DELAWARE WATER RESOURCES CENTER

WATER NEWS

UNIVERSITY OF DELAWARE

Winter 2008 – Spring 2009
Volume 9 Issue 2

Features

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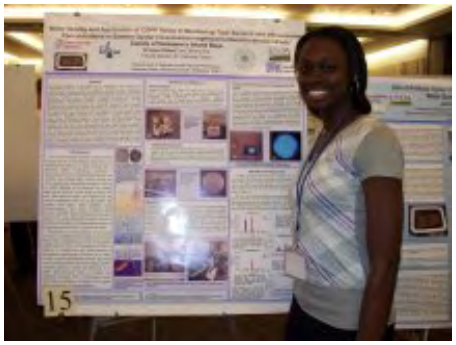
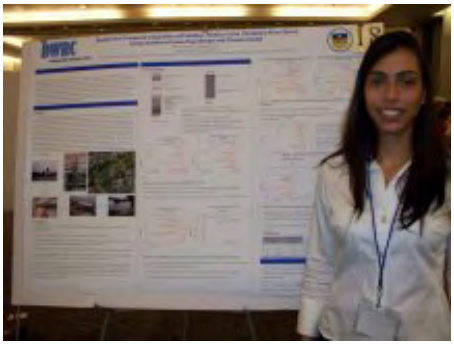
DWRC Annual Luncheon and Poster Session – April 24, 2009

2008-09 ***DWRC*** *interns, graduate fellows, advisors, and* ***DWRC*** *Advisory Panel members enjoyed lunch together and learned about research projects and interests. After lunch, the Advisory Panel held its annual meeting at the Trabant University Center, University of Delaware.*

The interns discussed posters summarizing their projects as part of the larger UD 2009 Undergraduate Research Scholars poster session.

2008-09 ***DWRC*** *interns (from left to right below): Christen Dillard, Erin Dilworth, and Cristina Fernandez*



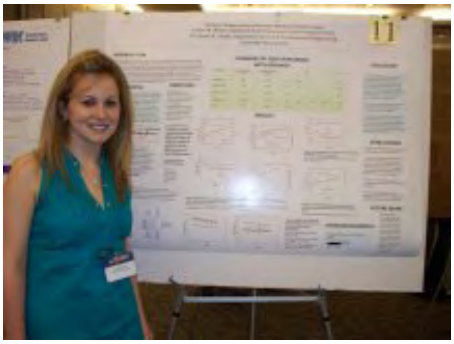


"My ***DWRC*** internship allowed me to expand on the experience and knowledge I gained in many classes. I was able to apply the theories I learned in class to real world situations, and now feel more confident in my chosen field." – *Erin Dilworth*

DWRC Annual Poster Session – April 24, 2009

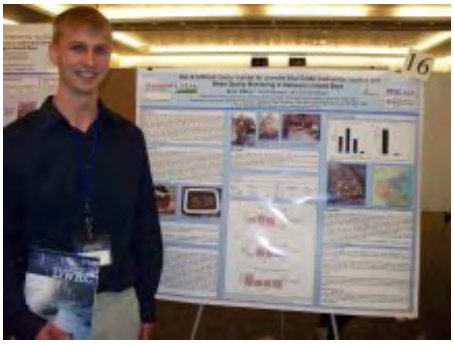
"My ***DWRC*** internship taught me a lot about the research process and all of the work that is involved. I learned that evaluating environmental policies and programs is a very complex and detailed process. My research required me to closely study all information surrounding Delaware's Coastal Zone Act. This sometimes involved communicating with Delaware's Department of Natural Resources and Environmental Control and the Water Resources Agency a***t the*** University of Delaware, both from whom I was able to learn a lot. Overall, my internship experience taught me a lot, both about my research topic and the research process." – *Erin McVey*

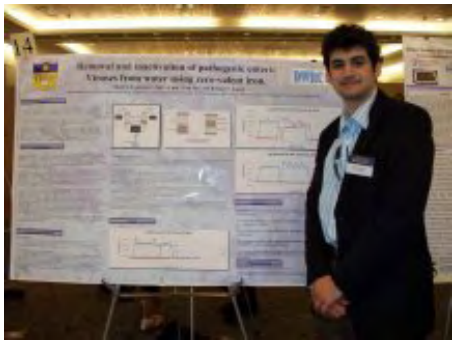
"My ***DWRC*** internship was special because it allowed me to investigate slow sand filtration, which has been implemented by UD's own chapter of Engineers without Borders in Cameroon, Africa. This international application of science helped me to realize my personal aspiration to make an impact on my community and beyond. My work in the Department of Environmental Engineering gave me increased confidence, which led me to switch my major from Natural Resources Management to Engineering Technology. I am extremely fortunate that I had this opportunity to work with knowledgeable people who inspired me to pursue my goals." – *Rachael Vaicunas*



"I am very grateful to the ***DWRC*** for giving me the opportunity to conduct research with Dr. Steven K. Dentel during the summer of 2008. Not only did I strengthen my skills as an Environmental Engineer, I learned how to work independently as well as collectively with other people. I was able to further explore methods for desalination and most importantly, I feel that I have made a contribution to science and people seeking potable water everywhere." – *Caitlin Wilson*

2008-09 ***DWRC*** *interns (from left to right below): Aaron Gibson, Edwin Wong, and Adam Yoskowitz*





"It was an enriching experience where my curiosity met methodology." – *Edwin Wong*

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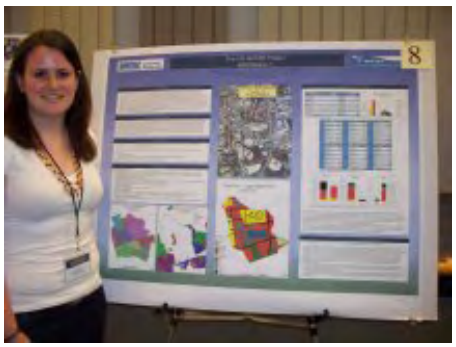
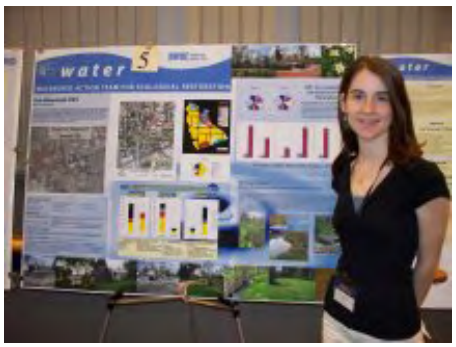
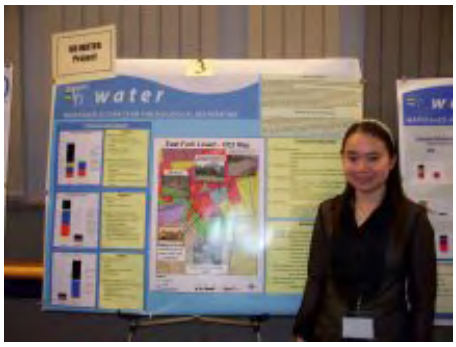
*Reporting on the **UD WATER** project are (from left to right, top row): Erin Dilworth, Kelsey Lanan (from left to right, bottom row): Samantha Loprinzo, Stracy Redis*







UD WATER - Project Goals and Recommendations

The goals of the ***UD WATER*** project were – for the UD Campus:

1) Identify major nonpoint sources of pollution in the Cool Run sub-watershed of the White Clay Creek (a wild and scenic river with tributaries on the campus)
2) Estimate, using USEPA methods and average pollutant concentrations in runoff, the annual pollutant loads to the Cool Run tributary from different land uses
3) Develop recommendations to improve storm water management, reducing flooding and improving water quality in the White Clay Creek watershed

Findings and Recommendations:

1) The estimated loads of sediment (TSS, TDS), nutrients (N, P), and metals (Cu, Zn) were determined by ***UD WATER*** team members for each sub-watershed and for the entire watershed. Primary sources of nonpoint pollution by storm water runoff appear to be commercial lands, streets, and parking lots.
2) The ***UD WATER*** team recommends wider use of the following "best management practices" to reduce storm water runoff and pollution of the White Clay Creek:

- ✓ Increase the acreage of wetlands and bio-retention ponds and swales
- ✓ Expand use of vegetated swales and filter strips along roadways
- ✓ Use more winter annual cover crops in the agricultural sub-watersheds

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DWRC Spotlight on Undergraduate Internships

INTRODUCING OUR 2009-10 SPRING INTERNS

Intern: Anna Bevan
Advisor: Dr. Delphis Levia
UD Department of Geography
Evolution of Dissolved Organic Nitrogen (DON) from the Headwaters to the Catchment Outlet

Intern: Victoria Bryan
Advisor: Dr. Steven Dentel
UD Department of Civil and Environmental Engineering
Direct Contact Membrane Distillation for Production of Potable Water from Deep Saline Aquifers

Intern: Nicole Dobbs
Advisor: Dr. Anastasia Chirnside
UD Department of Bioresources Engineering
Monitoring Cool Run Watershed for the UD Middle South Campus

Intern: Megan Furman
Advisor: Dr. Eric Wommack
UD Department of Plant and Soil Sciences
Microbiome of the Eastern Oyster, *Crassostrea virginica*

Intern: Aaron Hallett
Advisor: Mr. Chad Nelson
UD Department of Plant and Soil Sciences
Newly Constructed Wetland Management: Year One

Intern: Brian Jayne
Advisor: Dr. Anastasia Chirnside
UD Department of Bioresources Engineering
Development of an Assay to Monitor the Activity of Fungal Enzymes in Soil

Intern: Kelsey Lanan
Advisor: Dr. Tom McKenna
Delaware Geological Survey
Hydrology of Freshwater Marsh Nature Preserve, New Castle County, Delaware

Intern: Emily Olson
Advisor: Dr. Clara Chan
UD Department of Geological Sciences
Investigation of Source and Dynamics of Bacterial Contamination in a Coastal Lagoon

Intern: Jennalee Rufft
Advisor: Mr. Scott Andres
Delaware Geological Survey
Physical Characterization of Infiltration Facilities Used for Disposal of Wastewater and Stormwater

Intern: Michael Ruppel
Advisor: Dr. Joshua Duke
UD Department of Food and Resource Economics
Endangered Species on the Delaware River: Ecological, Economic and Institutional Concerns

Intern: Suneil Seetharam
Advisor: Dr. Shreeram Inamdar
UD Department of Bioresources Engineering
Characterizing the Chemistry of Dissolved Organic Matter (DOM) in Watershed Runoff Using Innovative Techniques

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DWRC Spotlight on Graduate Research

Maryam Akhavan is the newest ***DWRC*** graduate fellow. She is pursuing a Ph.D. *at UD, working on the project* "Modeling Hydrologic and Geochemical Effects of Land-based Wastewater Disposal," under the co-supervision of Mr. Scott Andres, Delaware Geological Survey and Dr. Paul Imhoff, UD Civil and Environmental Engineering. She writes, "Land-based wastewater treatment is the controlled application of wastewater to soil to remove constituents in the wastewater. In this system physical, chemical, and biological mechanisms within the soil-water matrix are used to treat the wastewater. A Rapid Infiltration Basin System (RIBS) is one of the three major land treatment techniques commonly used."

With Cape Henlopen State Park in southern Delaware as the study site, Maryam states, "Understanding the effect of RIBS on groundwater and surface water quality is necessary for developing guidelines for the selection of RIBS sites as well as operational practices. The present study explores the influence of site conditions and operational procedures that affect RIBS performance. The objectives are to:

1. characterize the effects of RIBS on hydrology and nitrogen and phosphorus removal;
2. evaluate the influence of geological materials (e.g., soil type, depth to water table) on RIBS performance;
3. assess application methods, including hydraulic loading rate, application cycles, and wastewater distribution methods, on residence time of pollutants in the unsaturated zone and the resulting loading of nitrogen and phosphorus loads to the aquifer and any nearby surface water;
4. investigate the effect of vegetation on the RIBS performance;
5. assess the probability of groundwater and surface water contamination by nitrogen and phosphorus for different operating conditions;
6. estimate the effects of soil heterogeneity and non-uniform distribution of wastewater on treatment performance; and
7. develop guidelines for site selection and RIBS operation."

Progress on this research will appear in future issues of WATER NEWS.

Former ***DWRC*** graduate fellow Stefan Hunger, along with co-authors J.T. Sims and D.L. Sparks, had the following article published in the *Journal of Environmental Quality*, 2008, Vol. 37, p. 1617-1625: **Evidence for struvite in poultry litter: Effect of storage and drying.**

Former ***DWRC*** intern Lydia Leclair, along with her advisor Dr. Delphis Levia, had the following article published in the journal *Physical Geography*, 2008, Vol. 29, p. 474-482: **Winter leaf conductance rates of *Pinus strobus* L. (eastern white pine).**

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DWRC Notices and Calendar

UPCOMING MEETINGS

Save the Date: Delaware Section of the American Water Resources Association
Visit http://www.deawra.org/meetings for updates

Aug. 6, 2009 – Program to be held in Wilmington, New Castle County
Oct. 1, 2009 – Program to be held in Sussex County
Oct.-Nov. 2009 – 2nd annual scavenger hunt
Dec. 3, 2009 – Annual dinner
Nov. 1-4, 2010 – Hosting, along with the New Jersey AWRA- 2010 AWRA Conference, Philadelphia, PA.

Nov. 3-6, 2009 – U.S. Committee on Irrigation and Drainage (USCID) 5th International Conference on Irrigation and Drainage: Irrigation and Drainage for Food, Energy and the Environment, Salt Lake City, UT. Visit www.uscid.org/.

Dec. 10-13, 2009 – National Ground Water Association Expo, New Orleans, LA. Visit http://www.ngwa.org/2009expo/index.aspx.

Visitors, especially children, to the UD College of Agriculture and Natural Resources' Ag Day in April 2009 were able to visualize non-point source water pollution, along with remediation practices, with the help of ***DWRC*** personnel and an EnviroScape® model. (*Photos by M. Pautler)*

July 17 marks the 45th anniversary of the signing of the Water Resources Research Act. Happy Birthday DWRC!

Delaware Water Resources Center Advisory Panel

The Delaware Water Resources Center

The Delaware Water Resources Center (*DWRC*), established in 1965, is part of a network of 54 Water Resources Research Institutes throughout the nation. The *DWRC* receives funding through Section 104 of the Water Resources Research Act of 1984. The US Geological Survey administers the provisions of the Act and provides oversight of the nation's Water Resources Centers. The primary goals of the *DWRC* are: to support research that will provide solutions to Delaware's priority water problems, to promote the training and education of future water scientists, engineers, and policymakers, and to disseminate research results to water managers and the public. For more information, visit our website: http://ag.udel.edu/dwrc/

WATER NEWS is published biannually by the Delaware Water Resources Center, *Dr. J. Thomas Sims*, Director. *Maria Pautler*, Editor, welcomes materials for publication, including news articles and letters to the Editor. To submit material or request future issues, please address your correspondence to the address below or contact the Editor at mpautler@udel.edu or 302-831-0847.

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