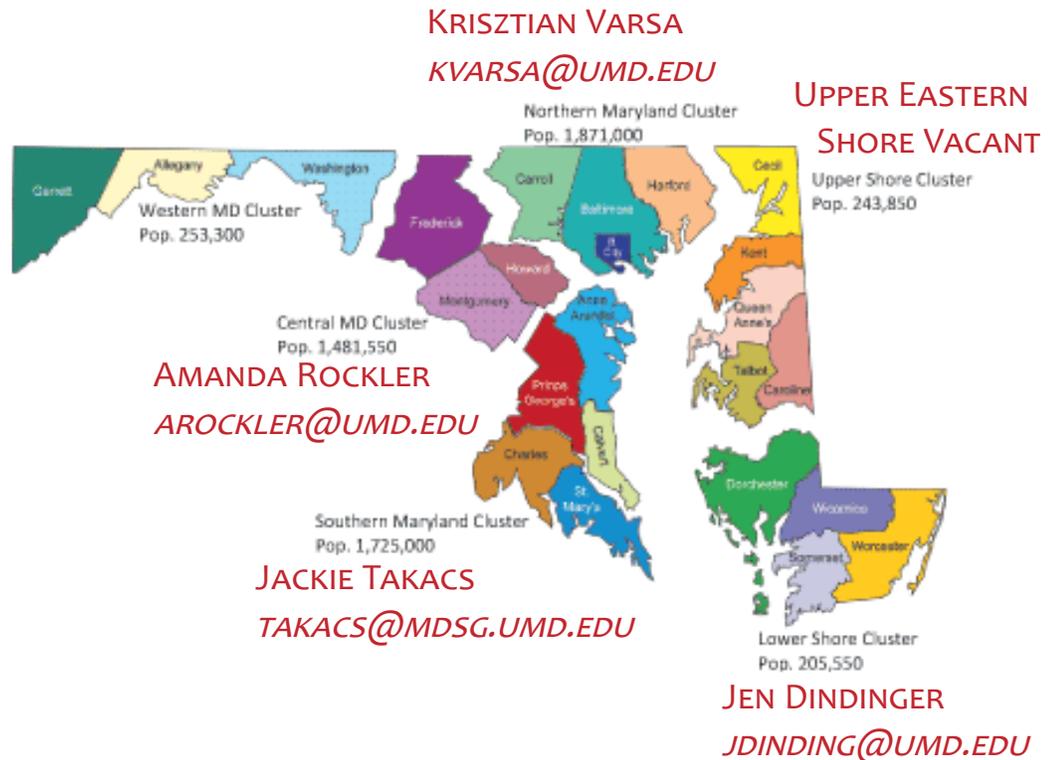
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Headwaters is a publication providing information and resources for Extension and watershed protection professionals. It is a joint production of the University of Maryland Extension and Maryland Sea Grant Program. If you have any comments, questions,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

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WHO'S YOUR WATERSHED SPECIALIST?



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