

## Integration: the Key to the Continued Success of the Land Grant University



The Land Grant Universities were founded in part to help stakeholders solve their problems through research, education and extension. In New Jersey, Cook College provides the education component of New Jersey's Land Grant University, the New Jersey Agriculture Experiment Station provides the research component, and Rutgers Cooperative Research & Extension provides the extension to complement the research and education components. Our long history of integrating research, education and extension makes the Land Grant Universities unique institutions that can deliver solutions to today's problems.

As state and federal budgets continue to be limited, elected officials and granting agencies are clamoring for success stories of funding that has been well spent. The Office of Management and Budget (OMB) has begun evaluating federal programs to determine their performance. The most significant aspect in their effort to determine program effectiveness is impact, with impact being defined as the outcome of the program, which otherwise would not have occurred without the program intervention. To assure that programs are making an impact, more and more grant programs are requesting projects that integrate research, education and extension (or at least two of the three). These groups have begun to realize that extension programming can yield quick measurable outcomes. This renewed focus on impact and integration provides a tremendous opportunity for the Land Grant Universities to flourish.

Christopher Obropta has had the pleasure of teaching senior design for bioenvironmental engineering (formerly known as bioresources engineering, which evolved from agricultural engineering). This class provides Dr. Obropta the opportunity to divide the students into groups and assign each group a real world problem. The students employ the skills that they have acquired during the first three years of college to develop their engineering solutions. Additionally, Dr. Obropta provides them with the latest research to incorporate into their designs. Furthermore, the student groups include an extension component in their project. This past year one of the design teams designed stormwater best management practices (BMPs) for an elementary school and a housing project in the Southern Ward of Newark, New Jersey. As part of their project, the students met with local stakeholders to solicit their ideas and better understand their needs. They incorporated the input from the stakeholders into their final design and presented the final design at a public meeting, which provided them the opportunity to educate the stakeholders on water quality issues, stormwater management, and urban BMPs that can be incorporated into existing landscapes. Dr. Obropta is currently soliciting funding to implement the student designs and construct the project.



P3 Design Team presenting their work in Washington, D.C.

Another design team developed a watershed restoration plan for Davidson Mill Pond. This team reached out to one of the middle schools in the watershed and helped a science teacher incorporate stormwater management into the ecology curriculum. The end result was 125 students learning about stormwater management, the students designed rain gardens to treat the stormwater runoff from the school, and a 4,000 square foot rain garden was constructed by the students to treat a portion of the runoff from the school. Once again, this was a project that integrated education, extension and research to solve a real world problem.

On a side note, all the senior design students received high paying jobs offers or received fully funded graduate assistantships to continue their education. Some students even received fairly large signing bonuses. Their senior design portfolio enhanced their marketability.

If the politicians and funding agencies are looking to show impact, integrated projects may be the answer. These projects can deliver quick, reliable solutions to today's problems and generate measurable impacts that will result in high grades from the OMB. Students are receiving training that makes them employable in high paying jobs. What more can a congressman ask for? For more information, please contact Christopher Obropta at [obropta@envsci.rutgers.edu](mailto:obropta@envsci.rutgers.edu).

## Notes from the Bacteria Source Tracking (BST) Seminar

On June 30, 2005, the Rutgers EcoComplex hosted a seminar on bacteria source tracking (BST). Approximately 95 were in attendance and received an overview on BST technologies being applied in New Jersey.

Over 200 Total Maximum Daily Loads (TMDLs) have been prepared for New Jersey's impaired waterways. Many of these TMDLs address fecal coliform impairments (i.e., approximately 170). Although each TMDL that is required to contain a source analysis, for the fecal coliform TMDLs, these source analyses are generally vague, mainly identifying farms, geese, and domestic pet waste as sources along with illicit discharges to the storm sewer system. No efforts are made to quantify each of these sources to determine the extent of their contribution to the impairments. Additionally, each TMDL is required to include an implementation plan that identifies best management practices and other actions necessary to implement the TMDL. For the fecal coliform TMDLs, the implementation plans mainly identify US Farm Bill programs that can be used to help farmers minimize water quality impacts from their farms. These plans go on to recommend additional "source crackdown" to further identify bacteria sources so that management practices can be put in place to treat these newly identified sources.

With so many waterways impaired for fecal coliform, New Jersey needs to make a strong push to clearly identify and quantify the sources of these impairments. With limited financial resources, the State needs to prioritize remediation activities and focus on addressing the major sources first in the most cost effective manner. BST is crucially important in achieving this goal. The first step should always be to conduct a detailed visual assessment of the watershed to identify potential sources. John Tiedemann discussed Monmouth University's "Watershed Sleuths" program where Antibiotic Resistance Analyses (ARA) are used to distinguish between human and non-human sources. Using a detailed reference database that Monmouth University has developed for Monmouth County, the ARA approach can be used to discriminate species-specific contributions from livestock, wildlife and domestic pets. As an initial test, Eric Feerst and Robert Connell of NJDEP's Bureau of Marine Water Monitoring use coliphage testing to determine human and non-human sources. They also use a procedure similar to Monmouth University's ARA called multiple antibiotic resistance (MAR) testing to determine species-specific sources of bacteria.

DNA-Based approaches for tracking bacteria were presented by Jerry Kukor from the Biotechnology Center for Agriculture and the Environment, NJAES and Cook College. Once thought to be extremely expensive, Dr. Kukor dismissed the high cost myth and

discussed a cost-effective approach for DNA tracking that can be readily conducted at the Biotechnology Center at Cook College. Although the presentation was highly technical, the audience overwhelmingly agreed that the time has come for DNA bacteria source tracking, and the place for this is Cook College.

Stephen Souza from Princeton Hydro and Christopher Obropta rounded out the day with talks on remediating bacterially impaired waterways and quantifying bacteria in TMDL development. Dr. Souza provided an excellent discussion on load reduction strategies that can be extremely cost effective. Dr. Obropta spoke on the regulatory aspects of addressing fecal coliform impairments within a TMDL.

Several questions came up during the conference including the cost of each BST technique and the spatial extents of reference databases needed for ARA, MAR, and DNA testing. Although the cost of actual ARA, MAR and DNA testing is very comparable, the cost of developing the reference databases needed for these BST techniques can be costly if a different reference database is needed for each county. It is clear that additional research needs to be conducted to clarify the range of applicability of these reference databases. The conference attendees agreed that a working group should be formed to develop a plan to address BST needs in New Jersey. The first meeting of this working group will be held in September 2005. For more information, please contact Christopher Obropta at [obropta@envsci.rutgers.edu](mailto:obropta@envsci.rutgers.edu).

## "Flood No More": Is this really an Achievable Goal?

On the one year anniversary of the great flood of Burlington County (namely Medford Lakes), a stormwater management symposium entitled "Flood No More" was held at the EcoComplex ([http://ecocomplex.rutgers.edu/news\\_events.php](http://ecocomplex.rutgers.edu/news_events.php)). On July 13, 2004, over 13 inches of rain fell on sections of Burlington County: 18 dams burst washing away roadways and flooding houses. In April 2005, another storm event in the Delaware Basin deposited four inches of rain over a weekend, causing flooding in towns bordering the Delaware River. In response to this flooding event, Governor Codey formed the New Jersey Flood Mitigation Task Force (<http://www.njflood.org/>). This Task Force is expected to release their findings shortly.

The bottom line is that very little can be done to prevent flooding when New Jersey is hit with these extreme storm events. Although the new stormwater management regulations will help prevent flooding from getting worst from new development, there is not enough money to create storage for these critical rainfall events. Even if sufficient funding was available, there is not enough space to collect and store the water. It simply is not practical. The best we can hope



to do is construct our dams to a higher standard to ensure that they will not break, to prevent development in the flood plain where people are in harm's way, and to relocate those who are already in the flood plain to safer, higher ground.

What else can we do? We should focus our efforts on addressing the smaller storm events and the nuisance flooding that accompanies these storms. We can implement management practices to control the two inch, three inch and even five inch rainfall event. This needs to be accomplished through regional stormwater management planning. Stormwater needs to be managed on a watershed basis. One town cannot implement controls without considering the impact of these controls on the upstream and downstream communities. This goes against "home rule," which many believe has made this state great, but this is about protecting people's property and lives. The time has come for municipalities to work together to solve stormwater management problems that are plaguing their communities.

The RCRE Water Resources Program is currently working with 18 towns in four counties to develop regional stormwater management plans for three watersheds. These towns are working together to develop a comprehensive plan that will benefit all their communities. By all the towns participating in the process, they keep their "home rule" perspective while conspiring to achieve much loftier goals that they could not have achieved alone. For more information on Regional Stormwater Management Planning go to [www.water.rutgers.edu](http://www.water.rutgers.edu) or contact Christopher Obropta at [obropta@envsci.rutgers.edu](mailto:obropta@envsci.rutgers.edu).

**LOG ON**

The Water Resources Program stores presentations and project updates at the following website:  
<http://water.rutgers.edu>

The EPA publishes a periodic report on the condition of the water-related environment, control of NPS, and the ecological management and restoration of watersheds:  
<http://www.epa.gov/OWOW/info/NewsNotes/>

**Education with a Twist:  
NJ-EMO**

NEMO stands for Nonpoint Education for Municipal Officials. It is an education program for local land use officials that addresses the relationship of land use to natural resource protection. There are currently 34 funded programs across 32 states and territories that are part of a National NEMO Network. In an effort to establish a program for New Jersey as an entry to the National NEMO Network, a partnership has formed a program called NJ-EMO (New Jersey – Education for Municipal Officials). Currently, the New Jersey Network includes representatives from New Jersey Sea Grant College Program, Monmouth University, Monmouth County Planning Board, Board of Chosen Freeholders of Burlington County, Association of New Jersey Environmental Commissions (ANJEC), New Jersey Department of Environmental Protection (NJDEP), and Rutgers Cooperative Research & Extension (RCRE). Burlington County College is the lead of the group and has dedicated significant resources to begin to establish NJ-EMO. Thus far, NJ-EMO is operating without funding through the volunteer efforts of the partners.



On August 16, 2005, the NJ-EMO inaugural conference, entitled Putting Communities in Charge: Storm Water, was held at the Burlington County College Enterprise Center. The conference focused on the next steps for stormwater management at the municipal level. An overview of Rutgers University's efforts on using Geographic Information Systems (GIS) and Spatial Analysis as a planning tool for coastal management was presented by Dr. Richard Lathrop from the Center of Remote Sensing and Spatial Analysis. Two panel discussions were given on how to make municipal stormwater plans work and what are the next steps for municipalities. Dr. Stephen Souza discussed regional stormwater management planning as a tool for restoring impaired waterways. Dr. Daniel Van Abs presented stormwater utilities as a tool for implementing and maintaining stormwater management practices that are needed to achieve water quality improvements.

Since all the NJ-EMO project partners already have strong programs to help stakeholders address their municipal issues, is there a need for NJ-EMO? The answer is yes. NJ-EMO can serve as an umbrella under which these groups can gather and disseminate their information to municipal officials. NJ-EMO can help educate these officials so they can make more informed decisions, resulting in cost effective solutions to municipal problems. NJ-EMO will begin to solicit funding for the program so that a New Jersey Coordinator can be hired and more specialty conferences can be offered to the stakeholders of the State. For more information on NJ-EMO, contact Christopher Obropta at [obropta@envsci.rutgers.edu](mailto:obropta@envsci.rutgers.edu). For more information on the National NEMO Network, go to [www.nemo.uconn.edu](http://www.nemo.uconn.edu).

## Small Grants...Big Projects... Real Impacts!

The Water Resources Program is currently working on two projects for local environmental commissions: 1) conducting a hydrologic and hydraulic analysis of the Many Mind Creek Watershed and 2) designing and implementing a water quality sampling program at Strawbridge Lake. What do these projects have in common? Both projects have been funded by the NJDEP's Office of Local Government Assistance, Environmental Service Program (ESP), which provides matching grants for local environmental agencies. The Atlantic Highlands Environmental Commission and the Moorestown Environmental Advisory Committee both secured \$2,500 from the ESP and received a \$2,500 match from their respective municipalities. These environmental commissions used these funds to engage the Water Resources Program to complete these projects. The Water Resources Program provided additional in-kind services to achieve the desired deliverables for each project. The Many Mind Creek Watershed hydrologic and hydraulic study was completed last month and produced a report that will help the Many Mind Regional Stormwater Management Committee and the Borough of Atlantic Highlands move forward in their regional stormwater management efforts. The Strawbridge Lake sampling project is still underway and will provide data to evaluate the water quality improvements to the lake that have resulted from various management practices implemented through the watershed. The end results are: the environmental commissions receive a deliverable that would have been too costly to produce without the assistance of the University; the Water Resources Program obtains data that can be disseminated through

scholarly publications and extension materials, and the NJDEP spends funds wisely, and the stakeholders in each municipality have projects that they can build upon to improve water quality within their towns.

For more information on the ESP go to [www.nj.gov/dep/grantandloanprograms](http://www.nj.gov/dep/grantandloanprograms). The Many Mind Creek Watershed project is featured on our web site at [www.water.rutgers.edu](http://www.water.rutgers.edu).

### MARK YOUR CALENDARS

October 29 - November 2, 2005, WEFTEC 2005: The Water Quality Event, Washington, D.C. Technical Sessions and Workshops will include Stormwater Management, Water Reclamation & Reuse, the Municipal Wastewater Treatment Process, and Utility Management, among others.

November 4-5, 2005, NJDEP 3rd Annual Volunteer Monitoring Summit. Held at the Clarion Hotel and Towers in Edison, NJ. Look for more information to be announced at [www.state.nj.us/dep/wmm/wmccupcomingevents.html](http://www.state.nj.us/dep/wmm/wmccupcomingevents.html).

November 15-17, 2005, Stormwater Institute, Landsdowne, VA. The Center for Watershed Protection has developed this event specifically for the Municipal Separate Storm Sewer System (MS4) community stormwater professional. There is currently a wait-list for registering for this conference.

February 5-9, 2006, USDA-CSREES National Water Conference. Conference will be held in San Antonio, TX. Workshops will cover Agricultural Best Management Practices, Rural Environmental Protection, Conservation and Resource Management, and Watershed Assessment and Restoration.

