University of Maryland Extension

Program Background and Detail

Credits

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Fit with UME Mission - Needs Assessment

To improve water quality and restore the Bay's ecosystem to a healthy condition, in 2010, under the authority of the Clean Water Act, the US EPA set a Total Maximum Daily Load (TMDL) for the Chesapeake Bay. For Maryland, this meant that the state had to reduce nitrogen loads to the Bay by 10 million pounds; phosphorus by 589,000 pounds; and sediment by 169 million pounds from the four major sectors that contribute excess sediment and nutrients to the Bay including agriculture, wastewater treatment plants, urban stormwater, and septic systems.

Realizing that two-thirds of the land in their county was in private ownership and that it did not have sufficient resources to address the myriad of water quality challenges on these non-public lands, in 2008, the Anne Arundel County Departments of Public Works and Public Schools formed a partnership that created the Watershed Stewards Academy (WSA). The WSA trains and supports a diverse group of volunteers ("Stewards") conversant in stormwater issues who then use their training to educate communities and design, implement, maintain, and promote restoration projects focused on stormwater management and improving local water quality.

The Anne Arundel WSA officially started in 2009 by Anne Arundel County government as a non-profit 501(c)(3) and is managed by an Executive Director and a Board of Directors. The second WSA to form was the National Capital WSA in 2011, which is an initiative of a coalition of watershed protection groups administered by Anacostia Watershed Society in partnership with the University of Maryland Sea Grant Extension. The Sea Grant Extension Watershed Restoration Specialists, in cooperation with county partners, then created the Howard County WSA in 2012, the Cecil County WSA in 2014, the St. Mary's County WSA in 2016, the Harford County WSA in 2017 and the Calvert County WSA in 2020.

The University of Maryland Extension Watershed Stewards Academy (WSA) provides Stewards with knowledge and expertise from lecturers, training in using watershed assessment tools for analyzing stormwater runoff, and hands-on experience leading stormwater management and behavior change projects. A consortium of experienced stormwater management practitioners provides Stewards with on-going support for their community projects. Stewards become community leaders in reducing the harmful effects of polluted stormwater running off into our streams.

Master Watershed Stewards:

- Assess Watersheds-Help communities to identify pollution sources

- Educate Communities-Help neighbors to understand the most pressing water quality problems in their area
- Reduce Pollutants-Work with communities to target pollution sources such as pet waste, fertilizer, pesticides, and illicit discharges
- Take Action-Help communities to reduce polluted runoff by engaging them in the installation of Best Management Practices, in accordance with all regulations and design specifications
- Measure Success-Track and demonstrate measurable impacts
- Continue Efforts-Continue education beyond the program and ensure practices are maintained.

Through education, oversight, or support from the Sea Grant Extension Watershed Restoration Specialists, the Watershed Stewards Academies have graduated 416 Master Watershed Stewards as well as provided assistance to previous program graduates with their community outreach and restoration activities.

In 2019, the five programs run in partnership with the University of Maryland Extension resulted in the completion of 42 new projects totaling 7,390 square feet of best management practices (BMP) treating 33,345 square feet of impervious surfaces. 1,812 native plants were planted, 70 educational events were held, reaching 1,810 individuals. 1,184 volunteers were engaged and completed 9 rain gardens, 130 rain barrels, 17 individual and community site assessments, and multiple conservation landscape installations and tree plantings, storm drain stenciling projects, and trash clean-up events. Volunteer hours in 2019 totaled 3,556, resulting in an estimated value* of $90,429.08.

In 2020, through education, oversight, or support from the Sea Grant Extension Specialists, there were no new Watershed Stewards Academies graduates, but the Specialists and their County partners continued with online classes and provided assistance to previous program graduates on various activities. Their combined efforts of class, capstone, and community projects resulted in the completion of 4 new projects totaling 495 square feet of best management practices (BMP) treating 940 square feet of impervious surfaces. In all, they planted 438 native plants, held 1 educational event, educated 250 individuals, and engaged 9 volunteers to complete 4 conservation landscapes. Volunteer hours in 2020 totaled 200, resulting in an estimated value[3] of $5,440.00.

[1]*State and University of Maryland COVID-19 restrictions severely curtailed face-to-face engagement, in-person teaching, and volunteer activities during most of 2020, and reflect a dramatic decrease in program impacts from previous years.*

[2]*due to changes in University of Maryland Extension volunteer background screening implemented in 2020, impacts from the National Capital WSA are no longer included in the Team WSA Impact Statement. It should be noted that National Capital WSA remains a vital partner in the statewide WSA partnership.*

[3]*Hourly rate $27.20. Source Independent Sector (https://independentsector.org/value-of-volunteer-time-2020/)*

The program's larger goals have remained consistent and it has been successful in meeting goals. Since 2010, WSA has

- Increased the number of trained Master Watershed Stewards across the State of Maryland.
- Increased the number of small-scale stormwater practices installed in the Bay Watershed and increased the number of community leaders that are actively engaged in stormwater.
- Created an informed and interactive network of Master Watershed Stewards.

There is no other program like the WSA in Maryland. Unique among all public and private institutions, only UME can provide and support:

- A dedicated cadre of over 400 Master Watershed Stewards to implement the program,
- Multi-disciplinary faculty to teach and support Stewards,
- Trusted science-based information, and
- Multiple educational opportunities for Stewards, organizations, and the public.

The WSA program also helps to distinguish UME from other organizations in the following ways:

- The WSA program directly influences and supports other AGNR program areas and units (including the Dean's Strategic Initiatives of "Ensure a Clean and Healthy Chesapeake Bay" and "Optimize Urban Environments Through Design, Green Tech, and Community Engagement").
- The WSA program is unique in that there is state-wide coordination and direction from the WSA state office. Program planning, implementation, and evaluation occurs collaboratively at state and local levels. WSA Coordinators have the freedom to creatively adapt the WSA Program to their local needs and conditions.
- There is participation and leadership from faculty, staff, volunteers, and external partners from across Maryland.
- WSA curriculum is science-based and updated based on timely information and emerging and changing science.
- The WSA is responsive and accessible.
- The WSA trains volunteers who implement small-scale stormwater solutions to improve water quality in the Chesapeake Bay.

The WSA program is included in the IEPs of nine field faculty and staff who serve as members of the Watershed Protection and Restoration Action Team.

Support for WSA includes:

- Faculty and staff time support from Nicole Basenback, Kelsey Brooks, Eric Buehl, Jennifer Dindinger, Jacqueline Takacs, and Amanda Rockler. In addition, a full-time staff coordinator position was created in 2018 and was funded for two years by Sea Grant.
- Approximately $40,000 in County support and grants annually
- Approximately $6,500 generated by WSA program activities such as Steward-driven grant funding and registration fees in this past year

Meets Critical Clientele Needs —Educational Intervention

To document the impact of the WSA course, IRB-approved evaluations are conducted at the beginning and end of each new training course. The pre- and post-evaluations are used to measure attendees' reports of changes in their knowledge, attitudes, skills, and aspirations through the entire course.

For example, in 2017, seventy-five percent of Cecil County WSA graduates reported being somewhat to extremely confident in their ability to write grants, to give a presentation to a community group, to design an effective outreach campaign, to design and build a rain garden, and to manage a community restoration project.

Post-session surveys are also collected from each individual class during the course. This post-session feedback helps the instructor decide what modifications to make to the class for the future.

The WSA program relies heavily on the train-the-trainer model, whereby Stewards are trained to do direct client teaching. Trained Stewards presented at 71 educational events and have reached over 2,000 people. Stewards speak on issues that reflect local needs or requests to groups such as neighborhood associations, schools, and scouting groups.

Teachers earn 5 Maryland State Department of Education (MSDE) continuing education credits for taking the WSA course. Anecdotal evidence indicates that teachers use the information to expand or incorporate watershed health lessons in their classrooms.

Varied and updated web content complements the direct, hands-on teaching accomplished by UME faculty, staff, and Stewards in and outside the classroom. A webpage for the WSA (https://extension.umd.edu/watershed/watershed-stewards-academy) was launched in the fall of 2013, with pages for the individual programs added over time. People can visit the page to learn more about the program, find related resources, and apply to local WSA programs.

WSA digital content includes:

- 3,406 unique visitors to the main WSA webpage
- 2,381 visits to the local WSA pages specifically
- Related Fact Sheets and Extension briefs have been downloaded more than 1,500 times

Teaching activities and materials vary based on the audience, and various teaching methods are used. These include classes/workshops, stormwater tours, demonstration projects, blogs and social media, videos, website content, direct consultations, and public events. Various curricula include the Watershed Stewards Academy curriculum, basic and advanced training materials, and factsheets.

Stewards-in-training enroll in a 12 to 18-month program where they receive 40+ hours of classroom and field training and project implementation experience and also complete a Capstone project that includes a site assessment, community engagement, implementation activities, and a maintenance plan.

Support is provided for the Stewards in the form of additional resource materials and access to a Consortium of Support Professionals with experience in landscape architecture, permitting, grant writing, engineering, and more.

The WSA program has begun planning for a hybrid online training using the University of Maryland ELMS Canvas platform. The team anticipates the creation of the first modules in 2020.

Through continuing education, Stewards practice and reinforce the skills they have learned in the training course as well as learn of the latest developments. Stewards are required to take Continuing Education classes in order to maintain their status as an active Steward. Classes are typically 1.5-2 hours in duration and are taught at various locations around the state. Sample classes include:

- Rain Garden Maintenance
- Effects of Climate Change
- Rain Barrel Design
- Grant Writing for Small Projects

In 2019, the program held its first statewide Watershed Stewards Academy conference. This pilot conference was held to learn about programmatic needs from participants across the state. Participants were selected from each Academy to attend.
In 2020, plans for a second statewide gathering were shelved due to Covid-19. The team anticipates convening the second gathering in 2021, depending on vaccine availability and UME protocols.

Representatives from the WSA program have regular collaborations with outside groups, including the Maryland Department of Natural Resources; Maryland Department of the Environment; the Chesapeake Bay Program; Chesapeake Bay Landscape Professional Certification Program; county environment, public works, and planning departments and school systems; libraries; community groups; non-profits including watershed groups; and media outlets.

As an example of work with a local stakeholder, the Howard County WSA formalized its partnership with the Howard County Public School System in 2019 to collaborate on a variety of activities and programs that educate staff and students about improving the health of local streams and waterways.

Meets Critical Clientele Needs—Curriculum

The original WSA curriculum framework was developed by the Anne Arundel WSA team. The UME WSA team used UME's Curriculum Assessment Tool as a guild as they adapted the curriculum to local needs and added content as needed. Teaching materials and web content are continuously updated and improved by observations and feedback.

Intensive face-to-face training sessions are augmented by Powerpoint presentations, hand-outs, and at-home practice for the Stewards-in-training. Please see Appendix A for a complete outline of the course material.

The curriculum is stored centrally on the online platform Box. Since each WSA program adapts the curriculum to local needs, Stewards-in-training access their course material through local host sites such as the county community college or Google Drive.

The curriculum has been peer-reviewed internally and externally.

> Brooks, K., E. Buehl, J. Dindinger, A. Rockler and J.U. Takacs. 2020. *Watershed Stewards Academy Curriculum*. University of Maryland Extension. 2020-0518.

The full curriculum and supporting materials are available to other states to use and adapt. The WSA Curriculum has been shared with Illinois-Indiana Sea Grant, which then developed a similar program.

Research and Scholarship —Research Base

In 2010, the US EPA established the landmark Chesapeake Bay Total Maximum Daily Load (TMDL) to improve water quality and restore the Bay's ecosystem to a healthy condition. The Chesapeake Bay TMDL is a federal "pollution diet" that sets limits on the amount of nutrients and sediment that can enter the Bay and its tidal rivers to meet water quality goals. Under this, Maryland must reduce nitrogen loads to the Bay by 10 million pounds; phosphorus by 589,000 pounds; and sediment by 169 million pounds.

Each of the seven Bay jurisdictions has created Watershed Implementation Plans (WIP) that spells out detailed, specific steps the jurisdiction will take to meet these pollution reductions by 2025. Federal, state and local governments coordinate through the Bay Program partnership to develop the WIPs.

In 2014, the Chesapeake Bay Watershed Agreement was signed, creating a goal-oriented document that addresses current and emerging environmental concerns. The agreement established 10 goals and 31 outcomes to restore the Bay, its tributaries and the lands that surround them.

The WSA program assists the state of Maryland in reaching the goals set through measurement of the activity taken by Stewards or by those they engage in improving local water quality. The measures and outcomes collected by WSA correspond to activities demonstrated to lead to the reduction of nitrogen, phosphorus, and sediment in the Chesapeake Bay.

Research and Scholarship—Program Scholarly Outputs

Program scholarship findings have been cited in team members Basenbeck, Brooks, Buehl, Dindinger, Rockler and Takacs' CVs and annual faculty reports (2010-2020). These findings have also been used in Brooks, Buehl, Dindinger and Rockler's packets for promotion.

The WSA team has presented often at professional association meetings, workshops, panels, and posters. Please see Appendix B for details on invited presentations given by the team.

The information generated by or for the WSA program is shared with the public. The team participates as eXtension COP members in Stormwater and Flooding. A total of 17 Factsheets and Extension Briefs related to WSA topics have been created. All 17 have been peer-reviewed. The Factsheets and Extension Briefs are available for download from the website https://extension.umd.edu/watershed/ and are used by Master Watershed Stewards, UME faculty, and the public. Please see Appendix C for publication details.

Program Evaluation—Evaluation Use

Upon graduation, Stewards begin reporting their implementation and continuing education activity annually. This information is collected and reported by the county governments for the purpose of documenting credit toward the TMDLs. This information is also documented by the Watershed Restoration Specialists in the annual WSA Impact Statement.

The WSA program has had an enormous positive impact on Maryland. Highlights of WSA's accomplishments to date include:

- The certification of 416 Master Watershed Stewards
- The completion of 147 Stormwater Assessments for residents of Maryland
- More than $528,429 in value of volunteer time to Maryland
- More than $240,000 leveraged for small-scale stormwater projects
- More than 115,870 square feet of small-scale stormwater practices installed
- Nearly 100,000 square feet of impervious surface treated from 2017-2019
- More than 52,292 trees, plants, and shrubs installed

In 2020 alone, 4 new projects were completed totaling 495 square feet of best management practices (BMP) treating 940 square feet of impervious surfaces. 438 native plants were planted, 1 educational event was held, 250 individuals were educated, and 9 volunteers were engaged. Volunteer hours in 2020 totaled 200, resulting in an estimated value of $5,440.00.

Through WSA's programming and resources, the program has been able to reach thousands of residents, implement thousands of square feet of small-scale stormwater best management practices, train more than 400 Stewards, and build a program that contributes to improving water quality and helping to restore the Chesapeake Bay.

Overall, as a result of the program, graduates of all the WSAs reported an increase in confidence in their ability to:

- Write a successful grant.
- Give a presentation to the community or neighborhood.
- Teach or talk to others about stormwater.
- Design an effective outreach campaign.
- Design and build a small rain garden.
- Identify specific pollution sources in your community.
- Identify upcoming County restoration projects planned for [the] watershed.
- Choose native plants for a conservation landscape.
- Install a rain barrel.
- Locate the elevation of [the] property.
- Determine the soil type of a specific property.
- Identify the TMDLs or pollution impairments for [the] watershed.
- Collaborate with the active watershed groups in [the] area.
- Manage a community restoration project such as a buffer planting or rain garden.
- Assist a homeowner with navigating County permitting processes and requirements.

Stewards also reported an increase in the use of several outreach methods as a result of the WSA program, including speaking engagements, volunteer events, and school presentations.

Program Evaluation—Evaluation Methods

A logic model was developed with the strategic goal of the implementation of best management practices focused on stormwater and improving local water quality. Inputs (i.e., what we invest), outputs (i.e., activities and participation), and one-year outcomes and indicators were determined. Please reference the entire logic model in Appendix E for more information.

As referenced in the section Meets Critical Clientele Needs, paired pre-and post-evaluations are administered to the Stewards at the beginning and end of each training course in order to determine individual knowledge and behavior change as a result of the program. The test is IRB-approved and data are collected through Qualtrics.

Adoption and Replication

UME's WSA program was launched in 2010 to address the increased statewide demand to expand the popular Anne Arundel County Watershed Stewards Academy which launched in 2009. The Anne Arundel County program had limited capacity to serve beyond the county boundaries, led the UME team to partner with them in order to expand the reach of the WSA program across the state of Maryland. The program quickly developed into a comprehensive, widely recognized statewide program. Currently, the Watershed Steward Academy is in Anne Arundel County, Howard County, the National Capital Region (covering Montgomery County, Prince George's County, and Washington, D.C.), Cecil County, St. Mary's County, Calvert County, and Harford County. A program will be launched in Wicomico County in 2021.

The WSA is recognized as a special program within the St. Mary's County's WIP and MS4 permit programs and Calvert County's MS4 permit program.

Master Watershed Steward Academy programs exist across the country. This team has worked with Pennsylvania, Illinois, and Indiana on replication of the Watershed Stewards Academy program.

Marketing and Communication

Formal marketing plan in place and evaluated for effectiveness.

A formal marketing plan is in the process of being developed. It will serve all of the Academies including National Capital and Anne Arundel. WSA also uses websites and social media to support programming and recruit new volunteers, as well as in-person trainings and workshops open to the general public.

WSA provides display boards, a trifold marketing brochure, and individualized business cards for Steward to promote the program at a grassroots level. WSA displays have been used at county fairs, local festivals, community events, and GreenFests. Stewards in various Academies have started their own outreach events such as garden tours, field days, and community stormwater tours to spread information about the program and stormwater management. Social diffusion strategies such as word of mouth and neighbor to neighbor communication have been used across the Academies.

Public Value

A hallmark of the WSA program is its value to communities, individuals, families, and local and state agencies. This starts before any educational work begins and involves the development of a Steering Committee. This is a group of local professionals from a variety of disciplines and those representing local agencies and non-profit organizations. Not only do these groups help localize the WSA program curriculum, but they also identify local groups to engage as the program prepares to begin accepting applications. Once a local WSA program is up-and-running, they utilize a Consortium of Support Professionals (CSP), which is a network of professionals from the local community that assist with various aspects of project design and implementation. Examples of CSP members include civil engineers, landscape architects, earthwork contractors, plant nurseries, and retired environmental and soil scientists.

After Stewards have completed their training program they begin working in their local communities. They respond to requests for information, assist in addressing localized flooding problems, and aid community residents in their desire to install homeowner-scale best management practices. Along with this type of one-on-one community engagement, Master Watershed Stewards help educate communities by participating in local environmental or county fairs, they are presenters at local events, and they complete restoration projects that involve numerous community volunteers. As a result, from 2015 through 2020 Watershed Stewards Academies successfully graduated 416 Master Watershed Stewards. These individuals, in turn, have engaged 42,334 members of their communities through educational outreach and volunteer events.

Empowered by their training and a desire to serve their local communities above-and-beyond their WSA training, since 2014, three Stewards have gone on to form local watershed associations (non-profit 501(c)(3) organizations) to serve their local communities.

- Friends of the Bohemia (https://www.friendsofthebohemia.org/)
- Elk & North East Rivers Watershed Association (https://www.elkandnortheastrivers.org/)
- Friends of St. Clements Bay (http://www.friendsofstclementsbay.org/)

Based in southern Pennsylvania but serving part of northeastern Maryland, the Octoraro Watershed Association promotes the WSA program to the community it represents on its website. They share a quote from Chuck Foster, a Master Watershed Steward, which embodies the goals of the WSA program and how Stewards see their role in the local community:

> *"If you are interested in clean water and helping your community, Cecil County's WSA presents an awesome opportunity! Through the WSA program and its dedicated staff, I was provided with education, strategies for action, resources, a network of people with similar interests, hands-on experience, and most*

importantly…confidence that I can serve as a community resource! This is a great way to help make a difference in the world." Chuck Foster (http://theowa.org/home/cecil-watershed-stewards-academy)

Numerous partners of WSA programs across the state recognize the value that Stewards are to their local communities and both support and promote the work they and the WSA program do. This type of expanded network of partners helps WSA reach a variety of communities through an individual's particular interest. A few examples include:

- Maryland Sea Grant College publishes Chesapeake Quarterly, its magazine which explores scientific, environmental, and cultural issues relevant to the Chesapeake Bay and its watershed, and through its blog, has shared information about WSA to a broad range of individuals interested in bay-related issues (https://www.chesapeakequarterly.net/V15N3/side1/) and (http://www.mdsg.umd.edu/onthebay-blog/stormwater-saviors-how-these-volunteers-arebecoming-master-watershed-stewards).
- Interfaith Partners for the Chesapeake, founded in 2013 "to reflect the diversity of faith communities in the Chesapeake region and the intention to bridge relationships and engage people across religious lines," works closely with and has shared information about WSA to the faith-based community (https://www.interfaithchesapeake.org/storm_water).
- Washington, D.C. Department of Energy and Environment promotes the local WSA to District residents via its official website (https://doee.dc.gov/service/national-capital-region-watershedstewards-academy).
- The Source Water Assessment Program in the Maryland Department of the Environment has a presentation available on its website about what community-based Master Watershed Stewards do (https://mde.maryland.gov/programs/Water/water_supply/Source_Water_Assessment_Program/Documents/GWS-2014/r6.mathews.pdf).
- The Chesapeake Bay Trust, a non-profit organization that funds outreach and restoration projects across the Chesapeake Bay watershed, highlights the WSA program (https://cbtrust.org/projecthighlight-national-capital-regions-watershed-stewards-academy/).
- Utah State University Extension's "Sustainability" webpage, which provides credible information and trainings fostering increased awareness and behavior change to improve environmental, social, and economic conditions, currently has information about the Watershed Stewards Academy Program in Maryland (https://extension.usu.edu/sustainability/programs/national-programs/maryland).
- An interview on *EmeraldPlanet TV* about National Capital Region's Watershed Stewards Academy with Matthew Gallagher, Community-based Restoration Manager. *EmeraldPlanet* partners with local and international radio, television, online, and print media to identify and share 1,000 plus best practices through the *EmeraldPlanet TV*, the *EmeraldPlanet* website "TV Programs" and "Alliances and Partnerships", multiple global social media outlets, United Nations ECOSOC

events; The World Bank Group Connect4Climate program, among other new and innovative world-wide media and networking opportunities (http://www.emerald-planet.org/?p=16318).

- Chesapeake Conservation Landscaping Council's Chesapeake Bay Landscape Professional (CBLP) Program Cblpro.org and https://www.chesapeakelandscape.org/

Sustainability

The WSA program is supported through the combination of University of Maryland Sea Grant Extension and partnering counties. The UME WSA team jointly manages the development and support of the overarching WSA program. Members of the team spend an additional portion of their time providing direct support for local Academies. Direct support comes from Nicole Basenback (0.5 FTE), Kelsey Brooks (0.2 FTE), Eric Buehl (0.2 FTE), Jacqueline Takacs (0.2 FTE), and Amanda Rockler (0.1 FTE). UME provided gap funding for the Howard County WSA to finish the Howard County WSA Sustainability Plan in 2019.

In addition to County staff time, County partners have contributed approximately $25,000-$50,000 each year to the programs through direct financial support. Please see Appendix D for a list of grants that helped to support and expand WSA programming.

Cost recovery is built into the program through a fee charged per person for the training course. This ranges from $100-$250 per person, depending on the Academy. This fee is not meant to be a barrier to anyone participating in the program though, and scholarships are available upon request.

The WSA program is dependent on partnerships outside of UME. At the state level, the WSA program runs in partnership with the Anne Arundel County WSA program. Locally, each Academy runs in partnership with their respective County partners. The WSA program relies on community partners for project sites, outreach opportunities, etc. Partners include NGOs, local and state government, faith-based institutions, schools, community groups, HOAs.

Appendix A: Curriculum

The curriculum outlined here is used by UME faculty and staff to train Master Watershed Stewards. [WSA Curriculum]

Module 1: Introduction to the WSA Program

1.1 Getting to Know your WSA
- Lesson: 1.1a Getting to Know Your WSA
- Presentation: 1.1b WSA Introduction
- Script: 1.1c WSA Introduction script
- Activity: Pre-Assessment

1.2 Who's in My Class
- Lesson: 1.2a Who's in My Class
- Activity: 1.2d WSA Scavenger Hunt

Module 2: Watershed Sciences and Land Use Changes

1.1 Getting to Know the Water Cycle
- Lesson: 2.1a WSA Water Cycle Lesson
- Presentation: 2.1b Intro and Water Cycle
- Script: 2.1c Intro and Water Cycle Script
- Activity: 2.1d How does our Water Flow
- Activity: 2.1e Incredible Journey

1.2 Properties of Water *(optional lesson)*
- Lesson: 2.2a WSA Properties of Water Lesson
- Presentation: 2.2b Properties of Water
- Script: 2.3c Properties of Water Script

2.3 Discovering Your Watershed Boundaries
- Lesson: 2.3a Discovering Your Watershed Boundaries
- Presentation: 2.3b Defining Watersheds
- Script: 2.3c Defining Watershed Script

2.4 Pollution Dilution is NOT the Solution
- Lesson: 2.4a WSA Pollution Lesson
- Presentation: 2.4b Pollution Dilution is NOT the Solution
- Script: 2.4c Pollution Script

Module 3: Stormwater Tour

3.1 Stormwater Tour
- Lesson: 3.1a Local Stormwater Tour Lesson
- Resources: 3.1f Sample Stormwater Tour Packet

Module 4: Water Systems and Stormwater Issues

4.1. Water Systems – Drinking Water, Wastewater, Stormwater
- Lesson: 4.1a Water Systems Lesson
- Presentation: 4.1b Water Systems
- Script: 4.1c Water Systems script

Activity: 4.1d Enviroscape Groundwater Manual
Can pair the activity with 4.2d below (Enviroscape Stormwater Manual)

4.2. Cause and Effect of Stormwater
Lesson: 4.2a Cause and Effect of Stormwater Lesson
Presentation: 4.2b Cause and Effect of Stormwater
Script: 4.2c Causes and Effect of Stormwater script
Activity: 4.2d Enviroscape Stormwater Manual
Can pair the activity with 4.1d above (Enviroscape Groundwater Manual)
Homework: 4.2e Cause and Effect of Stormwater Homework

Module 5: Legislation, Programs, and Policy

5.1 Water Quality Laws and Regulations
Lesson: 5.1a Water Quality Laws and Regs Lesson
Presentation: 5.1b Water Quality Laws and Regs
Script: 5.1c Water Quality Laws and Regs Script

5.2 Local Perspectives, Programs, and Policies
Lesson: 5.2a Local Perspectives, Programs, and Policies Lesson
Presentation: *presentation to be created by local representatives*
Homework: 5.2e Local Perspectives, Programs, and Policies Homework

Module 6: Introduction to Small-Scale Stormwater Best Management Practices

6.1 Small-Scale Stormwater Best Management Practices
Lesson: 6.1a Small-Scale Stormwater Best Management Practices Lesson
Presentation: 6.1b Small-Scale Stormwater Best Management Practices
Script: 6.1c Small-Scale Stormwater Best Management Solutions script
Homework: 6.1e Rain Garden Maintenance Homework

Module 7: Native Plants

7.1. Benefits of Native Plants
Lesson: 7.1a Benefits of Native Plants lesson
Presentation: 7.1b Benefits of Native Plants
Script: 7.1c Benefits of Native Plants Script
Activity: 7.1d Native Plants Activity

7.2. Non-Native Invasive Plant Species
Lesson: 7.2a Invasive Plants lesson
Presentation: 7.2b Invasive Plants
Script: 7.2c Invasive Plants Script

7.3. Selecting Native Plants
Lesson: 7.3a Selecting Native Plants
Presentation: 7.3b Selecting Native Plants
Script: 7.3c Selecting Native Plants Script
Activity: 7.3d Right Plant Right Place Activity

Module 7: Soil

8.1. Understanding Soils and Hydrologic Soil Groups

Lesson: 8.1a Understanding Soils lesson
Presentation: 8.1b Soils and Hydrologic Soil Groups
Script: 8.1c Soils and Hydrologic Soil Groups Script
Activity: 8.1d Texture by Feel Activity

8.2. Finding Soils Information
Lesson: 8.2a Finding Soils Information lesson
Presentations: 8.2b Web Soil Survey
Script: 8.2c Web Soil Survey Script
Activity: 8.2d Web Soil Survey Activity

8.3. Relation to Stormwater BMPs
Lesson: 8.3a Relation to Stormwater BMPs lesson
Presentation: 8.3b BMPs Soils Perc
Script: 8.3c BMP Perc Script
Activity: 8.3d BMP Perc Activity

Module 9: GIS and Desktop Analysis

9.1 GIS
Lesson: 9.1a GIS lesson
Presentation: 9.1b Introduction to GIS
Script: 9.1c Introduction to GIS Script
Activity: 9.1d GIS Practice Outline

9.2 Desktop Analysis
Lesson: 9.2a Desktop Analysis lesson
Presentations: 9.2b Topographic Maps & 9.2b Desktop Analysis Outline
Activity: 9.2d Desktop Analysis Practice Outline
Homework: 9.2e Desktop Analysis Homework

Module 10: Neighborhood and Site Assessments

10.1: Introduction to Neighborhood & Site Assessments
Lesson: 10.1a Neighborhood & Site Assessments Lesson
Presentation: 10.1b Site Assessments presentation
Script: 10.1c Neighborhood and Site Assessments script
Activity: 10.1d Nbrhd & Site Assessment Instructions and Forms
Homework: 10.1e Conduct Site Assessment at Home

Module 11: Social Marketing

11.1 Social Marketing 101
Lesson: 11.1a Social Marketing 101 Lesson
Presentation: 11.1b Social Marketing 101
Script: 11.1c Social Marketing 101 Script
Activity *(optional)*: 10 Steps Worksheet

Module 12: Community Engagement

12.1 Role of a Steward
Lesson: 12.1a Role of a Steward Lesson
Presentation: 12.1b-4b Community Engagement PPT all

Script: 12.1c-4c Community Engagement script all
Activity: 12.1d Role of a Steward activity *(and panel presentation of Master Watershed Stewards)*

12.2 Community Partnerships
Lesson: 12.2a Community Partnerships lesson
Presentation: 12.1b-4b Community Engagement PPT all
Script: 12.1c-4c Community Engagement script all
Activity: 12.2d Panel presentation of community partners
Homework: 12.2e Community Partnerships Homework

12.3 Working in Teams
Lesson: 12.3a Working in Teams lesson
Presentation: 12.1b-4b Community Engagement PPT all
Script: 12.1c-4c Community Engagement script all
Activity: 12.3d Group Problem Solving Activity
Homework: 12.3e Working in Teams Homework

12.4 Public Speaking
Lesson: 12.4a Public Speaking lesson
Presentation: 12.1b-4b Community Engagement PPT all
Script: 12.1c-4c Community Engagement script all
Activity: 12.4d Guidelines for the Individual Presentations
Homework: Video: Worst Presentation Ever; Article: Ten simple rules for making good oral presentations link; 12.4e Guide to Compressing an image in PowerPoint

Module 13: Project Management and Funding

13.1 Project Management
Lesson: 13.1a Project Management
Presentation: 13.1b Project Management
Script: 13.1c Project Management script
Activity: 13.1d Sample Rain Garden Project Management Checklist Activity; Creating a Project Plan Activity

13.2 Project Funding
Lesson: 13.2a Project Funding
Activity: 13.2d Project Budgets Template and Samples.docx; 13.2d Sample Capstone Project – Tree Planting.pdf

13.3 Grant Applications
Lesson: 13.3a Grant Applications
Presentation: 13.3b Project Funding
Script: 13.3c Project Funding script

Appendix B: Presentations

Invited presentations on WSA made by team members.

Rockler, A. (presenter), Takacs, J., Dindinger, J. 2012. The Watershed Stewards Academy – Empowering Community Leaders to Restore the Local Watersheds One Neighborhood at a Time. NIFA Land Grant and Sea Grant National Water Quality Conference. Portland, OR.

Rockler, A. (presenter), Takacs, J., Dindinger, J. 2014. The Watershed Stewards Academy – Empowering Community Leaders to Restore the Local Watersheds One Neighborhood at a Time. UME Annual Conference. Annapolis, MD

Dindinger, J. (presenter), Rockler, A., Etgen, S. 2016. "Watershed Stewards Academies: Volunteers Leading the Way." Conference on the Future of Stream Restoration and Preservation in Maryland. Mount St. Mary's University. Frederick, MD.

Rockler, A. (presenter), Dindinger, J. (presenter). 2016. "Watershed Stewards Academy- An Army of Stormwater Stewards." Social Coast Biannual Forum. Charleston, SC.

Dindinger, J. (presenter), Rockler, A., Buehl, E., Takacs, J., Varsa, K. 2016. "Watershed Stewards Academy." Association of Natural Resources Extension Professionals (ANREP) and National Association of Community Development Extension Professionals (NACDEP) Joint Conference: Building a Path to Resiliency. Burlington, VT.

Rockler, A. 2017. Watershed Stewards Academy- Training a Cadre of Community Stormwater Leaders to Improve Water Quality. Virtual Session. 10th annual International Conference of Education, Research and Innovation (ICERI).

Dindinger, J., Buehl, E., Rockler, A., Takacs, J. & Brooks, K. 2018. Impacts of the Watershed Stewards Academies. Association of Natural Resources Extension Professionals. Biloxi, MS.

Rockler, A. (presenter), Dindinger, J. (presenter). 2019. "Watershed Stewards Academy – A volunteer train the trainer program." National Extension Conference on Volunteerism. Billings, MT.

Dindinger, J. (presenter), Rockler, A. 2019. "Watershed Stewards Academy: A Community Engagement Model for Meeting Chesapeake Bay Restoration Goals." Challenges of Natural Resource Economics and Policy: 6th National Forum on Socioeconomic Research in Coastal Systems. New Orleans, LA.

Dindinger, J. (presenter), Rockler, A. 2019. Lightning talk. "Watershed Stewards Academy." Challenges of Natural Resource Economics and Policy: 6th National Forum on Socioeconomic Research in Coastal Systems. New Orleans, LA.

Dindinger, J. (presenter), Buehl, E., Rockler, A., Takacs, J., Brooks, K. 2019. “Impacts of the Watershed Stewards Academies.” Chesapeake Studies Conference. Salisbury, MD.

Appendix C: Publications

The following Fact Sheets and Extension Briefs are available on the UME website and are used by Master Watershed Stewards, UME faculty, and the public.

Rockler, A., Varsa, K. 2013. Stormwater Rebate and Reimbursement. FS-976. UME. 2pp.

Scaroni, AE., Dindinger, J., Rockler, A., Takacs, J., Varsa, K. 2014. Understanding Montgomery County's Water Quality Protection Charge. EBR-19. UME. 2pp.

Scaroni, AE., Dindinger, J., Rockler, A., Takacs, J., Varsa, K. 2014. Understanding Anne Arundel's County's Water Quality Protection Charge. EBR-22. UME. 2pp.

Varsa, K., Dindinger, J., Rockler, A., Scaroni, AE., Takacs, J. 2014. Understanding Baltimore County's Stormwater Remediation Fee. EBR-23. UME. 3pp.

Rockler, A., Dindinger, J., Scaroni, AE., Takacs, J., Varsa, K. 2014. Understanding Frederick County's Stormwater Remediation Fee. EBR-24. UME. 3pp.

Rockler, A., Dindinger, J., Scaroni, AE., Takacs, J., Varsa, K. 2014. Understanding Howard County's Stormwater Remediation Fee. EBR-25. UME. 3pp.

Dindinger, J., Rockler, A., Scaroni, AE., Takacs, J., Varsa, K. 2014. Understanding Harford County's Stormwater Remediation Fee. EBR-26. UME. 2pp.

Varsa, K., Dindinger, J., Rockler, A., Scaroni, AE., Takacs, J. 2014. Understanding Carroll County's Stormwater Remediation Fee. EBR-28. UME. 2pp.

Newburn, D., Alberini, A., Rockler, A., Karp, A. 2015. Adoption of Household Stormwater Best Management Practices. FS-0368. UME. 21pp. http://hdl.handle.net/1903/14974

Varsa, K., Dindinger, J., Rockler, A., Takacs, J. 2015. Install a Pet Waste Station. EBR-31. UME. 2pp.

Varsa, K., Dindinger, J., Rockler, A., Takacs, J. 2015. Slow it Down and Soak it In: Disconnecting and Redirecting Your Downspouts. EBR-336. UME. 4pp.

Buehl E., Dindinger, J., Rockler, A., Takacs, J., and Varsa, K. 2018. The Right Tree for Your Lawn - Planting trees to help improve Chesapeake Bay water quality. FS-1029. University of Maryland Extension. College Park, MD. 4 pp.

Rockler, A., Buehl, E., Dindinger, J., Takacs, J., Varsa, K. 2016. Rain Gardens. FS-0371. UME. 4pp.

Rockler, A., Buehl, E., Dindinger, J., Takacs, J., Varsa, K. 2016. Conservation Landscaping. FS-0370. UME. 4pp.

Buehl, E., Dindinger, J., Rockler, A., Takacs, J., Varsa, K. 2018. Stormwater Runoff - What To Do When It Impacts You. FS-0395. UME. 3pp.

Dindinger, J., Buehl, E., Rockler, A., Takacs, J. 2019. Permeable Pavers. FS-1062. UME. 5pp.

Dindinger, J., Kyler, K., Rockler, A.K., Sample, D., Fox, L. Hughes, S. 2019. "Basic Principles of Watershed Restoration and Stormwater Management in the Chesapeake Bay Region – Pilot Draft." (Made final review edits; awaiting publication number from FastTrack) http://cblpro.org/downloads/BasicPrinciplesWatershedRestoration.pdf.

Appendix D: Grants Secured

Grants secured by team members to support WSA.

2011. Watershed Stewards Academy. Outreach and Stewardship Grant for the National Capital Region-Watershed Stewards Academy. Source: National Fish and Wildlife Foundation (NFWF). Award: $146,000.

2012. Watershed Stewards Academy funding. Source: Campbell Foundation. Award: $50,000.

2012. Watershed Stewards Scholarship Funding. Source: Prince George's County Government. Award: $50,000.

2012. Watershed Stewards Scholarship Funding. Source: District Department of the Environment (DDOE). Award: $70,000.

2013-2014. Rockler, A. Toyota TogetherGreen. Source: Toyota and Audubon. Total Award $10,000.

2014. Howard County Watershed Stewards Proposal for HoCo Watershed Enhancement Grant Programs. Source: Howard County. Award: $35,000.

2014. Dindinger, J., Scaroni, AE. "Eastern Shore Watershed Stewards Academy: project support." Source: Chesapeake Bay Trust, Annapolis, MD. Amount: $10,784.

2014. Howard County Watershed Stewards Academy. Source: Chesapeake Bay Trust. Award: $25,000.

Appendix E: Logic Model

Situation Statement: As the population in the watershed continues to increase, natural areas are converted to more impervious surfaces in order to accommodate the needs of residents, businesses, and industry, thereby increasing stormwater runoff and the transport of sediment and nutrients. The CBP estimates state that "increased development across the watershed has made stormwater runoff (also called polluted runoff) the fastest-growing source of pollution to the Chesapeake Bay."

Realizing that two-thirds of the land in their county was in private ownership and that it did not have sufficient resources to address the myriad of water quality challenges on these non-public lands, in 2008, the Anne Arundel County Department of Public Works and Public Schools formed a partnership that created the Watershed Stewards Academy (WSA). The WSA trains and supports a diverse group of volunteers ("stewards") conversant in stormwater issues who then use their training to educate communities and design, implement, maintain, and promote restoration projects focused on stormwater management and improving local water quality.

The Anne Arundel WSA officially started in 2009 as a non-profit 501(c)(3) and is managed by an Executive Director and a Board of Directors. The second WSA to form was the National Capital WSA in 2011, which is an initiative of a coalition of watershed protection groups administered by Anacostia Watershed Society in partnership with the University of Maryland Sea Grant Extension. The Sea Grant Extension Specialists, in cooperation with county partners, led to the creation of the Howard County WSA in 2012, the Cecil County WSA in 2014, the St. Mary's County WSA in 2016, and the Harford County WSA in 2017.

Strategic Goals and Expected Outcomes:
The Watershed Stewards Academy (WSA) uses a train-the-trainer approach to instruct and manage a diverse group of Stewards, conversant in watershed issues, who provide localized community outreach and assist with the implementation of best management practices focused on stormwater and improving local water quality.

Evaluation Methods and Indicators

Focus - Collect Data - Analyze and Interpret – Report
Follow-up surveys

Logic Model for Watershed Stewards Academy

Inputs *What We Invest*	***Outputs*** *Activities*	*Participation*	***1 Year Outcomes/Indicators*** *Outcomes*	*Indicators*
• UME/AGNR • Faculty / Staff • Master Watershed Stewards • Professional development • Financial resources • Web sites: UME and Individual Programs • WSA teaching resources • UME fact sheets and marketing materials • Master Watershed Steward Curriculum	• Train WSA volunteers to teach stormwater to their communities and residents of Maryland • Teach about watershed restoration and stormwater to the general public • Add subject matter content to UME websites using written and other communication tools to promote improving water quality in Chesapeake Bay • Demonstrate best practices and innovative techniques • Fundraising / grant writing • Conduct research • Disseminate research-based, reliable and current information • Collaborate with local, regional and national partners	• Master Watershed Stewards • Public School Teachers • Homeowner Associations • Community leaders • Staff of local stormwater management agencies	• Marylanders' stormwater knowledge and skills are improved • Marylanders adopt stormwater practices that improve soil and protect water resources • Recognize UME as the premier, go-to stormwater resource in Maryland	• Number of learners who demonstrate increased basic stormwater knowledge and skills following participation in UME classes, workshops, demonstrations, webcasts, etc. • Number of learners who demonstrate behavior change or intent to change behavior, including adopting recommended practices, and increasing the number of education and outreach program participants reached • Number of square feet of impervious surface treated • Number of square feet of BMPs installed