Water HIGHLIGHTS

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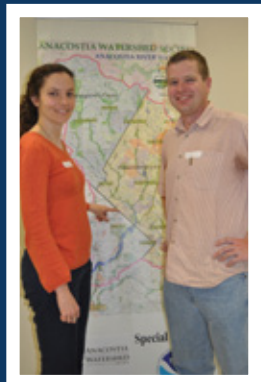
WATER RESOURCES RESEARCH INSTITUTE
College of Agriculture, Urban Sustainability and Environmental Sciences

FEATURE

3 Watershed Stewardship Academy

Building Water Expertise Close To Home



Throughout the DC metro region, the majority of streams and rivers continue to be rated as poor or fair in terms of their ability to support critical aquatic life. The National Capital Region Watershed Stewards Academy (NCR-WSA) and the University of the District of Columbia have partnered to present the 2011-12 Watershed Stewards Academy, whose goal is to empower community activists to become advocates for water solutions in their communities. Hosted on the UDC campus, the 15- session course prepares stewards to navigate complex issues involved in mitigating water problems in Washington, DC and in Prince Georges and Montgomery counties in Maryland.

WHAT'S INSIDE

Left, top: Water Stewards Mary Lee Houghwout and Chris Moore display a map of the Anacostia Watershed. Right: Flowing through major population centers, the Anacostia and Rock Creek are among the nation's most urbanized watersheds. This map identifies branches and other features of the 77 square-mile Rock Creek watershed.

Director's**MESSAGE**

A New Dean, and New Horizons for WRRI

The Institute congratulates Dr. Sabine U. O'Hara as our new Dean in the College of Agriculture, Urban Sustainability and Environmental Sciences (CAUSES), especially during this period of transformational changes at the University of the District of Columbia focusing on sustainability. Her vision, leadership and incredible passion for integrating research, community engagement and teaching add tremendous strength to our program offerings. Our partnership with the Anacostia Wa tershed Stewardship Academy is another means by which we will transfer information and engage our stakeholders with research-based knowledge. This train-the-trainer program is featured in this issue of "Water Highlights," with capstone projects by new watershed advocates. Please continue to support our efforts to improve ground, surface and drinking water quality in the District as we share research accomplishments of faculty and students. The message below is from our new Dean, Dr. Sabine O'Hara.

WILLIAM HARE
Director of the D.C. Water Resources Research Institute

Local Commitment—Global Reach

Local Commitment - Global Reach

The University of the District of Columbia (UDC) is an urban land grant university that offers associate, baccalaureate, and graduate programs, certificate programs and community outreach programs to learners of all ages. The College of Agriculture, Urban Sustainability and Environmental Sciences (CAUSES) embodies the land-grant tradition of UDC, and I am delighted to be able to play a role in implementing this important tradition. CAUSES offers cutting-edge academic programs in environmental science, urban sustainability, water resources management, nutrition and food science, urban architecture and community planning. We also offer a wide range of programs that serve individuals and organizations in our community and beyond. Over 180,000 participants benefited from the community outreach programs offered across DC in 2011 alone.

Making a Difference

The Community is our Classroom. This means that what we teach is steeped not only in sound theory, but also in the knowledge we draw from the community and region around us. We offer a wide range of research programs through the Water Resources Research Institute, the Agricultural Experiment Station, the 143-acre Muirkirk Research Farm, and the Architecture Research Institute. We also offer community outreach programs for all ages through 4-H and the Center for Youth Development, the Center for Nutrition, Diet and Health, and the Center for Sustainable Development.

Knowledge for a Lifetime

We are deeply committed to being relevant to the residents of the District of Columbia. Given our three-pronged approach of teaching, research and community outreach, we seek to make a measurable, positive difference in the lives of people right where they live and work. As a result, our programs focus on improving economic opportunities, social and cultural conditions, and the health of people and their living environments. Yet our community-based programs are more than local. They also serve as models for relevant learning far beyond our region.

Preparation for a Global Marketplace

CAUSES programs recognize that, like ecosystems, we are connected to people and places right here in our own neighborhoods and to those half way around the world. Pollution travels, resources are not always consumed where they are generated, and job markets are increasingly global and knowledge based. Given these realities, we aspire to teach how to think in systems, work in diverse teams, and focus on connectivity and innovation. We apply these principals to all of our programs including our Master's and Bachelor's degree programs, professional development certificates and community outreach and youth programs.

It is a distinct honor to serve as the Dean of CAUSES and Director of the Agricultural Experiment Station and Cooperative Extension Services. The faculty and staff of CAUSES look forward to discussing with you how our programs and initiatives can best serve you. Please contact us at (202) 274-7011or at causes@udc.edu. ■

SABINE O'HARA
Dean, College of Agriculture, Urban Sustainability and Environmental Sciences

Director of the Agricultural Experiment Station & Cooperative Extension Services

Dr. Sabine O'Hara was appointed Dean of the College of Agriculture, Urban Sustainability & Environmental Sciences (CAUSES) of the University of the District of Columbia in March 2012. As Dean of CAUSES, she is responsible for academic, research and outreach programs in the College. Dr.O'Hara earned a doctorate in environmental economics and a master's degree in agricultural economics from the University of Göttingen, Germany. She serves on the board of directors of several national and international organizations, including as past president of the United States Society for Ecological Economics, as International Advisory Board member of King Abdul-Aziz University in Jeddah, and as reviewer and editorial board member of several academic journals.

PARTNERSHIPS

Watershed Stewards Academy

Building Water Expertise Close To Home

Throughout the DC metro region, the majority of streams and rivers continue to be rated as poor or fair in terms of their ability to support critical aquatic life. The National Capital Region Watershed Stewards Academy (NCR-WSA) and the University of the District of Columbia have partnered to present the 2011-12 Watershed Stewards Academy, whose goal is to empower community activists to become advocates for water solutions in their communities. Hosted on the UDC campus, the 15- session course prepares stewards to navigate complex issues involved in mitigating water problems in Washington, DC and in Prince George's and Montgomery counties in Maryland.

Jacqueline Goodall, mayor of Forest Heights, MD digs in to a stormwater project she organized in her town. Read how she and other Watershed Stewards Academy volunteers are making a sustainable difference in their communities.

"Part of the drive behind creating the WSA has been the continuing impairment of local and regional water bodies, including streams, rivers, and the Chesapeake Bay," Maria Sgambati, WSA Outreach Coordinator, explains.

Ms. Sgambati, who has a biomedical background, serves on the Program Committee for the Rock Creek Conservancy and is actively involved in the Melvin Hazen tributary group. She also volunteers as a water quality monitor along the Pinehurst Tributary of Rock Creek. WSA co-Executive Director Lee Cain began working at the Anacostia Watershed Society in 2006 as an environmental educator. His passion for work in conservation stems from his roots in the Chesapeake Bay where he spent his youth fishing and crabbing.

The Learning Curve

Aspiring stewards find out about the course through the WSA website, other water organizations – and through word of mouth. "When I talk to applicants, I try to convey the intensity of the course. It's a big time commitment," Lee Cain notes. Maria Sgambati concurs, "We're looking for people who are already active in changing things and raising awareness in their communities."

Although the course is non-credit, it imparts a high level of both scientific and practical information. This includes learning about municipal regulations, permitting, funding, and finding expertise and partners for community water projects. Formal classes are supplemented with field trips such a Stormwater Tour of Takoma Park to view different stormwater capture and retention systems. On neighborhood site visits, stewards learn to critically examine stormwater issues and suggest solutions.

"Partnering with the WSA was a natural step for the University," states William Hare, Director of the Water Resources

In this project initiated by WSA Steward Mary Rollefson, the rain garden in a church parking lot will enhance the planting bed as well as absorb rainwater.

Julie Meyers, Irv Sheffey, Dennis Chestnut and Clif Grandy used native plants on their urban project site to mitigate water runoff.

See Watershed Stewards Academy on page 7

STUDENT INTERNSHIPS

Area Students Reflect the Next Generation of Water Researchers

The Water Resources Research Institute organized "The Rewards of Research from the Student Interns' Perspective," a Forum to highlight the contributions of graduate student researchers from area universities. Hosted on the UDC campus on September 20, 2011, the Forum created an opportunity for nine students participating in WRRI seed grant research projects to share their research experiences and findings in an open dialogue. The Forum focused, not on the results of the projects, but rather on the experiences and benefits that students derive from collaborating on research projects.

"Research needs inquiring minds thinking outside of the box and leveraging cooperation," WRRI Director William Hare informed the students. He reminded them that the imperative for environmentally effective solutions drive many scientific innovations, and that is important to support these initiatives through rigorous and imaginative research.

Keynote speaker Sarah Neiderer, Water Communications Coordinator for DC WASA, addressed the audience on a topic of continuing interest, DC drinking water vs. filtered and bottled water quality. ■

For the titles of the projects presented at the Forum, visit the WRRI webpage, http://www.udc.edu/docs/water%20forum%20Agenda.pdf.

Student Interns pictured left to right: Trevor Cone (UMD); Minh Tri Le (CUA); Mohammad Haghshenas (CUA); Andrei Callejas (UDC); Freddy Montano (UDC); Christianne Greer (Georgetown); Lalindra Jayatilleke (UDC); Emma Burns (GWU). Not pictured: Antonia Davidson (UDC)

FEATURED UDC RESEARCHER

Xueqing Song

From the time he was six years old, Xueqing Song was interested in science. Growing up in a rural area near Nanjing, China, he continued that interest through his college studies at Nankai University, receiving an M.S. and PhD in Organic Chemistry. He came to Catholic University of America in Washington, DC as post-doctoral fellow in 1999, and in 2007 he joined the University of the District of Columbia as assistant professor of chemistry.

Dr. Song has been conducting research on the chemistry of biologically active organotin for more than 10 years and has more than 30 publications in this area. He follows a tradition in organotin research that was pioneered 30 years ago at UDC by Dr. George Eng, a professor of chemistry at UDC and an internationally known organotin chemist. Dr. Song's research on organotin chemistry adds to UDC's ongoing goal to strengthen its capacity as a research institution. Organotins have widespread industrial uses as PVC stabilizers, wood preservatives, and as agents in paints for marine vessels that discourage growth of microorganisms and barnacle larvae. The potential for leaching of the paints has lead to concerns of environmental toxicity. Dr. Song's 2009 paper, "Speciation of Some Triorganotin Compounds in Anacostia and Potomac Rivers Sediments using MNR Spectroscopy," related the decomposition rates of three compounds in D.C. area waters.

UDC research received a boost when Dr. Song secured a $300,000 National Science Foundation grant for a Varian 400-MR Ft-NMR spectroscope and workstations. These will support the expending research programs at UDC, as well as laboratory courses, and serve the needs of student and faculty activities in chemistry, biology, engineering and environmental science.

Regional educational institutions will benefit as well. Remote access and networked consoles installed on Gallaudet University and Catholic University will allow real-time control and data acquisition on samples for research projects and courses.

In his application for the spectroscope, Dr. Song pointed out that it would "make first-rate, research-caliber instrumentation available to faculty and students at three universities in the District of Columbia, including two primarily undergraduate institutions that service populations significantly underrepresented in science (Blacks and the deaf and hard of hearing)."

"Significantly, many UDC chemistry majors are mentored and trained in their laboratories, becoming co-authors on papers," he explains. Dr. Song has mentored a number of chemistry students, advising them on participation in national scientific meetings, observing research protocols, and preparing papers for publication.

"As we have more compounds to compare, other researchers can look for more information on organotins on the molecular level of the compound." This work is especially valuable, Dr. Song believes, "because this research has medical applications. It has important implications in fighting disease."

RESEARCH

WRRI Research Projects

As part of a federal/state partnership in water-related research, information transfer and education, WRRI provides interdisciplinary research support to identify water and environmental resources and problems in the Metropolitan DC area, and contribute to their solution. Listed below are summaries of Seed Grant-supported research completed in FY 2010.

Identifying major sources of fecal pollution in the District of Columbia from both combined sewage outlet (CSO) sites and non-point sources (NPS) was the purpose of **Dr. David Morris's** research project, "The Application of Multiple Antibiotic Resistance Profiles of Coliforms to Detect Sources of Bacterial Contamination of the Anacostia River." The research links pollution-derived coliform levels, and antibiotic resistance in mid-summer water samples, and suggests transference of resistance between human and/or animal-derived and natural-source coliforms. As few studies have been carried out to determine the variance of MAR profiles of fecal coliforms in tributary that was studied, the study provides a comprehensive "before and after" assessment of fecal contamination in the watershed as projected revitalization continues. **Read the full report at http://www.udc.edu/docs/dc_water_resources/technical_reports/Morris_WRRI_FY2010_Final_Report.pdf**

Dr. Harriet Phelps's paper, "Active (ABM) and Passive (POM) Chlordane Monitoring in the Anacostia River Watershed (MD)," details the active biomonitoring and passive monitoring she employed to assess the presence of chlordane in the Sligo Creek Park watershed of the Anacostia River. Clams, minnows, and sediment were collected and the amounts of chlordane present in samples were analyzed. The use of both types of monitoring yielded a more complete picture of chlordane and other contaminants in the creek sites indicating, for example, the locations where Sligo Creek may be considered a potential ongoing source of chlordane–contaminated sediment to the Anacostia tidal region. **Read the full report at http://www.udc.edu/wrri_new/docs/WRRI%20REPORT%202011.pdf**

With their research project, "A Hierarchical Spatio-Temporal Dynamical Model for Predicting Precipitation Occurrence and Accumulation," **Dr. Ali Arab** and **Dr. Tolessa Deksissa** address the problem of predicting occurrence and accumulation of precipitation, which is of considerable interest in many disciplines such as atmospheric sciences, agriculture, and hydrology, among others. In this project, the authors developed a statistical method that yields predictive distributions for precipitation occurrence and accumulation while accounting for spatial and temporal correlation in the precipitation fields. The predictive distributions for precipitation accumulation can then be used to obtain exceedance probability of rainfall accumulation beyond a threshold in order to issue flash flood warnings, and optimize evacuation management in case of flooding events. The modeling approach is based on a hierarchical modeling framework that allows breaking down a complex problem into simpler components that are linked together probabilistically. The proposed approach was implemented using historic precipitation data in the Washington D.C. area. **Read the full report at http://www.udc.edu/docs/dc_water_resources/technical_reports/Arab_WRRI_FY2010_Final_Report.pdf**

Research for "Determination of Seasonal Source Variation of Hydrocarbons, Organics and Nutrients in the Anacostia River: Stable Isotope Ratios of Specific Compounds" was carried out by **Dr. Stephen MacAvoy**. This project analyzed seasonal nutrient dynamics and organic material sources of the Anacostia River to determine if a seasonal component to water nutrient concentrations and sources exists, and to identify biogeochemical controls within the river in order to discern which geochemical and nutrient variables are driving those

controls. Water, sediment, and (when possible) invertebrate samples were collected (in most cases monthly) from three tidal freshwater sites along the Anacostia River since April 2010, and continuing through May 2011. Water nutrients (NO_3 and NH_4) demonstrate seasonal fluxes; all sites showed a peak in nutrients during early summer (June) and subsequent decline. Examination and interpretation of results is ongoing. **Read the full report at http://www.udc.edu/docs/dc_water_resources/technical_reports/McAvoy_WRRI_FY2010_Final_Report.pdf**

In their report,"Evaluating the Performance of Low Impact Developments on Runoff Volume in Washington DC," **Dr. Arash Massoudieh** and **Dr. Pradeep Behera** evaluated the effectiveness of LID practices in reducing the stormwater runoff load in an area in the east side of the District of Columbia. The EPA Stormwater Management Model (SWMM) was used for this evaluation. A few major simplifications were made to make modeling of stormwater possible over a large and highly heterogeneous area. The analysis was performed for four representative years representing two wet years, one average year and one dry year. The simulations were performed for a baseline condition (assuming no LIDs) as

See WRRI Research Projects on page 6

APPRECIATION

Edward Graham, WWRI Advisory Board Member 2006-2011

In his post at the Metropolitan Washington Council of Governments (COG), Edward Graham had an opportunity to see – and help to solve – problems affecting the natural systems in the vast DC-VA-MD area. As director of COG's Water Resources Program in the Department of Environmental Programs, Ted Graham emphasized regional solutions to the area's complex water system. And, as one of the original members of the WRRI Water Advisory Board, Dr. Ted Graham's expertise and dedication have greatly benefited the Institute.

A District native, Dr. Graham studied electrical engineering at the Massachusetts Institute of Technology, earning a PhD in that discipline from Carnegie-Mellon University. He started his career with a computer consulting firm and later joined Montgomery County as an environmental planner. From there he went to the Washington Suburban Sanitary Commission (WSSC), and later returned to the Montgomery County government as director of the Department of Environmental Protection.

Dr. Graham joined COG as Water Program Director in 1998. In his 13 years at COG, he championed efforts to make the Anacostia River "a fishable, swimmable river." Since a regional agreement was signed in 1987, COG has been the focal point for federal, state and local restoration efforts in the Anacostia. The Anacostia Restoration Partnership in its present form was created by the COG Board of Directors in 2006. Dr. Graham was the principal author of the concept document used as the Partnership's organizational blueprint. The Steering Committee of the Partnership draws from federal, state and local agencies and several non-governmental organizations with a stake in the restoration of the Anacostia. Perhaps the Partnership's single most important achievement was the completion of the Congressionally-mandated Anacostia Restoration Plan in 2010.

Another challenge was coordinating regional cooperation for the Blue Plains waste water treatment plant, establishing jurisdictional lines and negotiating equitable sharing of financing for the plant. While at WSSC, Dr. Graham was one of the key negotiators of the 1985 Blue Plains Intermunicipal Agreement. He brought that continuing interest in Blue Plains to COG.

Much of Dr. Graham's work during his tenure at COG was related to the multistate efforts to restore and protect the Chesapeake Bay. During this period, Dr. Graham was appointed by Mayor Tony Williams to the Scientific and Technical Advisory Committee of the Chesapeake Bay Program. He was instrumental in focusing much of the Committee's attention on managing stormwater.

Dr. Graham considers that, despite its challenges, the DC area enjoys numerous advantages in natural resources. "Washington is a water-rich area," he points out. "We don't suffer from the water scarcity problems that other parts of the country experience." Going forward, he adds, in an era of fiscal constraints, and continued pressures from growth, alignment on managing regional water issues will be the key determinant for success, as well as connecting water research with real-world issues.

Dr. Graham continues to share his expertise as a consultant on water and planning issues. He also volunteers with conservation organizations, and recently completed a five-year tenure as president of a local land trust in Maryland. As Dr. Graham has now retired from the Advisory Board, WRRI takes this opportunity to express our thanks and best wishes. ■

WRRI Research Projects, from page 5

well as three LID scenarios including the capture of runoff from respectively 10%, 20% and 50% of houses through vegetated swales represented by the infiltration trench feature of SWMM. It was found that vegetated swales can significantly reduce the total volume of runoff; however, they were less effective in reducing the peak runoff. This is due to the fact that the vegetated swales in urban areas have a limited capacity and overflow occurs as soon as the rain intensity exceeds a certain amount and therefore these practices are less effective for large storms. Moreover, most small events can be fully captured by the vegetated swales in residential areas, while they only can capture a fraction of the rain during large events. **Read the full report at http://www.udc.edu/docs/dc_water_resources/technical_reports/Massoudieh_Project_Publication.pdf**

Information Transfer

Dr. Tolessa Deksissa and water consultant **Dr. Cat Shrier** coordinated the 14-week DC Area Water Issues Program (DCAWIP), offered as a pilot program during the fall 2010 semester by the University of the District of Columbia's College of Agriculture, Urban Sustainability and Environmental Sciences (CAUSES). DCAWIP was created to implement a strategic goal of the DC Water Resources Research Institute: to generate greater involvement by students and faculty at all of the area universities in water education programs, as well as that of other DC area water stakeholders; and to develop a network of peer reviewers for DC WRRI-funded research. This multidisciplinary seminar program featured expert speakers from water organizations and explored numerous aspects of water and watersheds in the DC area. DCAWIP drew an average of 40 attendees per week, indicating a strong interest by participants to come together on a regular basis to learn more about area issues and programs, and to develop opportunities for greater student and other university involvement in the larger community of water professionals. **Read the full report at http://www.udc.edu/wrri_new/docs/Deksissa_FY2010_Final_Report.pdf** ■

Watershed Stewards Academy, from page 3

Research Institute. "It combines science-based research with the power of citizen participation to improve water quality and quality of life."

Theory Into Practice

The culmination of the course is the Capstone Project, in which students apply the concepts learned in the classroom to real-world solutions. These projects are often small-scale stormwater installations of rain gardens, conservation landscapes, rain barrels, or pet waste stations. Proposals are evaluated for their potential to reduce pollution at the source; engage the community; and educate formally and informally. Projects should be at the right scale and forecast a realistic timeline for completion, usually one year. Although some projects are carried out by one person, most involve groups of two to four. Project partners also tend to live in geographic proximity.

The projects necessarily involve interaction with a wide range of both individual and organizational stakeholders. And even though the course equips the stewards for maximum self-sufficiency, Lee Cain emphasizes, "We continue to offer a consortium of support professionals to help volunteers. We also believe that everyone in the course has something to offer and that students can serve as a resource to each other."

"The ultimate aim of the WSA is to facilitate a paradigm shift in how people view water and what we do with it in our everyday lives – to change perspectives and perceptions that translate into action and lasting benefits," Maria Sgambati reflects. "The WSA also hopes to create a corps of individuals who can serve as critical and trusted information sources in their neighborhoods." ■

Visit the NCR_WSA on the web at www.ncr-wsa.org and on Facebook at Watershed Stewards Academy – National Capital Region

Read more about the WSA projects at http://www.udc.edu/wrri_new/docs/wsa_extended/waterhighlights_2012.pdf

CURRENTS

Water news from around the Web and more

Ojibway elder Josephine Mandamin of Thunder Bay initiated the Mother Earth Water Walk around Lake Superior as her response to the question: What will you do for the water? She, with about eight companions, shared in walking and carrying a bucket of lake water from the Bad River Reservation in Wisconsin, circling the entire Lake. Later, they circled all the Great Lakes and culminated the project last year by walking buckets of salt water carried from the four directions - Pacific and Atlantic oceans, Hudson Bay and the Gulf of Mexico - to mingle with Lake Superior at Bad River. **Read about the journey and other actions to protect Lake Superior and all waters at http://www.lakesuperior.com/articles/335award**

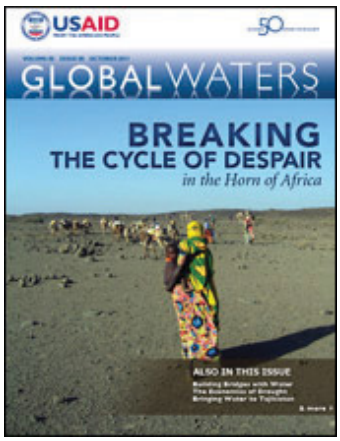
RICHARD MORPHET, MOTHER EARTH WATER WALK

"The Hidden Anacostia: Seven People Who See What Many Miss" in The Washington Post magazine (October 2, 2011) recounts the history of the DC region's iconic river and its relationship to those who live on, play on, and protect it. Evocative photos reveal the beauty and threats to the river's health. **http://www.washingtonpost.com/lifestyle/magazine/the-hidden-anacostia/2011/08/08/gIQAzMCJ7K_gallery.html#photo=20**

Experts at the Wilson Center in Washington, DC discuss the vulnerabilities women in conflict areas face in obtaining water. See the webcast at **www.wilsoncenter.org/event/digging-deeper-water-women-and-conflict**

Global Waters is the quarterly online magazine of the U.S. Agency for International Development, devoted to highlighting the Agency's water-related efforts around the world. Access the newsletter and find links to articles, interviews, and videos at **http://www.usaid.gov/our_work/cross-cutting_programs/water/globalwaters/gw_ezine.html**

A new report from the National Research Council concludes that expanding water reuse could significantly increase the nation's total available water resources, and that a portfolio of water treatment options is now available to mitigate water quality concerns. Read the summary "Water Reuse: Potential for Expanding the Nation's Water Supply Through Reuse of Municipal Wastewater" at **http://dels.nas.edu/Report/Water-Reuse-Potential-Expanding/13303**. ■



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COLLEGE OF AGRICULTURE, URBAN SUSTAINABILITY AND ENVIRONMENTAL SCIENCES

WATER RESOURCES RESEARCH INSTITUTE

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