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of The University of North Carolina

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Hurricane Floyd: Have we seen the worst?

On Sunday, August 29, Governor James B. Hunt, Jr. rushed home from a Latin American trade mission and declared a state of emergency as Hurricane Dennis neared the North Carolina coast. A week later, the storm finally finished with the state, having pounded coastal areas twice and dumped rain not only on the coast but also from the Eastern Piedmont (5 inches at Clayton) across the Coastal Plain (7 inches at Rocky Mount).

With soils across Eastern North Carolina still waterlogged and streams still swollen from Dennis, Hurricane Floyd hit on September 14. A massive storm heavy with moisture, Floyd deluged two-thirds of the state, dumping 7.33 more inches of rain at Clayton and 16.18 more inches at Rocky Mount.

According to the U.S. Geological Survey, some areas of the Piedmont and Coastal Plain got rainfall amounts equal to half their annual averages from these two storms.

As Floyd exited the state on September 16, the State began to issue flooding and damage reports. Over the next week, it would become evident that North Carolina had experienced its worst natural disaster ever:

- 48 people confirmed dead
- 30 towns and cities completely submerged
- 30,000 homes damaged by flood waters, 9,000 either severely impacted or destroyed, in an area already suffering from a housing shortage

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North Carolina Department of Environment and Natural Resources
Customer Service Center
1-877-623-6748
http://www.envhelp.org/

The floods in the eastern part of North Carolina have created environmental and natural resource emergencies in excess of anything previously experienced. The North Carolina Department of Environment and Natural Resources (DENR) has experienced an increase in customer questions and requests during this recovery and rebuilding period.
Thus, the NCDENR Customer Service Center (CSC) is serving as the Floyd Assistance Information Center. Those in immediate need of environmental and natural resource information should call the toll free number 1-877-623-6748. When necessary, the CSC will refer technical questions to the appropriate DENR offices and non-DENR questions to appropriate agencies.

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Director's Forum

What can we learn from Hurricane Floyd?

Kenneth H. Reckhow, Director, Water Resources Research Institute

"Was all of this under water?" my son, Michael, asked somewhat incredulously, as he viewed the surroundings during our drive through the North Carolina Coastal Plain on the way to the beach last month.

"No," I responded, "not all of this; but much of the flood prone area was."

"So, are you saying that only flood prone areas get flooded?" Michael questioned.

"That's what we mean by 'flood prone,'" I replied somewhat inattentively.

"Well, if that's the case, then why did the TV news show people's homes, hog houses, and city streets under water? Are those areas 'flood prone'? If they are, it seems pretty stupid to build houses where everyone knows you're going to get flooded!"

"Well," I said, starting to be more mindful of the conversation, "it's not quite that simple. First, Hurricane Floyd was a major storm; in fact, some scientists have called it a 500 year storm."

"That's probably not true," my wife, Ellen interrupted. "It may have been closer to a 200 year flood. Michael, do you know why it's important for communities to periodically update flood maps as they develop and change the landscape?" continued Ellen, seizing a parental opportunity for a mini-lesson in hydrology and land use planning.

"Of course," countered Michael. "Margaret, Will, and I did a project on wetlands last year for our earth science class; we actually wrote about how filling and paving over wetlands can increase flooding."

"That's right," continued Ellen. "In Durham County, we recently updated our flood maps, but many communities in North Carolina have outdated flood maps, resulting in an underestimation of flood risks."

"So, you're saying that all of the flooding and pollution due to Floyd is due to bad maps?" asked Michael.

"Well, that's certainly a contributing factor," Michael's Mom responded. "Good decision making requires good information. Beyond that, we have to use that information in a responsible manner."

"That's right," I added. "Hurricane Floyd has had disastrous consequences for North Carolina, but now that we're focusing on clean-up and rebuilding, there's a great opportunity for us. Scientists working on our Neuse project …"

"Not the Neuse project again," moaned Michael. "That's all you talk about."

"Well, that's because we're learning a great deal from the project. As I was starting to say, scientists working on our Neuse project are looking at the impact of nitrogen sources, like hog operations

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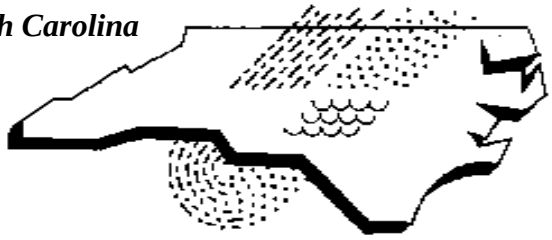

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and urban runoff, on water quality in the Neuse River and Estuary. It's no great surprise that what we do on the land affects the downstream water quality; now, with that scientific knowledge, and up-to-date flood maps, we need to take advantage of this opportunity to implement effective actions."

"So, what should we do?" asked Michael.

"I'll tell you what we should do," interjected Ellen. "It's pretty evident that hog lagoons are 'yesterday's technology' and need to be phased out. Rather than temporarily weaken our water quality regulations to allow farmers to recover from Floyd, we should use this occasion to move forward. There's no question that the farmers need our assistance to do this, but not to continue business as usual with old technology. Instead, this is our chance to relocate hog operations out of the true floodplain, implement newly-emerging technology to improve wastewater treatment, and examine incentives stimulating utilization of animal biomass as an energy source."

"And, as a scientist," I responded proudly, "I can tell you that to do this well and to address these 'quality of life' issues in eastern North Carolina, we begin with knowledge; that is, with better scientific understanding of the impacts of our actions on flooding and on water quality. Research like our Neuse modeling and monitoring project can have direct benefits to the public by providing the scientific basis for better decisions."

"Drive faster, Dad, this is getting boring." pleaded Michael.

(Author's note: Michael, Margaret, and Will are students at Durham Riverside High School, and Ellen is vice-chair of the Durham County Commission. This dialogue, while fictitious, generally reflects conversations during the past month.)

Have we seen the worst? *continued*

- at peak, more than 48,000 people in official shelters
- some 2.8 million chickens and turkeys, 880 cattle and more than 30,000 hogs dead, with many floating in flood waters
- more than 650 roads closed, 11 bridges and culverts destroyed
- 22 dam failures, 6 of them high hazard, and nearly 80 more damaged
- 50 animal operations with waste lagoons flooded; millions of gallons of animal waste spilled into floodwaters
- thousands of acres of cropland flooded with 30,000 farms affected and large crop losses, including 35% of the state's cotton crop and nearly 20% of the tobacco crop
- 24 municipal wastewater treatment plants flooded
- 915 community water systems and thousands of private wells flooded or otherwise impacted
- dozens of public schools damaged and teaching materials destroyed; community college facilities affected; some buildings at East Carolina University in Greenville flooded and many off-campus ECU students flooded out
- all shellfishing waters closed due to potential for high bacteria levels from runoff

Even before the rains from Floyd had stopped, Governor Hunt had persuaded President Clinton to issue an emergency declaration making 66 N.C. counties eligible for federal funds and resources and for individual disaster aid. On Sept 30, the president approved increasing the federal portion of disaster aid from 75 to 90%. Soon thereafter the Governor began lobbying Congress for $2.2 billion in emergency appropriations to address immediate recovery efforts and begin restoring communities, businesses and farms.

Was Floyd a 500-year event?

Media reports on unprecedented flooding immediately after Floyd referred to the "flood of the century" and the "500-year" flood. However, as more information began to filter into the pages of newspapers and evening news accounts, it became evident that Floyd was not that rare.

The U.S. Geological Survey moved to correct statements that Floyd brought a 500-year flood, saying that Floyd was perhaps a 150-or 200-year event.

David Lawrence, a geologist at East Carolina University, in a Raleigh *News and Observer* editorial reminded North Carolinians about the 1954 storm called Hazel with 120 mph winds that dumped 8-10 inches of water over central North Carolina and of back-to-back storms called Connie and Diane in 1955 that resulted in a billion dollars worth of damage.

Said Lawrence, "Dennis and Floyd were just the last storms in a string of unwelcome visitors."

Stanley Riggs, a colleague of Lawrence at ECU, followed up that editorial with one describing urbanization in the Piedmont and upper Coastal Plain that has converted forest and agricultural land to paved surfaces that increase stormwater runoff, and extensive channelization in the Coastal Plain that prevents wetlands from retaining flood waters.

Riggs concluded that "we created our own crisis in Eastern North Carolina through systematic and traumatic modification of our watersheds."

But, watershed modification was not the only human activity that contributed to the astounding flooding in Eastern North Carolina.

According to Nat Wilson with the N.C. Division of Water Resources, land subsidence in the Central Coastal Plain caused by decades of unsustainable withdrawals from aquifers exacerbated flooding.

"I can document up to 9 inches of land subsidence in the Central Coastal Plain from 1935 to 1979," said Wilson.

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"If you continue those rates of subsidence, then there has been up to 12 inches of subsidence in this area. A secondary reason for the Floyd flooding is the reduced land surface elevations. A flood event will affect a much larger area because the land has subsided," he said.

Then, news emerged of outdated floodplain maps. As watersheds urbanize, floodplains rise, but floodplain mapping—the responsibility of FEMA—has not been funded at a level that will keep maps current. In many places, homes and businesses built out of the floodplain a decade ago are now in harm's way.

Could the flooding have been foreseen?

Could the flooding in Eastern North Carolina have been predicted? In fact, catastrophic flooding in the N.C. Coastal Plain was predicted by hydrogeologist Ralph Heath more than 20 years ago.

In a 1978 pamphlet published by WRRI, Heath outlined what could occur in N.C.'s Coastal Plain by using the known statistical relationship between drainage area and discharge in the Atlantic Coastal Plain area together with information on the largest floods observed between South Carolina and Long Island. He said that North Carolina had not yet recorded a flood comparable to those observed elsewhere in the Atlantic Coastal Plain but inevitably would.

Noting urbanization in the state, Heath warned "We have built and are building below the level reached by past floods, none of which are as large as those that will occur."

Given that urbanization continues apace and that Floyd was not the 500-year storm it was first thought to be, it is still likely that, as Heath said in 1978, "The worst is yet to be."

Copies of Heath's ***Floods and Droughts: The worst are yet to be*** *are available from WRRI. Call Julie Mason at (919) 515-2815 or email: Julie_Mason@ncsu.edu.*

Water and wastewater system personnel called heroes

Throughout Hurricane Floyd and its aftermath, the media focused attention on the plight of victims, daring rescues, and activities of the Federal Emergency Management Agency (FEMA) and N.C. Emergency Management. Meanwhile, hundreds of employees of state and local agencies labored out of the spotlight, often under extreme conditions, to protect public facilities, restore public services, and aid victims.

Addressing a meeting of the N.C. Urban Water Consortium in October, Kent Wiggins of the N.C. Division of Water Quality singled out employees of flooded and threatened municipal wastewater treatment plants for praise. Wiggins said that U.S. Environmental Protection Agency personnel sent to advise on responses to environmental and health threats from the flooding told him they were strongly impressed by the dedication of water and wastewater system employees. Many of these local government employees worked around the clock for days to first protect facilities, then to repair damages and restore services while their own families coped with flooding and damage.

"EPA said they have been in other states during floods where there was no one at the treatment plants—everyone was at home taking care of their own crises. Not so in North Carolina. Here plant personnel were doing everything they could to keep the facilities working," said Wiggins.

Greenville Utility Commission staff were especially lauded for weeks of fighting flood waters at their water and wastewater treatment plants.

Linda Sewall, director of the N.C. Division of Environmental Health, said that EPA personnel were also impressed with the ability of water system personnel to respond to flooding, line breaks, and other disruptions and get safe water flowing to consumers quickly.

"When EPA came in, we told them it was under control," said Sewall. "They later told us we were right. We had six major water plants impacted, but it didn't take long for any of them to get back to producing high quality water.

"The efforts North Carolina has made in operator training and in continuing education through professional organizations over the decades paid off."

Sewall said that while some donated bottled water came in from other states, the bulk of emergency drinking water for flooded areas was provided by North Carolina water plants and was trucked to affected areas by the National Guard.

"The major problem was line breaks," said Sewall. "Plants could produce good water, but there were large areas of distribution systems that had to be closed off."

While most customers of municipal and district water systems had service restored and good water flowing to their taps fairly quickly, people with private wells were not so fortunate.

Sewall said that sampling of private wells following the floods revealed that in some areas large percentages of wells tested positive for both total coliform and E. coli bacteria.

"The municipal and district water systems are doing a great job," said Sewall, "but there are a lot of people in North Carolina not drinking high quality water. We do not have a good system to assure safety of private wells."

Testing of private wells in Eastern North Carolina continues, and local health departments in counties not affected by the floods have sent personnel to help. However, with thousands of wells to test, progress is slow.

Sewall said that the Division of Environmental Health is working with N.C. State University to map areas that might be hot-spots of bacterial contamination so that testing can be targeted.

Review

Disaster and Democracy: The Politics of Extreme Natural Events

by Rutherford H. Platt (320 pages, Island Press)

With much of Eastern North Carolina still devastated by flooding from Hurricane Floyd, it may seem callous to ask, as Rutherford Platt does, "Who should pay for disaster losses?" When thousands of individuals have lost everything, how can we not seek all the help available for them from any source?

Platt's examination of federal disaster policy does not suggest abandoning aid to individuals in times of extreme need. It does suggest, however, that natural sympathy and generosity of Americans and the political advantages to be gained by doling out federal aid to victims of disaster—needy or not—are feeding an increasingly costly entitlement program that is expanding hazards and vulnerability to natural events.

Platt begins his examination of the political response to natural disasters by reviewing the evolution of the federal disaster assistance role. Before 1950, he tells us, natural disasters were considered "acts of God," and disaster assistance was considered the responsibility of communities, churches, and charities. The federal government assumed no responsibility for welfare of victims.

With the passage of the Federal Disaster Relief Act of 1950 and 14 additional acts between 1950 and 1980, the financial cost of disasters was transferred from local governments and individuals to federal taxpayers. During this period the federal government added to the initial basic federal disaster benefits temporary housing, grants for repair of damaged state property, unemployment compensation to victims, legal and mental health services, individual and family grants, food coupons, and payments to communities to offset lost tax revenue. Today, public assistance under federal disaster programs also includes debris removal, repair or replacement of public facilities, and emergency response costs of states and local governments.

Accompanying this federalization of disaster assistance, says Platt, has been development of "an implicit new social compact . . . between government and citizenry in which the former assumed a large share of disaster losses arising from the bad luck or bad judgment of the latter."

Platt examines the "bad judgment" of citizens and local governments in several chapters that trace the erosion of congressional mandates to reduce vulnerability to hazards through land-use regulation, the property rights movement and its chilling effect on local governments' willingness to use regulatory power to reduce vulnerability to natural disasters, and regional case studies of the balance of federal and non-federal loss-bearing.

In these chapters, Platt and co-authors show that national disaster policy has increasingly moved away from individual and local responsibility for loss avoidance, and that "mitigation" has come to be understood as whatever the federal government pays for, rather than what local governments and individuals do to protect themselves.

Platt's examination of disaster assistance also reveals an inequity between assistance to individuals and to public entities (state and local governments). While both are contingent upon a presidential declaration, individual assistance is limited by need criteria, while public assistance has no means test, and communities in declared counties can receive federal dollars for damaged public facilities (including beaches) regardless of the economic status of the community or its residents.

The source of federal funds for disaster relief also receives scrutiny, and we learn that disaster outlays between 1977 and 1993 amounted to over $119 billion, reaching an all-time high of $10 billion in 1994, and that most funding is provided from off-budget appropriations.

Platt also examines the presidential declaration process, noting that no clear objective criteria have been established for declarations, that the numbers tend to rise during presidential campaign years, and that Congress has consistently rejected proposals to limit the scope and availability of federal disaster assistance. Using a geographical analysis of disaster declarations, he suggests that disaster assistance has become a new "pork barrel" whereby visible federal spending is bestowed in localities accustomed to receiving dams, harbor improvements, military bases, and other federal projects.

But neither the cost nor the political uses of federal disaster assistance is Platt's main concern. His primary concern is that "the high probability that any natural event—extreme or not—will be tacitly federally declared encourage[s] building and rebuilding in hazardous areas." He notes that while the federal government has spent over $1 billion mapping flood hazard areas (not always with success), 40% of all National Flood Insurance Program payments have been made for structures that have had repetitive losses.

Platt offers a number of suggestions for changes to federal disaster assistance programs that would depoliticize assistance to individuals and reduce the magnitude of assistance to state and local governments, thereby reducing incentives to build in areas subject to natural hazards and encouraging more effective use of land use controls and incentives.

Platt's analysis of the politics of disaster assistance is enlightening and becomes all the more so when read in the context of the "new federalism" and "devolution" rhetoric flowing from Congress. As other analysts have noted, federalism and devolution should concentrate risk at the state and local levels. That it has not done so in the case of natural disasters suggests the power of politics over ideology.

October action of the N.C. Environmental Management Commission

At its regular meeting on October 14, the N.C. Environmental Management Commission took the following action:

■ Re-elected Dr. Charles Peterson as vice chairman.

■ Approved holding a public hearing on rules governing minimum management practices for dry-cleaning facilities. The public hearing will be held at 7 pm, November 30, 1999, in the Ground Floor Hearing Room of the Archdale Building in Raleigh. For additional information, contact Lisa Taber with the Division of Waste Management's Superfund Section at (919) 733-2801, Extension 244.

■ Adopted temporary rules to correct deficiencies in N.C.'s Title V Air Quality permitting requirements. The temporary rules become effective Dec 1, 1999. For information visit website http://daq.state.nc.us/Rules/Adopted/.

■ Adopted permanent rules on controlling odors from animal operations. The permanent rules differ in several important respects from the temporary rules that went into effect on March 1, 1999. An amendment offered by Commissioner Marion Deerhake to restore a statement that the odor rules are part of the Governor's Lagoon Conversion Plan and will be updated and revised to remain in concert with that plan was narrowly defeated. Commissioners Robert Epting and Dan Besse argued for the amendment as a way of expressing support for the Governor's plan and expressing disapproval of the current method of animal waste disposal. For a copy of the permanent rules visit website: http://daq.state.nc.us/Rules/Adopted/.

■ Adopted amendments to Air Quality New Source Performance Standards and adopted a new rule for control of emissions from abrasive blasting.

■ Approved holding a public hearing on amendments to the Air Quality Visible Emissions Rule and the Excess Emissions Reporting and Malfunction Rule. For information on the public hearing, call Tom Allen with the N.C. Division of Air Quality at (919) 733-1489.

■ Adopted a resolution endorsing the establishment of the Sustainable Coast Corporation and its vision for a sustainable North Carolina coast. The Sustainable Coast Corporation has been established to assist local governments in developing long-term, comprehensive, knowledge-based growth management strategies. For information about this initiative, contact Dr. James Merritt, Associate Director of the Center for Marine Science Research at UNC-Wilmington, at (910) 256-3721 or merrittj@uncwil.edu.

■ Adopted temporary rules under which activities exempt from Clean Water Act Section 404 (wetlands) permitting requirements (primarily agricultural and silvicultural activities) can be deemed to be in compliance with North Carolina's water quality standards relating to wetlands.

■ Reclassified Lake Waccamaw in Columbus County to Class B Swamp Outstanding Resource Waters (ORW) and applied the ORW management strategy to waters draining to Lake Waccamaw.

■ Reclassified Rough Creek in Haywood County from Water Supply I (WS-I) to WS-I Trout Outstanding Resource Waters. The Town of Canton had requested the ORW reclassification.

■ Reclassified Lake Montonia in Cleveland County to Class B High Quality Waters (HQW).

■ Reclassified Wesser Creek in Swain County to Class C Trout (Tr). The Tr classification is intended to protect freshwaters for natural trout propagation and survival of stocked trout.

■ Approved publishing in the *N.C. Register* a notice of rulemaking proceedings to change 36 groundwater quality standards. The changes were recommended by the N.C. Division of Public Health based on updated health information. Among the standards to be changed are those for arsenic and methyl-tert butyl ether (MTBE).

■ Sent back to the Groundwater Committee for further study a proposal to adopt temporary rules to change the groundwater quality standards for arsenic and methyl-tert butyl ether (MTBE). Permanent rules to change these standards cannot become effective before April 1, 2001, and the Division of Public Health has questioned whether leaving the present standards in place provides sufficient protection to those who rely on water wells for drinking water. However, Groundwater Committee Chairman Ryan Turner told the EMC that little information had been presented to his committee on the need to adopt temporary rules.

■ Approved publishing in the *N.C. Register* a notice of rulemaking to establish groundwater quality standards for 38 substances and to change the requirement that standards for substances listed in the groundwater rules be reviewed every two years . The Groundwater Section proposed that the review of standards be conducted every three years because any revisions that would be necessary take at least two years to accomplish under the most recent changes to the Administrative Procedures Act.

■ Approved publishing in the *N.C. Register* a notice of rulemaking to change well construction standards and holding a public hearing on changes.

October action of the EMC Water Quality Committee

At its regular meeting on October 13, 1999, the Water Quality Committee of the N.C. Environmental Management Commission took the following action:

- Approved a variance from the Neuse River Riparian Area Protection Rule for construction of a single-family home on three combined lots in southeast Raleigh.

- Considered proposed changes in nitrogen allocations for wastewater dischargers subject to the Neuse River Nutrient Sensitive Waters Management Strategy. Errors in the calculations used to make the original allocations resulted in a calculated 24% rather than 30% reduction in nitrogen loading to the Neuse Estuary. More than 100 wastewater discharge permits in the basin have expired or are being administratively extended until allocation changes can be approved. Although the Division of Water Quality had worked with dischargers to reach an agreement on allocations, the Lower Neuse Basin Association had not met to give its final agreement to the changes. Therefore, the Water Quality Committee approved presenting new allocation rules to the EMC in December but may adjust the allocations at its December meeting just prior to the EMC meeting.

- Approved revisions to the Water Supply Watershed Protection Ordinances for the City of Lincolnton, Town of Jonesville, and Macon County.

The Save our Streams Program of the Izaak Walton League offers a number of videos about stream monitoring and basic equipment needed to start a biological stream monitoring project. For information visit website http://www.iwla.org/SOS/catalog/.

Variances from setbacks between wells and septic systems will no longer be granted

At the request of the N.C. Division of Environmental Health, the N.C. Groundwater Section has agreed to discontinue granting variances from the required setback between wells and septic tank systems.

N.C. well construction standards and subsurface wastewater rules both require a 100-foot separation between a well and a septic tanks. Both allow for a reduction of the setback to no less than 50 feet for small lots. In the past, conflicts have arisen when the Groundwater Section of the Division of Water Quality, in accordance with its rules, has granted a variance from the separation requirement to allow less than 50 feet. Such a variance is not allowed by the sewage rules. The granting of setback variances has sometimes resulted in situations in which subsurface wastewater systems could no longer be approved for lots where it was initially thought there would be adequate space for both the well and septic system.

To avoid these conflicts, Secretary of Environment and Natural Resources Bill Holman asked the Groundwater Section to stop issuing variances that would allow a separation distance of less than 50 feet between a well and any ground absorption sewage treatment and disposal. Arthur Mouberry, Chief of the Groundwater Section, issued the order to regional groundwater supervisors effective August 10, 1999.

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October action of the EMC Ground-water Committee

At its regular meeting on October 13, 1999, the Groundwater Committee of the N.C. Environmental Management Commission (EMC) took the following action:

- Approved asking the EMC for permission to hold a public hearing on minimum management practices for dry-cleaning facilities.

- Approved a variance, with no monitoring required, from groundwater standards under 15A NCAC 2l .0113 for the Carolina Coatings Inc. site at 711 Pressley Road in Charlotte.

The committee also heard the following information items:

- At the request of the Division of Environmental Health, the Groundwater Section has agreed to discontinue granting variances from the setback requirement between wells and septic tank systems (see separate article this page).

- At the request of concerned citizens, the Division of Water Resources (DWR) will review hydrogeologic data from Brunswick, New Hanover, and Pender counties and will hold a public meeting to determine if a Capacity Use Investigation for this area of the state is needed. For additional information, contact Nat Wilson with DWR at (919) 715-5445 or nat.wilson@ncmail.net.

- Hearing Officers for the Central Coastal Plain Capacity Use Area (CCPCUA) rulemaking and DWR have determined that additional time and stakeholder meetings are need to improve the CCPCUA rules. DWR will coordinate stakeholder meetings between October 1999 and March 2000 and reintroduce CCPCUA rules to the Groundwater Committee in May 2000.

New and expanding Public Water Supply Systems must meet capacity development requirements

On October 1, 1999, temporary rules implementing North Carolina's Public Water Supply Capacity Development Program requirements became effective. This new program is required by the 1996 Amendments to the Safe Drinking Water Act (SDWA). The new State rules add requirements for State approval of new or expanding community and non-transient non-community public water systems. (Existing water systems that do not need plan and specification approval for changes to their system are not affected.)

The new rules are scheduled to become permanent on August 1, 2000. They will be codified in 15A NCAC 18C Section .0300 and in Rule .1304.

The 1996 SDWA Amendments required states to develop programs that will prevent the formation or expansion of community and non-transient, non-community public water supply systems that do not have the technical, managerial, and financial capacity to comply fully with all aspects of the SDWA. North Carolina's Capacity Development rules were created through an advisory committee process and include the required aspects of the capacity development program.

The first opportunity for the Public Water Supply Section to determine a proposed new or expanding system's technical, managerial, and financial capacity is during the plan review and approval phase. Therefore, anyone who wishes to construct or expand a public water supply system should become familiar with these new requirements before developing plans.

Technical capacity refers to the physical and operational ability of a water system to meet SDWA requirements. Since 1977, Rules in 15A NCAC 18C Section. 0300 have required an engineer's report and engineering plans and specifications for new or expanding systems. The new technical requirements include the completion of an Operation and Maintenance Plan and an Emergency Management Plan for all new or expanding community and non-transient non-community water systems approved after September 30, 1999 [Rule .0307 (d)(e)].

Managerial capacity is the ability of the water system owner and manager(s) to conduct the affairs of the system in a manner that enables the water system to achieve and maintain compliance with SDWA requirements. As of October 1, 1999, all new or expanding community and non-transient non-community water systems must document managerial capacity in a Water System Management Plan to satisfy the requirements. The managerial components of the Water System Management Plan require documentation about the organization, ownership, management qualifications, management training and policies [Rule .0307 (c)].

Financial capacity is a water system owner's ability to acquire and manage financial resources to allow the system to achieve and maintain compliance with the SDWA requirements. As of October 1, 1999, all new or expanding community and non-transient non-community water systems must document financial capacity in a Water System Management Plan to satisfy the requirements. The financial components of the Water System Management Plan require water systems to submit specific documentation to demonstrate the water systems financial capacity. For systems regulated by the North Carolina Local Government Commission, or the North Carolina Utilities Commission, financial capacity may be demonstrated by documenting compliance with Local Government Commission or North Carolina Utilities Commission requirements [Rule .0307 (c)(7)].

A guidance document for the Water System Management Plan has been developed to help applicants through the specific requirements. A copy of the guidance document and the temporary rules can be down loaded from the Public Water Supply Section web site at http://www.deh.enr.state.nc.us/pws or call Phylis Locke at 919-715-3898 to receive the temporary rules by mail.

Help for currently expanding systems

Because it has been difficult to get information to existing systems, the Public Water Supply Section has developed a check list that will allow existing systems actively planning expansions to complete "Water System Management Plan certification" that will give them until August 1, 2000, to submit required details. For additional information, please contact James McGuire at 919-715-3269.

Setback variances no longer granted *continued*

According to Linda Sewall, Director of the Division of Environmental Health, local health department personnel have been directed not to refer home builders to the Division of Water Quality for variances. In addition, well drillers are being asked to contact local health departments if they decide in the field to put a well in an area other than the location designated when an "improvement permit" for a septic system was issued. Moving a well has often made the only site available for a drain field unusable.

Sewall said that this issue points to the need to have residential wells and wastewater systems permitted locally, since without field visits, it is impossible to assure that private water supplies will be adequately protected.

While some counties have local well inspection programs, many still do not.

State Supreme Court reverses Durham stormwater fee decision

In August, the North Carolina Supreme Court filed a decision superseding a Supreme Court decision filed in July 1998 that had upheld the City of Durham's authority to impose fees to operate its stormwater program.

The suit was brought by Smith Chapel Baptist Church, Fellowship Baptist Church, Layman's Chapel Baptist Church, and Calvary Baptist Church of Durham. The plaintiffs contested a program established by the City of Durham to comply with the Clean Water Act NPDES stormwater permitting program. Durham adopted an ordinance and created the Durham Stormwater Utility to receive fees, based on the impervious areas of assessed lands, to operate a stormwater program.

The plaintiffs alleged that the city did not have the authority to impose fees to operate its stormwater program, that the method by which fees were to be calculated is unlawful, that the rates set by the city were discriminatory, and that a fee for utility service must be commensurate with service rendered while evidence showed there was virtually no benefit to them. In the 1998 decision, the Supreme Court rejected all the plaintiff's arguments and remanded the case for entry of a judgment for the defendant.

On discretionary review the Supreme Court recently decided that state law limits stormwater utility fees to the amount which is necessary for a City to maintain the stormwater and drainage system and that these fees may not be used to support a program aimed at reducing water quality problems related to stormwater. Based on this interpretation of state law, the court held the City of Durham's Stormwater Utility ordinance and the fees charged under it are invalid and that the plaintiffs are entitled to a full refund of the illegally collected fees from the City, plus interest on those fees to the date of judgment.

Several other stormwater programs in North Carolina which collect fees to operate stormwater utilities will be affected by the decision.

According to Paula Thomas, manager of environmental policy with the N.C. League of Municipalities, the League may cooperate with the N.C. Department of Environment and Natural Resources to ask the next session of the General Assembly for action clarifying state law on the issue of use of stormwater utilities to deal with water quality problems.

EPA jumps through congressional hoops to issue NPDES Phase II stormwater rules

For more than 25 years, the U.S. Environmental Protection Agency has sought to document the effects of stormwater and to craft urban runoff regulations acceptable to environmental groups on the one hand and local governments, which must implement the regulations, on the other.

In 1973, EPA exempted stormwater runoff discharges from National Pollutant Discharge Elimination System (NPDES) permitting and was promptly sued by the National Resources Defense Council (NRCD). Under court order, EPA promulgated urban stormwater regulations in 1984 but asked the court to remand the regulations following passage of the Clean Water Act reauthorization of 1987.

Provisions in the Clean Water Act reauthorization established a framework for stormwater regulation agreed to by environmental groups and local governments, which had argued that the proposed permitting of individual storm sewers was too expensive and unnecessary. Under the compromise contained in the 1987 legislation EPA promulgated stormwater regulations covering urban areas with populations over 100,000 in 1990. Under these Stormwater Phase I rules, Charlotte, Raleigh, Durham, Winston-Salem, Greensboro, and Cumberland County implemented stormwater management programs.

Phase II rules covering smaller urban areas (50,000 to 100,000) were due to be issued under a consent agreement between EPA and NRDC on October 29.

On October 15, Congress passed H.R. 2684 making appropriations for Veterans Affairs, HUD, and Independent Agencies (including EPA). An amendment to that bill by Texas Senator Kay Bailey Hutchison prohibited EPA from issuing NPDES Phase II regulations until the agency delivered a report containing:

(1) an in-depth impact analysis on the effect the final regulation will have on urban, suburban, and rural local governments subject to the regulation including an estimate of:
   (A) the costs of complying with the 6 minimum control measures described in the regulations
   (B) the costs resulting from lowering of the construction threshold from 5 acres to 1 acre
(2) an explanation of the rationale of the Administrator for lowering the construction site threshold from 5 acres to 1 acre
(3) documentation demonstrating that stormwater runoff is generally a problem in communities with populations of 50,000 to 100,000
(4) information that supports the position of the Administrator that the Phase II stormwater program should be administered as part of the National Pollutant Discharge Elimination System

President Clinton signed HR 2684 on October 20, and for some days there

continued

Stormwater Phase II
continued

was confusion as to whether EPA would promulgate Phase II regulations by the court-ordered deadline of October 29.

However, the Agency quickly prepared the required report, delivered it to Congress on October 28, and signed the NPDES Phase II rules on October 29, as ordered. The rule was expected to be published in the *Federal Register* in November.

Documents related to NPDES Phase II stormwater regulations (including a press release and fact sheet on the rule; the final rule, preamble and attachments; and the report to Congress) have been posted on the EPA website: http://www.epa.gov/owm/sw/phase2.

Under the Phase II rules, 85 towns, cities, and urbanized counties in North Carolina and construction sites between one and five acres will be required to get permits and manage storm water runoff. In addition, the N.C. Division of Water Quality must develop criteria which it could use to designate additional areas for Phase II coverage. For information on implementation of Phase II regulations in North Carolina, contact Bradley Bennett or Bill Mills with the N.C. Division of Water Quality at (919) 733-5083.

EPA has still more reporting to do under Senator Hutchison's amendment to HR 2684. In February, the Agency must deliver another report containing a detailed explanation of the impact that the Phase I program has had in improving water quality in the United States. EPA must also publish in the *Federal Register* for public comment both reports required by the Hutchison amendment.

Draft Integrated Assessment of Hypoxia in the northern Gulf of Mexico available for comment

EPA has made available for comment a document assessing causes and consequences of hypoxia in the Gulf of Mexico. This may be of particular interest to those concerned about hypoxia in the Neuse River Estuary. The document is available at: http://www.epa.gov/msbasin/ia/.

Environment-related legislation in Congress

Following are some of the many bills directly or indirectly related to environmental issues that have been introduced in Congress. For more information on these bills visit the Congressional website: http://thomas.loc.gov/

S 25 Conservation and Reinvestment Act of 1999. Provides Coastal Impact Assistance to State and local governments, amends the Outer Continental Shelf Lands Act Amendments of 1978, the Land and Water Conservation Fund Act of 1965, the Urban Park and Recreation Recovery Act, and the Federal Aid in Wildlife Restoration Act (commonly referred to as the Pittman-Robertson Act) to establish a fund to meet the outdoor conservation and recreation needs of the American people, and for other purposes. (Committee on Energy and Natural Resources held hearings in April and May.)

S 493 Toxic Microorganism Abatement Pilot Project Act. Requires the Secretary of the Army, acting through the Chief of Engineers, to evaluate, develop, and implement pilot projects in Maryland, Virginia, and North Carolina to address problems associated with toxic microorganisms in tidal and non-tidal wetlands and waters. (No action)

S 835 Estuary Habitat Restoration Partnership Act of 1999. "A bill to encourage the restoration of estuary habitat through more efficient project financing and enhanced coordination of Federal and non-Federal restoration programs, and for other purposes." (Reported in the Senate.)

S 941 Combined Sewer Overflow Control and Partnership Act of 1999. "A bill to amend the Federal Water Pollution Control Act to require that discharges from combined storm and sanitary sewers conform to the Combined Sewer Overflow Control Policy of the Environmental Protection Agency, and for other purposes." (Committee on Environment and Public Works held hearings on the bill on Oct 7)

S 1090 Superfund Program Completion Act of 1999. Amends the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) to direct the Administrator of the Environmental Protection Agency (EPA) to establish programs to provide grants to eligible entities (including local government units, redevelopment agencies, States, and Indian tribes) for site characterization and assessment of, and performance of response actions at, brownfields facilities. Absolves from liability for response actions bona fide prospective purchasers to the extent liability at a facility for a release or threat thereof is based solely on ownership or operation of a facility. Establishes limitations to liability for codisposal landfills (certain MSW or sewage sludge landfills that may have received hazardous waste and that contain predominately MSW or sewage sludge transported from outside the facility). Revises provisions regarding uses of Superfund. Authorizes appropriations from Superfund.

S 1214 The Federalism Accountability Act of 1999. Requires Congress and agencies to issue explicit statement of congressional or agency intent when preempting state or local law and explain reason for preemption; requires each agency to designate a federalism officer to implement requirement of the act and serve as liaison to state and local officials; requires agencies early in rulemaking to notify and consult with state and local public officials that could be affected; requires

agencies to provide federalism assessment for rules; requires that when Congress caps or otherwise decreases federal share of an entitlement program, reports accompanying legislation must analyze whether legislation includes new flexibility or whether there is existing flexibility to offset additional costs.

S 1457 Forest Resources for the Environment and the Economy Act. Amends the Energy Policy Act of 1992 to assess opportunities to increase carbon storage on national forests derived from the public domain and to facilitate voluntary and accurate reporting of forest projects that reduce atmospheric carbon dioxide concentrations, and for other purposes.

S1706 Water Regulation Improvement Act of 1999. Amends the Federal Water Pollution Control Act to exclude from stormwater regulation certain areas and activities and provides that local government entities shall not be liable for failure of co-permittees or other governmental entities to implement stormwater measures.

HR 623 Low-Flow Toilets bill. Amends the Energy Policy and Conservation Act to repeal restrictions on certain plumbing products and appliances, including showerheads, faucets, water closets, and urinals.

HR 728 Small Watershed Rehabilitation Amendments of 1999. "A bill to amend the Watershed Protection and Flood Prevention Act to authorize the Secretary of Agriculture to provide cost share assistance for the rehabilitation of structural measures constructed as part of water resource projects previously funded by the Secretary under such Act or related laws." (Subcommittee has marked up and ordered reported.)

HR 999 Beaches Environmental Assessment, Cleanup, and Health Act of 1999. Amends the Federal Water Pollution Control Act to require States having coastal recreation waters to adopt water quality criteria and standards for such waters for pathogens and pathogen indicators for which the Administrator of the Environmental Protection Agency has published criteria under such Act. Requires States to adopt new or revised standards for such waters after the Administrator publishes new or revised criteria. (Has passed House; committee hearings held in Senate.)

HR 2669 Coastal Community Conservation Act of 1999. "A bill to reauthorize the Coastal Zone Management Act of 1972, and for other purposes." (Controversial language related to property rights and nonpoint source pollution added in Subcommittee on Fisheries Conservation, Wildlife and Oceans markup. Bill has been ordered reported.)

Environment-related legislation passed

S 507 (PL 106-53) Water Resources Development Act of 1999. "An Act to provide for the conservation and development of water and related resources, to authorize the United States Army Corps of Engineers to construct various projects for improvements to rivers and harbors of the United States, and other purposes." Section 437 authorizes a study to determine whether there is federal interest in a project for water quality, environmental restoration, and other purposes in the White Oak River, North Carolina. Section 212 authorizes a study of nonstructural methods of reducing flood hazards and restoring natural riverine functions and values in a number of named watersheds throughout the country, including Briar Creek, North Carolina. Briar Creek is a tributary of Sugar Creek in Mecklenburg County. (However, funds have not yet been appropriated for this study.)

Flawed flappers fuel low-flush flap

By Gary Woodard
Reprinted by permission from the ***Arizona Water Resource***

Water conservation professionals are in the awkward position of publicly defending ultra-low-flush (ULF) toilets as effective water conservation devices even as they quietly debate growing evidence that some ULF models become water wasters as they age. Congressman Knollenberg (R-MI) once again is trying to repeal the water use efficiency standards for plumbing fixtures contained in the Federal Energy Policy Act. Low consumption plumbing fixtures, including ULF toilets using 1.6 gallons or less, were required in new construction on a national basis as of 1994.

Some early ULF toilets needed frequent double flushes or had other serious design flaws, but most models now work well when new. The issue is durability over time. Many models of ULF toilets contain proprietary parts, such as early-close flapper valves, that wear out and cannot be readily found in hardware or plumbing supply stores. Even home improvement stores that sell ULF toilets often do not stock spare parts, leaving the homeowner to decide whether to live with a leaky toilet or replace the proprietary part with a generic flapper, which may greatly increase water use. In many cases, the homeowner is not even aware that the replacement part differs from the original, or that installing it will increase water use.

The problem is significant for the many water and wastewater utilities that spent hundreds of millions of dollars on rebates and expected to reduce water demand and wastewater flows for decades. Hillsborough County, Florida, which spent $7 million over six years on 58,000 toilet rebates, reports its customers installed over 190 different ULF models. Now this wide variety of ULF

continued page 12

Flawed Flappers *continued*

models and lack of standardized parts are causing the initial water savings to erode. New federal drinking water regulations leading to higher disinfection levels in many communities, may further shorten the useful lives of flappers and other rubber parts.

What to do about the problem is not clear. Some conservation professionals advocate limiting rebates to ULF models with standard parts, such as some pressure-assist toilets. A short-term strategy calls for compiling a catalog of all ULF toilet makes and models, listing sources for those parts that wear out over time. The catalog would be available at major home improvement and plumbing outlets, as well as on the internet.

Longer-term strategies include more research on which ULF models rely on proprietary parts, and how quickly the parts deteriorate. This information could then be used to urge major toilet suppliers and municipalities offering rebates to avoid the more problematic models. One study by the Water Resources Research Center and the City of Phoenix Water Department is looking at the water use of some 200 toilets installed through City of Tucson rebates eight years ago.

The consensus among conservation professionals is that concerted action on the part of large municipal water and wastewater utilities is needed to get the toilet industry to act. Otherwise they fear Congress may reject the entire ULF fixture because of faulty parts. This would be like throwing out the baby with the bath water because the tub leaks.

EPA issues draft Coastal Research and Monitoring Strategy

In response to a charge issued under the Clinton Administration's Clean Water Action Plan, EPA has developed a Coastal Research and Monitoring Strategy. This is an assessment of the nation's coastal research and monitoring needs and recommends an integrated framework to address the needs of the nation and the coastal states to protect vital coastal resources. A copy of the draft strategy is available at http://www.epa.gov/owow/oceans/crm/cmr.html.

Deadline extended for comment on proposed TMDL rule

On August 23, 1999, the U.S. Environmental Protection Agency issued two proposed rules to revise regulatory requirements for identifying impaired waters and establishing Total Maximum Daily Loads (TMDLs) under the Clean Water Act and revisions to the National Pollutant Discharge Elimination System (NPDES) Program and Federal Antidegradation Policy in support of the TMDL revisions. On October 1, EPA extended the period for comment on the rule to December 22, and, on October 27, in response to requirements in the EPA appropriations bill, extended the comment period again to January 20, 2000.

According to EPA, the proposed revisions establish a new framework for cleaning up impaired waters. The agency is calling for all pollution sources to participate in creating comprehensive, local, watershed-based cleanup plans. Detailed implementation plans would be required and states would have to clarify their authority to regulate sources of polluted runoff when necessary to restore waters.

States would also have to include in implementation plans "reasonable assurances" that "on-the-ground" actions will occur. Such assurances could include local ordinances and zoning requirements to demonstrate commitment to reducing polluted runoff. To enhance EPA's and states' ability to establish reasonable assurances, the proposed rules would allow EPA to decide that currently unregulated sources are causing water quality problems and allow states and EPA to require these sources to have an NPDES permit. This authority would be limited to animal feeding operations, aquatic animal production facilities, and some discharges from forestry operations.

The proposed regulations would allow EPA to step in when reasonable progress toward meeting water quality standards is not being achieved.

The proposed rules would allow for large new and significantly expanding dischargers to impaired waters only when the dischargers commit to reducing pollution from other sources by 1.5 pounds for every pound they add.

The text of the proposed rules and a number of related fact sheets can be found on the EPA website at: http://www.epa.gov/owow/tmdl/proprule.html.

EPA publishes notice of intent to revise and develop aquatic life criteria

On October 29, the U.S. Environmental Protection Agency published in the *Federal Register* a notice of intent to revise aquatic life criteria for copper, silver, lead, cadmium, iron and selenium and to develop aquatic life criteria for atrazine, diazinon, nonylphenol, Methyl Teritiary-Butyl Ether (MtBE), manganese and saltwater dissolved oxygen (Cape Cod to Cape Hatteras). These criteria will be based on latest scientific knowledge and may not consider economic impacts or technological feasibility of meeting criteria in ambient water. Lists of references on these substances may be found at http://www.epa.gov/ost/standards/criteria/. EPA would like scientific views and public comment by the end of December.

People

Robin Smith, a special deputy attorney general in the N.C. Attorney General's Environmental Division, has been named assistant secretary for environmental protection in the N.C. Department of Environment and Natural Resources. She assumed the position October 11.

Greg Thorpe is the new deputy director of the N.C. Division of Water Quality.

WRRI report available

WRRI has recently published a peer-reviewed technical completion report on a research project for which it provided funding. Single copies of WRRI reports are available free to federal/state water resource agencies, state water resources research institutes, and other water research institutions with which exchange agreements have been made. Single copies of publications are available to North Carolina residents at a cost of $4 per copy prepaid ($6 per copy if billed) and to nonresidents at a cost of $8 per copy prepaid ($10 per copy if billed). Send requests to WRRI, Box 7912, North Carolina State University, Raleigh, NC 27695-7912 or call (919) 515-2815 or email: water_resources@ncsu.edu.

Anaerobic Biodegradation in Contaminated Aquifers: Influence of Protozoan Predation and Iron Bioavailability
Report 324 July 1999

Sreenivas Kota and Robert C. Borden
Department of Civil Engineering
North Carolina State University

Microbes are present in most shallow aquifers and can degrade contaminants released from petroleum underground storage tanks. However, the major factors controlling the rate and extent of biodegradation are still poorly understood. Rates of biodegradation in laboratory experiments have not matched field biodegradation rates. Therefore, it is not possible to predict the extent of contaminant migration and assess the risk associated with a particular plume.

Previous work had suggested to the principal investigator that protozoa in soil may be controlling biodegradation rates by consuming microbes that degrade hydrocarbon constituents, and that microcosms used in previous studies may have been too small to reflect the effect of protozoan population increases on bacterial populations and subsequent biodegradation rates. In this project, the investigators tested this hypothesis using soil from a gasoline-contaminated site near Rocky Point, NC. They also examined the effect of iron oxide bioavailability on the rate and extent of anaerobic biodegradation.

To evaluate the effect of protozoan predation on aerobic biodegradation rates, a sediment extract was fed a mixture of benzene, toluene, ethylbenzene, and xylene isomers (BTEX); and the extract then was incubated aerobically with and without protozoan inhibitors. After a 10-day incubation, over 89% of the added BTEX was degraded in incubations with the protozoan inhibitors compared to only 36% degraded in the incubations without protozoan inhibitors. The effect of protozoan predation on anaerobic biodegradation rates was evaluated in macrocosms (1 kg sediment and 600 mL liquid) that were repeatedly fed benzaldehyde over a 1000-hour period. In macrocosms containing the protozoan inhibitor cycloheximide, the number of total anaerobes and iron reducers was higher than in macrocosms that did not receive the inhibitor. However, benzaldehyde degradation rates and protozoan numbers were similar in the macrocosms with and without the protozoan inhibitor. These results suggest that protozoan grazing may limit biodegradation rates in aquifer sediment under aerobic conditions. However, protozoan predation was not significant in the experiments under anaerobic conditions. Additional research is needed to understand under what environmental conditions and for what contaminants protozoan predation will be important.

To evaluate the effect of ferric iron—Fe (III)—bioavailability on contaminant biodegradation, anaerobic macrocosms were constructed with contaminated aquifer sediment. Repeated benzaldehyde additions initially resulted in an increase in ferrous iron—Fe (II)—and a decrease in Fe (III). However, after approximately 400 hours, total Fe (II) and Fe (III) stabilized, and both ethanol and benzyl alcohol began to accumulate, indicating a shift in microbial processes from iron reduction to fermentation. The addition of Fe (III) as goethite, hematite, and amorphous oxyhydroxide to the Fe (III)-depleted sediment stimulated ethanol and benzylalcohol degradation, indicating that Fe (III) bioavailability was limiting contaminant biodegradation. Washing the sediment with $CaCl_2$ and NaAc to remove sorbed and/or precipitated Fe (II) also stimulated ethanol and benzylalcohol degradation, indicating that Fe (II) was fouling the sediment surface. These results suggest that fouling of the iron oxide surfaces by sorbed and/or precipitated Fe (II) may limit the amount of bioavailable iron, reducing the overall assimilative capacity of shallow aquifers. Additional research is needed to identify conditions when Fe (II) fouling will be important.

DEADLINE EXTENDED FOR PUBLIC COMMENTS ON PROPOSED TAR-PAMLICO NUTRIENT RULES

Due to the impacts of recent hurricanes on eastern North Carolina, the public comment period for several proposed nonpoint source nutrient rules for the Tar-Pamlico River Basin has been extended. Comments will now be accepted until December 31, 1999, on proposed rules for urban stormwater, agriculture, and nutrient management. The original 60-day comment period closed September 30th. It was initially extended until October 15th. This additional extension is in response to requests from the public.

The comment period for the remaining Tar-Pamlico rules, regarding protection of riparian buffers, closed October 15th and will not be extended. The NC Environmental Management Commission will consider adopting these riparian buffer protection rules at its December 9, 1999, meeting.

Please direct comments and questions to:
Rich Gannon, Planning Branch
NC DENR, Division of Water Quality
1617 Mail Service Center, Raleigh, NC 27699-1617, or (919) 733-5083 ext. 356, or email rich.gannon@ncmail.net

Call for Papers for 2000 Annual North Carolina Water Resources Research Conference

The Water Resources Research Institute is sponsoring an annual conference on water resources research in North Carolina. This conference will be held on March 30, 2000, at the McKimmon Center on the campus of N.C. State University in Raleigh. The meeting will highlight water resources research in North Carolina and provide an opportunity for researchers to meet and discuss their work with others. University and other researchers, representatives from local, state and federal agencies, and industrial and agricultural representatives should attend this conference to gain current information on research that is addressing water resource issues.

Those interested in presenting a paper or poster at the annual conference should submit **a 400-word abstract by January 7, 2000**. We are looking for technical, policy, economic, and other types of scientific research on water resources issues in North Carolina. The text should be submitted as a hard copy and a 3½" computer disk in Word for Windows or WordPerfect format. The abstract should include the title of the presentation, authors' names and affiliations, full addresses, telephone numbers, and e-mail addresses. Space will also be provided for a poster session.

Send abstracts to:

2000 Annual Water Resources Research Conference
Campus Box 7912, NCSU
Raleigh, North Carolina 27695-7912

For more information contact Robert Holman: VOICE: (919) 515-2815; FAX: (919) 515-2839; email Robert_Holman @ncsu.edu. The final agenda and registration form for the conference will be mailed in mid-January 2000.

NRCS water quality monitoring training available

The Natural Resources Conservation Service has a self-paced training course on the design of water quality monitoring available to the public free of charge. The focus of the course is designing chemical monitoring systems to evaluate the effectiveness of nonpoint source control conservation practices in agricultural settings, but the principles and procedures are more generally applicable.

The following website provides information on registration and testing: http://www.ftw.nrcs.usda.gov/nedc/homepage.html.

Participants scoring 95+ on the web site pre-test will receive a Certificate of Competency from NRCS. Participants scoring below 95 will receive the instructional materials for self-study. The materials consist of the NRCS National Handbook of Water Quality Monitoring, a video, and student workbook.

Approximately sixteen hours of concentrated study are required to complete the course. The post-test must be taken within 90 days of registration.

North Carolina Precipitation/Water Resources

	September	October
Rainfall (+/- average)		
Asheville	2.20" (-1.67")	3.31"(-0.28")
Charlotte	4.26" (+0.76")	5.47"(+2.11")
Greensboro	8.62" (+5.10")	2.32"(-1.18")
Raleigh	21.79" (+18.60")	2.46"(-0.40")
Wilmington	23.45" (+18.41")	3.81"(+1.12")

Streamflow **Index Station** (County, Basin)	**September mean flow (CFS)** (% of long-term median)	**October mean flow (CFS)** (% of long-term median)
Valley River at Tomotla (Cherokee, Hiwassee)	49 (57%)	54 (66%)
Oconaluftee River at Birdtown (Swain, Tenn)	150 (63%)	207 (86%)
French Broad River at Asheville (Buncombe, FB)	391 (36%)	913 (64%)
South Fork New near Jefferson (Ashe, New)	143 (57%)	158 (44%)
Elk Creek at Elkville (Wilkes, Yadkin/Pee-Dee)	30 (66%)	33 (54%)
Fisher River near Copeland (Surry, Yadkin/Pee-Dee)	86 (85%)	-- (--%)
South Yadkin River near Mocksville (Rowan, Yadkin/PD)	74.6 (42%)	110 (61%)
Rocky River near Norwood (Stanly, Yadkin/Pee-Dee)	647 (224%)	1,575 (724%)
Deep River near Moncure (Lee, Cape Fear)	3,517 (940%)	1,786 (733%)
Black River near Tomahawk (Sampson, Cape Fear)	6,440 (1,848%)	4,655 (2,033%)
Trent River near Trenton (Jones, Neuse)	---- ----	1,155(2,902%)
Lumber River near Boardman (Robeson, Lumber)	4,780 (710%)	5,466 (1,094%)
Little Fishing Creek near White Oak (Halifax, Pamlico)	---- ----	326 (982%)
Potecasi Creek near Union (Hertford, Chowan)	---- ----	916 (6,026%)

Groundwater **Index well (Province)**	**September depth below surface (ft)** (departure from average for month)	**October depth below surface (ft)** (departure from average for month)
Blantyre (Blue Ridge)	34.69 (-2.99)	6.54 (-1.18)
Mocksville (Piedmont)	18.87 (-1.30)	18.86 (-1.12)
Simpson (Coastal Plain)	2.39 (+3.26)	3.09 (+2.47)

Source: U.S. Geological Survey's *Water Resources Conditions in North Carolina*

CALL FOR PAPERS

The American Institute of Hydrology will convene an international conference on

Atmospheric, Surface and Subsurface Hydrology and Interactions

November 5-8, 2000
Sheraton Imperial Hotel and Convention Center
Research Triangle Park, NC

This conference will highlight complex air, land, and water resources interactions. Technical sessions are planned for deterministic and stochastic modeling of transport processes throughout the hydrologic cycle; management of uncertainty, incorporation of decision-analysis methods; using the total maximum daily load (TMDL) process for water quality based decision, and using the TMDL to address habitat degradation. Other topics of focus include interactions between the engineered man-made environment and nature (e.g., the impacts of urbanization on water quality and flooding, and associated planning); surface-ground water interactions in supply planning, conjunctive management of surface and ground water quality in watershed-scale management, and atmospheric-surface interactions.

Papers are sought that embrace the watershed/airshed approach to environmental hydrology and integrated modeling.

For additional information contact the planning committee chairman, Miguel Medina at miguel.medina@duke.edu or (919) 660-5195.

Publications

The N.C. Stream Restoration Institute at N.C. State University is producing a series of fact sheets related to the use of natural channel design in restoring impaired streams. To date two fact sheets have been published: #1 *Natural Stream Processes* and #2 *Application of the Rosgen Stream Classification System to North Carolina*. For information on obtaining the fact sheets contact Will Harman at (919) 515-8245 or will_harman@ncsu.edu.

The American Water Resources Association has published *Human Dimensions of Watershed Management*, a collection of 19 papers dealing with locally led watershed management initiatives in the United States. According to AWRA, the "grassroots" watershed management movement is a social phenomenon that raises a number of questions addressed in this collection of papers. The 202-page soft-cover book is available for $20.00 for members and $25.00 for non-members from American Water Resources Association, P.O. Box 1626, Middleburg, VA 20118-1626 or (540) 687-8390 or info@awra.org.

Conferences and workshops

Using Conservation Buffers in Urbanizing Landscapes National Conference May 9-11, 2000, Arbor Day Farm/Lied Conference Center, Nebraska City, Nebraska. Conservation buffers, commonly used practices on cropland, have widespread application in urban areas as well for flood control, for water quality improvement, for fish and wildlife habitat enhancement, for aesthetic and other purposes. This conference will examine uses of conservation buffers in urban and suburban landscapes, including design, installation and maintenance, and provide numerous case studies of successful urban and suburban buffer programs. For more information email conferences@arborday.org.

Erosion and Sediment Control Design Workshops. February 8-9, Sheraton Grand, New Bern; March 14-15, Holiday Inn Select, Hickory. Sponsored by the N.C. Division of Land Resources, Land Quality Section, the N.C. Sedimentation Control Commission, and WRRI. Topics include Sedimentation Pollution Control Act regulatory update, engineering planning, new technologies, vegetative cover, channel design, pipe and dissipater design, and 401/404 regulations. PDH's available for engineers and land surveyors. Registration: $100 **REGISTRATION DEADLINE: Jan 25, 2000, for New Bern workshop; Feb 29, 2000, for Hickory workshop. For** a registration form and draft agenda, visit website: http://www2.ncsu.edu/ncsu/CIL/WRRI/s&eworkshops.html

Websites

The Carolinas Chapter of the **Society of Environmental Toxicology and Chemistry** has announced its new website at http://www.csetac.org.

The **Social Sciences Institute (SSI) of the Natural Resources Conservation Service** (NRCS) has developed a Social and Economic Data Access Site: http://people.nrcs.wisc.edu/customdata/. The site provides conservation professionals with:

* direct access to standard social and economic data sets from multiple sources
* the ability to create their own custom subset of social and economic data elements for a geographic area
* basic training materials on using social and economic data to more effectively provide conservation to landowners
* access to thematic maps showing social and economic indicators at the county and sub county level.
* the knowledge and tools to help them build profiles describing their own counties. These profiles may be used to make presentations to the public, more effectively market conservation, and to assess the rapidity with which new practices may be adopted in their area.

1999-2000 Water Resources Research Seminar Series

Presentations take place in the Ground Floor Hearing Room of the Archdale Building in downtown Raleigh or in Room 1132 of Jordan Hall on the N.C. State University campus. Presentations begin at 3 pm unless otherwise noted. This schedule is also posted on the WRRI website, and any changes will be posted there. (http://www2.ncsu.edu/ncsu/CIL/WRRI/2000seminars.html) For additional information contact Associate Director Robert Holman at (919) 515-2815 or Robert_Holman @ncsu.edu.

Monday, Nov 22, 1999, Archdale
Examination of Long-Term Nutrient Data in the Neuse River Watershed
Professor Craig Stow, Duke Univ Nicholas School of the Environment

Tuesday, Jan 18, 2000, Jordan
Algal, Bacteria, and BOD Responses to Nutrient Gradients in Coastal Plain Watersheds
Research Associate Michael Mallin, UNC-Wilmington Center for Marine Science Research

Monday, Feb 21, 2000, Archdale
Predicting Long-term Wetland Hydrology Using Hydric Soil Field Indicators
Professor Michael Vepraskas, NC State Univ Dept Soil Science

Monday, Mar 27, 2000, Jordan
Soil Processes Impacting Groundwater Quality in the North Carolina Piedmont: Contamination by Organic Agrochemicals
Asst Professor Dharni Vasudevan, Duke Univ Nicholas School of the Environment

Monday, April 24, 2000, Archdale
Impact of Sediment Processes on Water Quality in the Neuse River Estuary
Asst Professor Marc Alperin, UNC-Chapel Hill Dept Marine Science

Monday, May 22, 2000, Jordan
Benefits of Quality Improvements in N.C.'s Water Resources
Asst Professor Dan Phaneuf, NC State Univ Dept Agricultural and Resource Economics

North Carolina Water Resources Association

NCWRA

North Carolina Section of the American Water Resources Association

Luncheon and Forum Schedule

Dec 6, 1999	Cape Fear Basin: Water Quantity Issues
Feb 14, 2000	Mitchell River Watershed: Case Study
April 10, 2000	Capacity Use
Sept 11, 2000	Land Use Planning

All luncheon/forums take place at 11:30 am at the Jane S. McKimmon Center on the N.C. State University campus. For additional information call Robert Holman at WRRI (919/515-2815).

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