



Maryland Water Resources Research Center

Department of Civil & Environmental Engineering
University of Maryland
College Park, Maryland 20742

www.waterresources.umd.edu

Fall 2006

Dr. Allen P. Davis, Director

Dr. Phil Kearney, Associate Director

“Extreme Water in Maryland” Symposium

Our upcoming conference on *Extreme Water in Maryland* will be held on Friday, October 27th, 2006 in the Benjamin Banneker Room, Stamp Student Union at the University of Maryland, College Park. The Maryland Water Resources Research Center and Maryland Sea Grant will sponsor this 1-day symposium. Seven eminent speakers have been invited.

The symposium will focus on those extreme water events, such as hurricanes, floods, and projected sea level rise that disrupt homes, crops, and wetlands and both terrestrial and aquatic life. Details are provided on page 3.

Request for Proposals 2007 Funding

Proposals for 2007 Maryland Water Resources Research Center funds are now being solicited. The Center is seeking requests for three types of project this year (with their estimated funding levels): regular research projects (\$15k to \$30k), summer graduate fellowships (\$3.6k) and seed research projects (\$2k to \$5k). Requirements for the 2007 summer fellowship program are presented below. The seed project program solicits proposals aimed at developing exploratory projects, with the deliverable being a major proposal for submission to another agency such as the National Competitive Grants program. The PI would be the team leader in developing a broad-based project on a high priority subject.

For information on proposal preparation, go to the Center web site at www.waterresources.umd.edu. Specific questions may be addressed to the Associate Director at (301-405-6829) or e-mail kearneyp@umd.edu. Proposals are due in the WRRC office (1147 Martin Hall, University of Maryland, College Park 20742) by close of business (4:30 PM) on Monday, November 6, 2006. Proposals must be approved and signed by an authorized University Representative.

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2007 Summer Fellowship Program

For the sixth year, the Center will offer \$3600 summer assistantships to selected outstanding graduate students. Selection of awardees will be made in late November based on: a) evaluations of student's records, b) strength of advisor's recommendation, and c) prospects that the research will benefit our understanding and management of Maryland's water resources. Interested applicants should contact Dr. P. C. Kearney for details at kearney@umd.edu. Summer Fellowship proposals must be submitted to our office by November 6, 2006. Guidelines can be found at the Center website.

Call for Abstracts Smart Growth @ 10: A Critical Examination of Maryland's Landmark Land Use Program

The National Center for Smart Growth Research and Education at the University of Maryland is organizing a three-day conference, tentatively scheduled between **October 3-7, 2007**, to commemorate the 10th anniversary of Maryland's landmark Smart Growth legislation. To advance both research and policy, the National Center for Smart Growth Research and Education is inviting the submission of brief abstracts related to specific aspects of the Smart Growth or urban growth management. Papers specifically about the Maryland Program are preferred but comparative papers or papers about similar programs in other states will be considered. For more information about this conference and call for abstracts please go to: www.smartgrowth.umd.edu (This event is being co-hosted by Resources for the Future.)

Master of Engineering and Public Policy program launched at the University of Maryland: Become the New Engineer

Natural resources -- how to use them and how to sustain them -- are central to both our economic progress and our quality of life.

- Should we build more dams, rethink nuclear power, move to hydrogen, or look to other energy sources?
- What controls over urban development and infrastructure are sensible, practical, and acceptable to our communities? Should we attempt to rebuild New Orleans as it was, or with a different vision?
- What forward thinking agricultural practices will allow us to feed the world, using less water, and reducing environmental degradation?
- How must our needs fit with those of the developing world?

Realistic proactive public policies, underpinned by engineering science and practice, are essential to optimize solutions for our community, for our nation, for our world. Engineers must provide fuller leadership in development of that public policy. The University of Maryland has launched a new graduate program to teach engineers the ropes of public policy, whether engineers are engaged in its development, or in its implementation.

Influence local, state, national and international policy in the making. Initiate and direct public policy discussions, build consensus and develop informed policy decisions. Become an agent of change both in and for your organization to advance effective engineering policy, integrate policy into design and navigate complex technology policy. Redefine the role of engineers.

Visit www.mepp.umd.edu or call Al Santos, MEPP Academic Coordinator, at 301-405-1977.



Fear the Turtle.

Extreme Water In Maryland

Sponsored by:
**Maryland Water Resources Research Center
Maryland Sea Grant College**

October 27, 2006
**Benjamin Banneker Room
Stamp Student Union Building
University of Maryland
College Park, MD 20742**

Extreme water events, such as hurricanes, floods, and projected sea level rise can disrupt homes, crops, and wetlands and both terrestrial and aquatic life. Our one-day symposium will look at possible impacts on Maryland from extreme water events. Both historical perspectives and future challenges will be discussed.

- 8:50 - 9:00** **Welcome + Opening Remarks**
- 9:00 - 9:40** *"The National Challenge in Dealing with Extreme Events: Where is the Vision?,"* **Dr. Gerald Galloway, Department of Civil and Environmental Engineering, University of Maryland, College Park, MD.**
- 9:40 - 10:10** *"Chemical and Microbial Parameters in New Orleans Flood Water Following Hurricane Katrina,"* **Dr. John Pardue, Louisiana State University, Baton Rouge, LA.**
- 10:10 - 10:25** **Break**
- 10:25 - 10:55** *"SLOSH – Sea, Lake, and Overland Surges from Hurricanes,"* **Dr. William Schaffer, National Weather Service Evaluation Branch, Silver Spring, MD.**
- 10:55 - 11:25** *"Modeling Flood Vulnerability in Maryland using HAZUS-MH,"* **Dr. Michael S. Scott, Department of Geography and Geosciences, Salisbury University, Salisbury, MD.**
- 11:25 - 11:55** *Historical Perspective,* **Dr. Kevin G. Sellner, Director, Chesapeake Research Consortium, Inc. Edgewater, MD**
- 11:55 - 1:15** **Lunch**
- 1:15 - 1:45** *"Floods in Urban Watersheds,"* **Dr. Andrew J. Miller, Department of Geography and Environmental Systems, University of Maryland, Baltimore County, Baltimore, MD.**
- 1:45 - 2:15** *"A Post-Katrina Framework for Integrating Flood Protection, Ecosystem Restoration and Navigation,"* **Dr. Donald F. Boesch, President, University of Maryland, Center for Environmental Science, Cambridge, MD.**
- 2:15 - 2:45** **Wrap Up**

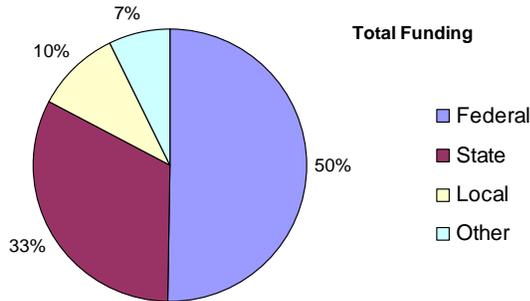
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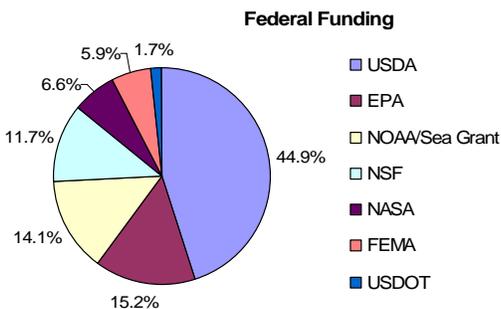
The Center will cover the cost of registration, breaks and lunch. Electronic registration on the Center webpage is required (www.waterresources.umd.edu) and will be available soon.

University of Maryland: Water Resources Research Funding 2005-2006

In order to gauge the level of funded Water Resources research taking place at the University of Maryland, the MDWRRC has been surveying researchers on campus. Since July 2005, 80 have been contacted. Eighteen researchers agreed to be interviewed by our staff and provided data on funding levels, funding agencies, and scientific publications. In all, a total of \$6.18 M of water resources funding was documented. The breakdown of the sources show that 50% of water resources projects were federally funded, 33% were state funded, 10% were locally funded, and 7% were funded by non-profit agencies.



Of all of the federally funded monies, nearly half (46%) came from various USDA programs, specifically the Agricultural Research Service and Cooperative State Research, Education and Extension Service, Biotechnology Risk Assessment, and Sustainable Agriculture and Research Education program. Other federal sponsors include NSF, FEMA, NASA, EPA, NOAA, and USDOT.

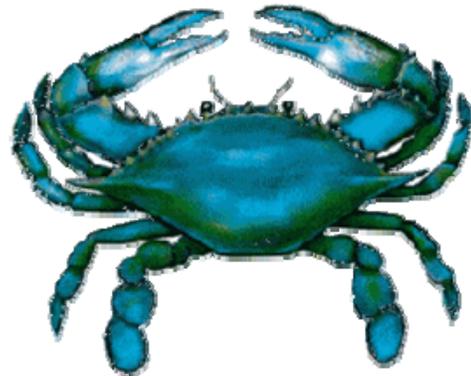


UMD Establishes New Department of Environmental Science and Technology

The University of Maryland College of Agriculture and Natural Resources is pleased to announce the establishment of a new academic department. The Department of Environmental Science and Technology will focus on four "areas of excellence": Soil and Watershed Sciences, Ecosystem Science and Management, Ecological Design and Technology, and Environmental Health.

"These core areas of excellence center on important societal and environmental issues," says department chair Dr. Frank Coale. "Our goal is to address these issues through high-quality research, undergraduate and graduate instruction and Extension Education and outreach programs." During the coming year, department faculty will develop exciting new curricula addressing each of the four areas of excellence, with some new majors ready for implementation by the fall 2007 semester. In the meantime, courses are currently available on subjects related to environmental science and policy; natural resources management; and soil, water and the environment.

For more information about the new department or specific course offerings, please contact Stephanie Bergwall at 301-405-1306 or sbergwal@umd.edu.



GISHydro2000: Web-Based Automated Hydrologic Analysis in Maryland

By: Glenn E. Moglen

GISHydro2000 is a GIS-based program that brings together both the data and tools needed to perform hydrologic analyses for any location in Maryland. Depending on the user's interest the program can be used to just simply determine a set of watershed characteristics (e.g., drainage area, watershed slope, percent imperviousness, 2-year rainfall depth, time of concentration, etc.) or can be used to perform more sophisticated analyses of flood frequency, rainfall-runoff modeling, nutrient loading, and/or stream biodiversity.

Let's look at a brief example. Figure 1 is a screen capture from *GISHydro2000* showing a small delineated watershed colored according to the land uses within its boundaries. (Shades of red are different intensities of residential and commercial development. The green towards the watershed outlet is a small spot of forest as the creek nears its confluence with Rock Creek. The stream itself is shown in blue.) After delineating the watershed one click will produce a listing of 26 unique watershed characteristics. For instance, this stream drains a watershed that is 1.7 square miles, 33.2 percent impervious, and has a 2-year, 24-hour storm depth of 3.18 inches. One more click produces the regression-based flood frequency for this watershed using equations developed by the U.S. Geological Survey and/or other researchers. This stream has a 1.25-year flood of 238 ft³/s and a 100-year flood of 2,730 ft³/s. One more click provides an estimate of several key annual nutrient loads: 3.3 tons of nitrogen, 0.5 tons of phosphorus, and 58.7 tons of sediment. One more click provides information on stream biodiversity at both the genus and family levels. Details for this example are omitted, but output shows the genera or families that should be found in the study watershed in the absence of human disturbance and then estimates the degree of species lost as a function of land use change. Not discussed here is the use of *GISHydro2000* as a front end to the TR-20 rainfall-runoff model, which is this program's primary application by the Maryland State Highway Administration (the program's principal sponsor), other state agencies, and H&H consultants from across the state.

GISHydro2000 is available for free download (program and documentation) at www.gishydro.umd.edu. However, downloading the program assumes the user has the ArcView GIS software to support it. This software is expensive and has generally been beyond the means of many smaller consulting firms and local government agencies, **but** as of January 2006, we now provide **free access to GISHydro2000 over the web**. All that is needed is a username, password, and a high-speed internet connection. For more information on the web-version, please go to www.gishydro.umd.edu/web.htm to learn how this works and to request an account.

The future of the *GISHydro2000* program includes development of tools to make estimates of nutrient loads based on modeling by the EPA Chesapeake Bay Program model and sensitive to land use change brought on by proposed development projects. Additionally, Delaware has recently sponsored a project to expand the spatial extent of the *GISHydro2000* database to cover all of its state.

Whether your interests are water quantity, water quality, stream biology, or just basic education about the stream draining through the back of your property, *GISHydro2000* will answer your watershed-based questions.

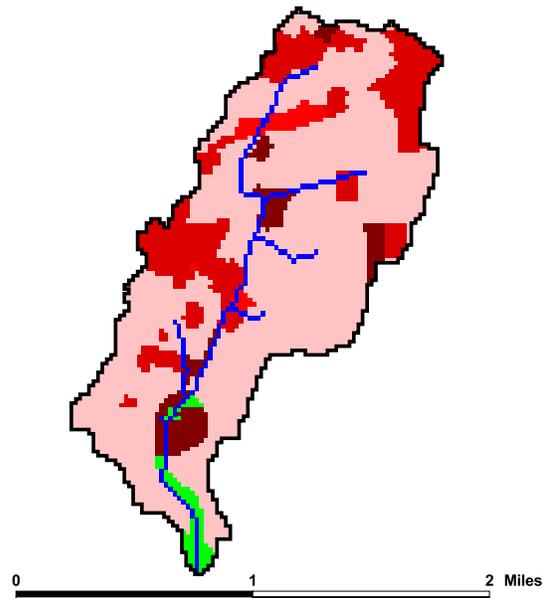
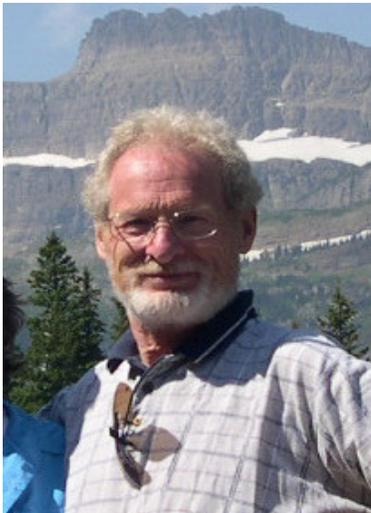


Figure 1. A small delineated watershed colored according to the land uses within its boundaries.

Featured Scientist: Dr. Stephen Prince

Dr. Stephen D. Prince is a Professor of Geography at the University of Maryland-College Park. He received a BSc from Bristol University, UK, and a Ph.D. from the University of Lancaster, UK. He has worked in Central Africa, at the University of London, and at NASA GSFC before joining the UMD faculty in 1989. Prince's work emphasizes ecological processes that operate across large areas of the Earth's surface, often using remote sensing as a measurement tool. At the present time his work is focused on issues that involve land surface changes that affect biological and physical processes.



Prince has a long-standing interest in degradation of tropical dry lands – sometimes called desertification – in which ecological, physical and human factors interact, affecting carbon, water and energy balances over vast areas. He has worked with agencies around the world on monitoring and combating desertification. In November he is chairing the remote sensing sessions at the Blaustein Institutes and the United Nations Convention to Combat Desertification – Annex IV nations conference on Deserts and Desertification. Prince's current work in dry lands involves relating water use of vegetation to the carbon cycle as a means of detection and monitoring desertification. Prince led the NASA contribution to the international Hydrologic-Atmosphere Pilot Experiment (HAPEX) - Sahel field campaign in West Africa.

Another area of Prince's research involves the effects of urbanization on land surface processes, studied mainly in the mid-Atlantic region of the USA, especially in the 166,000km² Chesapeake Bay watershed. While the mid-Atlantic includes "Megalopolis" - home to more than 15 million people - it also has sparsely populated areas and a wide range of physiographic regions and land uses. The Regional Earth Sciences Application Center (RESAC), directed by Prince, was founded with a NASA grant to explore the applications of Earth Science to regional environmental issues. Land cover and land use, wetland changes, impervious surface and other themes were mapped and their dynamics studied using satellite data from the mid 1980s to 2000s throughout the mid Atlantic. The RESAC also applied land cover change models to forecast the changes in impervious surface that are likely to occur in the next 30 years. The forecasts are spatially explicit to approximately 1ha resolution and thus allow comprehensive simulations of the future human "footprint" on the region. The implications of these projections for runoff, stream health, resource lands conservation and key biophysical processes are being studied. Prince leads EPA sponsored research on watershed classification with the Woods Hole Research Center and Smithsonian Environmental Research Center (of which he is an associate researcher).

A more recent activity has been the use of www geographical information systems (GIS) to allow hydrological and ecosystem simulations to be run by the non-expert with no more equipment than a PC, a broad-band Internet connection and browser software. The technical and educational aspects of this work are supported by the UMD Center for Teaching Excellence and NASA.

Prince is involved with a campus-wide initiative, known as the Center for Integrative Environmental Research (CIER), currently planning a conference to be called "Maryland 2050" to be held this academic year with the aim of mobilizing the UMD research community to address human-environment interactions, including ecological, physical and human aspects. All aspects of the water cycle will be represented including water resources and human aspects.

Featured Scientist: Dr. Andrew Baldwin



Andrew Baldwin is an Associate Professor and Acting Associate Chair of the *Department of Environmental Science and Technology*. He joined the University of Maryland as an Assistant Professor in 1996, and was promoted to Associate Professor in 2002. He served as Acting Chair of the Department of Biological Resources Engineering (ENBE) from July 1, 2005 until June 30, 2006, during which time he was instrumental in the transformation of ENBE into the Department of Environmental Science and Technology. In addition to a Ph.D. in Botany from Louisiana State University (1996), he holds two B.S. degrees, one in biology and one in engineering, from Tufts University, Medford, MA (1983). Between his undergraduate and graduate studies, he worked for eight years in the environmental consulting field, first as an environmental engineer and then as an applied ecologist. This work included feasibility studies of contaminant removal and treatment technologies at hazardous waste sites, ecological risk assessment, wetland delineation and assessment, and quantitative biological survey.

Dr. Baldwin's primary research areas are wetland plant ecology and ecological engineering. Specifically, he is interested in the disturbance and regeneration ecology of wetland vegetation, wetland seed banks, and nutrient and sediment dynamics in natural, restored, and wastewater treatment wetlands. Recent projects have included the study of seed dispersal, seed banks, and vegetation and soil development in restored tidal freshwater marshes along the Anacostia River in Washington, DC, wetland plant biodiversity along estuarine gradients in the Chesapeake Bay, hurricane damage and regeneration in south Florida mangrove forests, and studies of effects of sediment and nutrient loading on plant diversity of tidal freshwater marshes and swamps on the Nanticoke River on Maryland's eastern shore. Additionally, he has collaborated with Dr. Jennifer Becker studying the role of wetland plants in facilitating microbial degradation of halogenated organic chemicals, and with Dr. David Tilley investigating the use of spectral radiometry of wetland vegetation to identify nutrient hot spots resulting from nonpoint source pollution in agricultural landscapes. He has published 18 articles in refereed journals or books and supported his research with \$1.5 M in research funding.

Dr. Baldwin teaches courses at the University of Maryland in wetland ecology and water quality, supervises graduate students conducting ecological engineering and wetland ecology research, and advises undergraduate students. Currently he is leading the development of new undergraduate curricula in the Department of Environmental Science & Technology. His professional activities include serving on the Board of the Society of Wetland Scientists (SWS) as chair of the SWS Awards Committee and as President of the SWS Mid-Atlantic Chapter. Previously he served for three years as Associate Editor of the journal *Wetlands*.

Maryland Water Resources Research Center

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