

## Deadlines loom for actions under 2008 drought bill

by Jeri Gray

July 1, 2009, is the deadline for all public water systems and large community water systems to require separate metering for new in-ground irrigation systems connections. This requirement was imposed by Session Law 2008-143 (H 2499 Drought/Water Management Recommendations).

July 1, 2009, is also the deadline for public water systems that want to be eligible for state grants and loans for extending water lines or expanding water treatment capacity to meet 6 additional requirements, although the deadline may be extended for at least one of the requirements. (These requirements do not apply to water system funding received through the American Recovery and Reinvestment Act of 2009, or the “Stimulus Bill.”)

Under SL 2008-143, to receive grants or loans funded either entirely or partly by state appropriated funds, public water systems must:

- Have a water supply plan that has been approved by the Division of Water Resources.
- Implement a water conservation education program and a leak detection and repair program.
- Meter all uses that are practical to meter.
- Adopt a water rate structure that is adequate to operate, maintain, and repair the system during drought conditions when revenue will be reduced as well as under normal operation conditions.
- Adopt a rate structure in which

water does not cost less as use increases (that is, no declining block rate structures).

- Consider whether reclaimed water can be used to meet some water demand in the future.

### Guidance to be provided

At the meeting of the State Water Infrastructure Commission (SWIC) on May 15, the Department of Environment and Natural Resources (DENR) unveiled drafts of documents that will be provided to water system operators to help them comply with some of the requirements of SL 2008-143. The Division of Water Resources (DWR) and the Public Water Supply Section have drafted respectively:

- A form that water systems can use to certify that they have met the requirement to complete a comprehensive evaluation of the potential for use of reclaimed water.

- Guidelines for meeting the leak detection and repair requirement.

### Deadline for adequate rate structure requirement to be extended

At the SWIC meeting in May, Robin Smith, DENR Assistant Secretary for Environment, said that the department will ask the General Assembly to extend for one year the requirement for an adequate rate structure (as detailed in G.S. 143.355.4 Water System Efficiency).

The statute requires that funding agencies “shall apply guidelines developed by the State Water Infrastructure Commission in determining the adequacy of the water rate structure to support operation and maintenance of the system.”

The study that SWIC has commissioned to determine adequate rate structures has not yet been completed, so guidelines cannot yet be provided to water systems. Therefore, a deadline extension will be requested.

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## SWIC addresses High Unit Cost Threshold for water system grants

In order to qualify for state grants for water and wastewater infrastructure—funding that does not have to be repaid—North Carolina water and/or wastewater systems must meet an affordability test: Their rates must exceed the “high unit cost (HUC) threshold.”

However, an analysis conducted by the Environmental Finance Center (EFC) at UNC-Chapel Hill makes it clear that under the current criteria, many—if not most—North Carolina communities already exceed the affordability threshold.

Since 1998 the high unit cost threshold for combined water and sewer services has been 1.5% of local median household income (MHI) for water and sewer or 0.75% of MHI for water or sewer only. The EFC study revealed that using these HUC criteria, 67% of the state’s water systems would qualify for grants. This indicates that systems that could afford to repay loans may instead apply for grants, thereby reducing the amount of grant funding available for systems in greater need.

Indeed, a recent report by the General Assembly’s Program Evaluation Division says that state funding for water and sewer through bond projects has been skewed in the direction of grants rather than loans, limiting the state’s ability to “optimize scarce state dollars.”

Recognizing the need to use grant funding more effectively, SWIC undertook to determine whether the HUC should be increased. SWIC considered a number of scenarios for directing grant funds to areas of greatest need and at its May 15 meeting, adopted a

resolution recommending to the General Assembly a change in the HUC. The recommendation is to:

- Increase the HUC threshold to 2.0% for combined water and wastewater systems and 1.0% for only water or only sewer systems having a poverty rate of less than 12.3% or the most recent poverty rate for the State of North Carolina available from the decennial census.
- Retain the current HUC thresholds for systems with a poverty rate of 12.3% or greater.

The new criteria are to be effective July 1, 2010. Using these criteria for combined water and sewer systems, 56% of N.C. water systems would still qualify for grants.

### Draft special budget provisions in the House Appropriations Subcommittee on Natural and Economic Resources address water infrastructure

Following are some of the draft special budget provisions that will be considered by the House Appropriations Subcommittee on Natural and Economic Resources before making recommendations to the full Appropriations Committee early in June:

- The State Water Infrastructure Commission (SWIC) is directed to develop a statewide

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## Use asset management to meet challenges in water utility operations



People. Performance. Excellence.

### Progress Energy Water Resources Seminar

“Don’t be parochial in your views,” Chuck Clarke warned water managers at the Progress Energy Water Resources Seminar in April.

Clarke was formerly director of Seattle Public Utilities, and his presentation at NCSU’s McKimmon Center reviewed the change in organizational culture brought about during his tenure in Seattle.

Clarke’s warning about parochialism came in his discussion of benchmarking. He said that when, as director of Seattle Public Utilities, he set out to identify water management best practices to serve as benchmarks for his system, his search led him—not to another U.S. utility—but to Australia, where extended drought has forced a nationwide “reformation” of water planning and management.

Exchanging ideas with Australia and New Zealand, he said, showed him that his system needed to be organized around asset management, defined as “meeting agreed customer and environmental service levels while minimizing service costs.”

Using benchmarks established by the Water Services Association of Australia, he also determined that his system needed to be more transparent, better at communicating with customers, more focused on risk management, simpler organizationally, better with forward planning, more sophisticated in system modeling, and more innovative.

Clarke advocates a customer-service centered operation. This means communicating with customers and finding out what they really want and letting expected service levels drive capital and operational investments. If customers know the cost of a zero failure rate, will they opt for a small risk of service interruption?

He also advocates meeting expected levels of service through risk management that is underpinned by thorough knowledge of system infrastructure and consequences of failure.

Finally, he said, performance should be measured and tracked, customers should receive reports on performance, and benchmarking should be used to insure accountability.

Clarke also warned about oversimplified water demand forecasting, noting that increasing supply to meet the demand forecasts for Seattle in the 1960’s and 1970’s would have led to unneeded reservoirs and misspent money. He advocates use of economic models that yield probabilistic results rather than trend or per capita forecasting.

“Demand doesn’t always follow population growth,” he said, showing graphs that revealed a decline in water demand in Seattle of 27 million gallons per day at the same time population increased from 1 million to 1.4 million. He emphasized that drivers and influences on demand must be refined and that systems must know their own particular demand elasticity.

In January 2009 Clarke left Seattle Public Utilities to become CEO of Cascade Water Alliance. Cascade Water Alliance is a consortium of eight municipalities and water districts in the Puget Sound region of Washington that is embarking on a major regional

planning process to determine how best to bring water to 370,000 residents and 22,000 businesses over the next several decades.

Reports and the slides from Clarke’s presentation may be accessed on the WRRRI website at <http://www.ncsu.edu/wrri/events/progressenergyseminars/index.html>

You may watch the webinar of Clarke’s presentation at: <http://mediasite.eos.ncsu.edu/Mediasite/Viewer/?peid=c20c0602922d4faf8cd09878c074d1ee>

### **Draft continued from page 2**

strategic plan for water and wastewater infrastructure by May 1, 2010, and money is transferred from the Mercury Switch Removal Account to the Department of Environment and Natural Resources (DENR) to pay for development of the plan.

- The Department of Commerce, DENR, the Clean Water Management Trust Fund, and the Rural Economic Development Center are directed to work cooperatively with SWIC to develop a common first page for applications for grants and loans for infrastructure funds, conduct joint regular funders meetings, develop a process for sharing progress reports and information to improve oversight of state funded water infrastructure projects and provide water funding data to SWIC for a single annual report to the General Assembly on state investments in water infrastructure.

# May action of the N.C. Environmental Management Commission

## Water Allocation Committee

The Water Allocation Committee of the N.C. Environmental Management Commission (EMC) met on May 13 and took the following action:

- Voted to send to the full EMC a request to hold a public hearing on an interbasin transfer petition from the Greenville Utilities Commission.
- Heard an update on an interbasin transfer petition from the Kerr Lake Regional Water system to increase a grandfathered 10 MGD transfer from the Roanoke River Basin to 24 MGD, and to transfer 2.4 MGD from the Roanoke to the Neuse River Basin. A draft EIS is expected for agency review early in 2010.
- Heard an update on an interbasin transfer petition from Brunswick County Public Utilities. The county has asked to increase its transfer of water from the Cape Fear Basin to the Shallotte River Basin (in the Lumber Basin) to 18.35 MGD and its transfer from the Cape Fear to the Waccamaw River Basin (in the Lumber Basin) to 0.94 MGD. A draft EIS is expected in early 2010.
- Heard an update from Tom Reeder, Director of the Division of Water Resources (DWR), on water resources legislation in the General Assembly. Reeder reported that:
  - H 802 and S 833 aimed at aligning the river basin programs of DWR and the Division of Water Quality by re-delineating river basins had been withdrawn. Reeder said that the bills would reduce from 38 to 17 statutory basins subject to interbasin transfer requirements. He said there was perception that the bill would reduce protection for source basins

and that the General Assembly “wanted to keep the bar high for interbasin transfers.”

- Neither S 907 nor H 1101, The Water Resource Policy Act of 2009, which would set up a statewide water withdrawal permit system, had been considered in committee as of that date (May 13, only one day before the crossover deadline). However, Reeder said the bill is not subject to crossover because money is involved (permit fees).
- That an amended version of H 1337, Water Resources Improvement Act of 2009, had received a favorable report in the House Water Resources and Infrastructure Committee. The bill would create a cost share program under the N.C. Soil and Water Conservation Commission to help landowners increase water storage capacity, develop and improve water resources, and adopt water efficient equipment or practices. The bill is not subject to crossover.

## Water Quality Committee

The Water Quality Committee of the EMC met on May 13 and took the following action:

- Removed from the agenda the request to send the Neuse River Basin Water Quality plan to the full EMC for approval. This action postponed for the second time consideration of the final plan. See discussion of this item under the EMC report.
- Approved an after-the-fact major variance from the Neuse River Riparian Area Protection Rules for Voller Properties for piping without approval 180 feet of stream

in Cary. The developer has paid \$9,600 for mitigation.

- Reviewed a draft of a Frequently-Asked-Questions sheet designed to educate landowners, developers and others about regulations concerning trout buffers. The draft sheet can be found in Sediments, the newsletter of the N.C. Sedimentation Control Commission: [http://www.bae.ncsu.edu/programs/extension/wqg/sediments\\_may09.pdf](http://www.bae.ncsu.edu/programs/extension/wqg/sediments_may09.pdf)
- Heard a report on public comments on a new Division of Water Quality policy requiring mitigation for impacts to intermittent streams. Larry Eaton of DWQ’s Wetlands Branch said that DWQ plans to publish a public notice of guidelines within the next week with a 60-day phase-in period to require 1:1 mitigation for impact to intermittent streams greater than 150 ft.

## Environmental Management Commission

The EMC met on May 14 and in a marathon meeting took the following action:

- After a full hour of presentations and discussion, declined to issue a Declaratory Ruling on the applicability of the open burning nuisance regulation in a dispute between neighbors.
- Declined to issue a Non-Binding Interpretive Ruling on the validity of buffer requirements imposed by DWQ in an area in Union County identified as habitat for the Heel-splitter Mussel. The ruling was requested by Longview South Development, which held that DWQ

**EMC continued on page 5**



**EMC continued from page 4**

does not have authority to impose buffer rules to protect a federally endangered species unless a specific management plan for the area has been adopted. Bradley Bennett of DWQ said the division believes that because it is mandated to protect existing uses of water bodies, it should apply requirements adopted to protect the mussel in the Goose Creek watershed (which is the only mussel habitat protection plan developed by DWQ) to other areas with the same species. The EMC agreed with staff and declined to issue the ruling.

- Voted to delay amending the air quality emissions reporting to add greenhouse gases (GHG). The proposed rule resulted from a study mandated by the Clean Smokestacks Act of 2002. It had undergone public hearings and hearing officers' review. The hearing officers disagreed on a recommendation, with commissioner Marion Deerhake recommending adoption and commissioner Steven Weber recommending that the rule be delayed until after the close of the 2009 General Assembly. Weber argued that a bill pending in the General Assembly (S 866) could prohibit new rules that impose costs except under certain circumstances, including in response to federal a regulation, and that EPA is currently considering a GHG reporting regulation. "There's a struggle as to who's the environmental policymaker in the state, and we don't want to be out front if the General Assembly's working on an issue," said Weber. He argued that nothing would be lost by delaying the rule, and a majority of the commission agreed.
- Voted to adopt changes that would require coal-fired power plants and other "combustion sources" to comply with N.C.'s health-based air toxics rules. Once again, commissioner Deerhake and commissioner Weber disagreed. Weber argued that EPA is close to promulgating a "maximum achievable control technology (MACT)" rule for these sources and that implementing a state rule before the federal rule is known could impose an economic burden on regulated sources. Deerhake argued that the federal rule is technology based and allows consideration of economic factors while the state's rule is health-based and aimed at protecting people living near the sources. This time Deerhake prevailed.
- Voted to withdraw previously adopted amendments to the air quality municipal waste combustor rules. The rules will be modified and re-proposed.
- Reclassified the watershed of the lower portion of the Horsepasture River in Jackson and Transylvania counties from a point approximately 0.60 miles downstream of N.C. 281 (Bohaynee Road) to the NC-SC state line as Outstanding Resource Waters (Class B Trout ORW) and adopted a special management strategy for the upper watershed to protect outstanding resource values found throughout the entire Horsepasture River watershed.
- Heard from Chairman Stephen Smith that consideration of the Neuse River Basinwide Water Quality Plan had been removed from the agenda to allow consideration of additional comments. Smith said that adoption of the plan had been postponed in January to allow the City of Raleigh time to review the final plan and make comments. A comment period had

been reopened and Raleigh had submitted 25 pages of comments. He said Raleigh had again asked for consideration of 4 more pages of comments. The agricultural community had also submitted additional comments. Smith said that he has asked Commissioner David Moreau to bring Raleigh, the Division of Water Quality, and the agricultural community together to negotiate differences. He said the plan WILL be considered in July.

- Approved holding public hearings on the Greenville Utility Commission interbasin transfer petition. Specifics about this and other IBT petitions can be found on the Division of Water Resources website: [http://www.ncwater.org/Permits\\_and\\_Registration/Interbasin\\_Transfer/index.php?tabid=0](http://www.ncwater.org/Permits_and_Registration/Interbasin_Transfer/index.php?tabid=0)

### Site contaminating South Fork New River placed on Superfund list

The Ore Knob Mine site located near Laurel Springs in Ashe County, NC, was placed on EPA's Superfund list in April 2009. The mine intermittently produced primarily copper ore from the 1850s to 1962. Tailings piles, contaminated soil and four mine adits that discharge low pH water are located at Ore Knob. Acid mine drainage from the three principal source areas has degraded downstream waters, including the entire 1.5-mile length of Ore Knob Branch, the entire 2.25-mile length of Little Peak Creek, about 2.9 miles of Peak Creek from its confluence with Ore Knob Branch to its confluence with South Fork New River, and South Fork New River for an unknown distance downstream of Peak Creek. Info at: <http://www.epa.gov/superfund/sites/narr/nar1798.pdf>

## Environment-related bills alive in the N.C. General Assembly

May 14 was “crossover” deadline in the N.C. General Assembly. Bills that had not passed one house by that date are dead unless they involve money.

The following are among the environment-related bills passed by the House:

H 239 AN ACT TO PROVIDE FOR IMPROVEMENTS IN THE MANAGEMENT OF THE JORDAN WATERSHED IN ORDER TO RESTORE WATER QUALITY IN THE JORDAN RESERVOIR. Originally titled An Act to Disapprove the Jordan Water Supply Nutrient Strategy Rules, this bill has undergone two major revisions. The link is to the 3rd version.  
<http://www.ncga.state.nc.us/Sessions/2009/Bills/House/PDF/H239v3.pdf>

H 749 AN ACT TO AUTHORIZE THE STATE BUILDING CODE TO PERMIT THE USE OF CISTERNS TO PROVIDE WATER FOR FLUSHING TOILETS AND FOR OUTDOOR IRRIGATION IN THE CONSTRUCTION OR RENOVATION OF RESIDENTIAL OR COMMERCIAL BUILDINGS OR STRUCTURES AND TO PROHIBIT ANY STATE, COUNTY, OR LOCAL BUILDING CODE OR REGULATION FROM PROHIBITING THE USE OF CISTERNS FOR THESE USES.  
<http://www.ncga.state.nc.us/Sessions/2009/Bills/House/PDF/H749v2.pdf>

H 789 (= S 586) AN ACT TO REQUIRE THE FILING OF NOTICE OF PENDING LITIGATION FOR ACTIONS SEEKING INJUNCTIVE RELIEF REGARDING SEDIMENTATION AND EROSION CONTROL FOR ANY LAND-DISTURBING ACTIVITY THAT IS SUBJECT TO THE REQUIREMENTS OF ARTICLE 4 OF CHAPTER 113A OF THE GENERAL STATUTES.  
<http://www.ncga.state.nc.us/Sessions/2009/Bills/House/PDF/H789v1.pdf>

H 1099 AN ACT TO AMEND CERTAIN ENVIRONMENTAL AND NATURAL RESOURCES LAWS TO: (1) REPEAL THE REQUIREMENT THAT SEASONAL STATE PARK EMPLOYEES WEAR A UNIFORM VEST; (2) REQUIRE ELECTRONIC REPORTING OF ENVIRONMENTAL LEAD TEST RESULTS AND BLOOD LEAD TEST RESULTS; (3) CLARIFY THE FEE STRUCTURE FOR FOOD AND LODGING PERMITS; (4) REVISE THE SUNSET PROVISION FOR NUTRIENT OFFSET PAYMENTS; (5) AMEND THE SOLID WASTE DISPOSAL TAX TO STREAMLINE THE PROCESS WHEN A LOCAL GOVERNMENT IS SERVED BY A SOLID WASTE MANAGEMENT AUTHORITY; AND (6) EXTEND BY ONE YEAR THE DEADLINE FOR THE DEVELOPMENT AND IMPLEMENTATION OF A NUTRIENT MANAGEMENT STRATEGY FOR CERTAIN DRINKING WATER SUPPLY RESERVOIRS. Extends to July 2010 the deadline for the EMC to adopt a nutrient management strategy for the Falls Lake Reservoir.  
<http://www.ncga.state.nc.us/Sessions/2009/Bills/House/PDF/H1099v3.pdf>

H 1100 AN ACT TO DIRECT THE DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES TO ESTABLISH STORMWATER CONTROL BEST MANAGEMENT PRACTICES AND PROCESS WATER TREATMENT PROCESSES FOR COMPOSTING OPERATIONS FOR THE PURPOSE OF PROTECTING WATER QUALITY. Applies to facilities permitted by DWQ and Division of Waste Management. Requires a new permitting process. Requires DWQ to convene a Compost Operation Stakeholder Advisory Group to provide input.  
<http://www.ncga.state.nc.us/Sessions/2009/Bills/House/PDF/H1100v3.pdf>

H 1236 AN ACT TO PROMOTE VOLUNTARY, YEAR-ROUND WATER CONSERVATION AND WATER USE EFFICIENCY MEASURES BY COMMERCIAL AND INDUSTRIAL WATER USERS. Provides that a trade or professional organization representing industrial or commercial water users may establish a water efficiency certification program and that users certified under the program shall receive credit for their water use reduction under drought regulations.  
<http://www.ncga.state.nc.us/Sessions/2009/Bills/House/PDF/H1236v3.pdf>

H 1399 AN ACT TO PROVIDE THAT CIVIL PENALTIES OF UP TO ONE THOUSAND DOLLARS MAY BE ASSESSED FOR VIOLATION OF CAPACITY USE AREA LAWS.  
<http://www.ncga.state.nc.us/Sessions/2009/Bills/House/PDF/H1399v3.pdf>

H 1429 AN ACT TO MAKE CERTAIN CLARIFICATIONS REGARDING THE IMPROVEMENTS TO DROUGHT PREPAREDNESS AND RESPONSE IN NORTH CAROLINA MADE BY THE 2008 SESSION OF THE GENERAL ASSEMBLY. Makes clear that local governments and public or private water systems cannot regulate private wells not connected to their systems.  
<http://www.ncga.state.nc.us/Sessions/2009/Bills/House/PDF/H1429v2.pdf>

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## Environmental Legislation *continued from page 6*

The following are among environment-related bills passed by the Senate:

**S 778 AN ACT TO AMEND THE GENERAL STATUTES TO PROVIDE THAT MAJOR DEVELOPMENTS SUBJECT TO PERMITTING UNDER THE COASTAL AREA MANAGEMENT ACT ARE EXEMPT FROM THE ENVIRONMENTAL POLICY ACT.**

<http://www.ncga.state.nc.us/Sessions/2009/Bills/Senate/PDF/S778v2.pdf>

**S 866 AN ACT TO LIMIT NEW AGENCY REGULATORY REQUIREMENTS.**

Provides that an agency may not adopt a rule that results in additional costs on persons subject to the rule unless adoption of the rule is required to respond to at least one of the following:

(a) A serious and unforeseen threat to the public health, safety, or welfare. (b) An act of the General Assembly or United States Congress. (c) A change in federal or State budgetary policy. (d) A federal regulation. (e) A court order.

<http://www.ncga.state.nc.us/Sessions/2009/Bills/Senate/PDF/S866v1.pdf>

**S 832 AN ACT TO PROVIDE THAT THE COASTAL RESOURCES COMMISSION MAY AUTHORIZE THE CONSTRUCTION OF A TERMINAL GROIN BY VARIANCE IF CERTAIN CRITERIA ARE MET.** Provides that the CRC may permit terminal groins to control sediment entering an inlet channel. Provides that the permittee must perform an environmental impact statement and that a permittee (other than federal state or local government) must provide financial assurance that the groin can be removed if it has an adverse impact on the environment.

<http://www.ncga.state.nc.us/Sessions/2009/Bills/Senate/PDF/S832v2.pdf>

**S 1018 AN ACT TO REDUCE PLASTIC AND NONRECYCLED PAPER BAG USE ON NORTH CAROLINA'S OUTER BANKS.** This bill was originally meant to apply statewide but was turned into a pilot program.

<http://www.ncga.state.nc.us/gascripts/BillLookup/BillLookup.pl?Session=2009&BillID=s1018>

**S 567 AN ACT TO PROMOTE THE USE OF ELECTRICITY DEMAND REDUCTION TO SATISFY RENEWABLE ENERGY PORTFOLIO STANDARDS.** Defines "electricity demand reduction" and adds it to the ways in which electrical utilities may meet the Renewable Energy and Energy Efficiency Portfolio Standard.

<http://www.ncga.state.nc.us/Sessions/2009/Bills/Senate/PDF/S567v3.pdf>

**S 141 AN ACT TO REQUIRE THE COMMISSION FOR PUBLIC HEALTH TO ADOPT RULES CONCERNING WHEN TESTING FOR VOLATILE ORGANIC COMPOUNDS IN NEWLY CONSTRUCTED PRIVATE DRINKING WATER WELLS IS REQUIRED, AND TO LIMIT DRINKING WATER TESTING FOR THE PRESENCE OF VOLATILE ORGANIC COMPOUNDS IN ACCORDANCE WITH THOSE RULES.** (H 163 has been amended in the House to be identical to this bill.)

<http://www.ncga.state.nc.us/Sessions/2009/Bills/Senate/PDF/S141v2.pdf>

**S 925 AN ACT TO PROVIDE THAT THE DECEPTIVE MISREPRESENTATION OF NORTH CAROLINA NATURAL SPRING WATER THAT IS OFFERED FOR SALE BY A BUSINESS IS AN UNFAIR TRADE PRACTICE.** Basically says that water that doesn't come from a natural spring can't be called spring water.

<http://www.ncga.state.nc.us/Sessions/2009/Bills/Senate/PDF/S925v1.pdf>

### **Ratified Bill**

The following bill has been passed by the General Assembly and signed into law by the governor.

**S 89/ S.L. 2009-12 AN ACT TO AUTHORIZE THE ADDITION OF GRANDFATHER MOUNTAIN STATE PARK TO THE STATE PARKS SYSTEM.**

<http://www.ncga.state.nc.us/Sessions/2009/Bills/Senate/PDF/S89v4.pdf>



# The Neuse Hydrologic Observatory: Grand challenges spawn grand visions

In 2001, the National Research Council (NRC) released *Grand Challenges in Environmental Sciences 2001*. This report was written in response to a request from the National Science Foundation (NSF) for NRC, drawing on expertise from across the environmental sciences, to identify the most important environmental research challenges of the next generation.

The NRC Committee on Grand Challenges in Environmental Sciences was asked to identify the areas most likely to yield results of major scientific and practical importance in responding to stresses on ecosystems brought about by rapid increases in human population. One of the eight challenges NRC identified was hydrologic forecasting.

Said the report, “The challenge is to develop an improved understanding of and ability to predict changes in freshwater resources and the environment caused by floods, droughts, sedimentation, and contamination. Important research areas include improving understand-

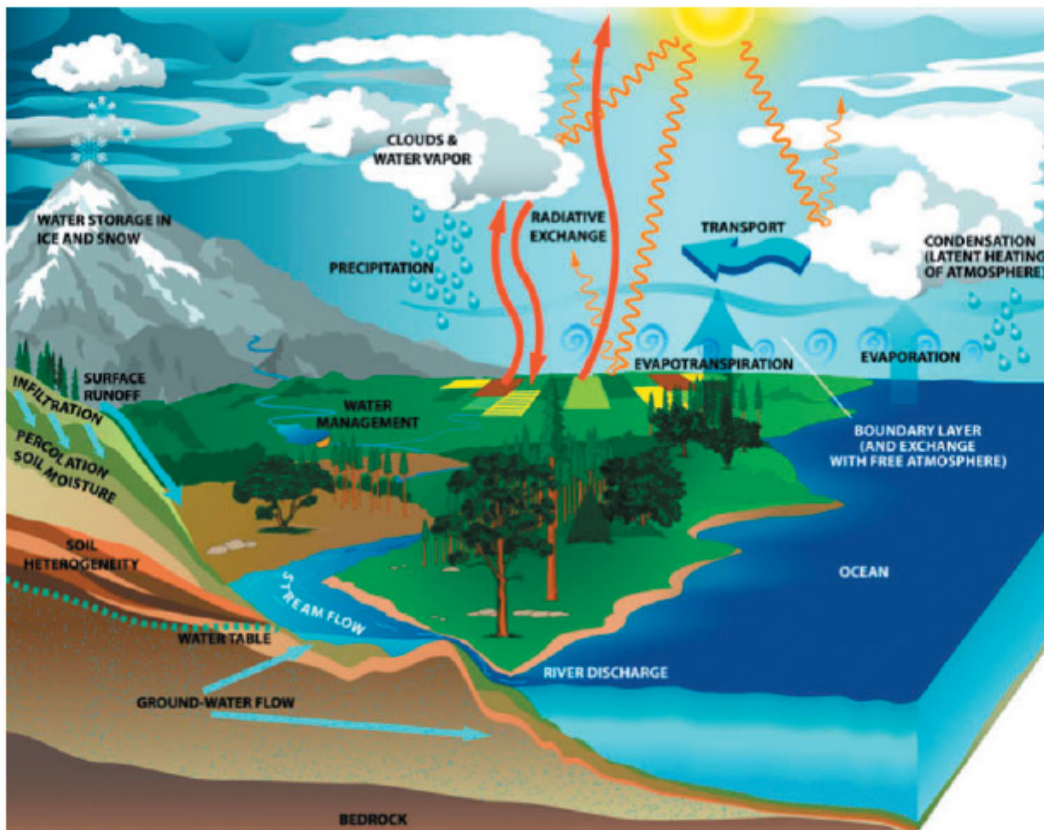
ing of hydrologic responses to precipitation, surface water generation and transport, environmental stresses on aquatic ecosystems, the relationships between landscape changes and sediment fluxes, and subsurface transport, as well as mapping groundwater recharge and discharge vulnerability.”

Fortunately, the report concluded, rapid increases in scientific capability make it possible for science to provide the needed predictive understanding of

tion for hydrological forecasting. The effort was first taken up by an NSF-funded organization calling itself CUAHSI for Consortium of Universities for Advancement of Hydrologic Science, Inc.

In a report soon to be available from WRRI, former director Kenneth H. Reckhow (Professor of Water Resources at Duke University) and colleagues describe what such an observatory for the Neuse River Basin

would involve. Under a CUAHSI grant, Reckhow pulled together a team of experts to determine the data that would be needed to construct a water budget sufficiently ecologically integrated and sensitive to answer questions such as, “Is the water budget of the Neuse River Basin and its subbasins changing and if so, where and how.”



*Conceptualization of the terrestrial water cycle and its interactions with all other components of the earth-climate system. (Climate Change Science Program 2003)*

hydrologic systems.

Thus began an effort in the scientific community to develop a national hydrologic observatory network to provide large-scale, comprehensive, and integrated physical, biological, chemical and social data and informa-

The report *Designing Hydrologic Observatories: A Paper Prototype of the Neuse Watershed* lays out the key science questions to ask about the hydrologic system as consisting of (1) the movement of surface water

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## Hydrologic Observatory continued from page 8

controlled by the landscape, (2) the movement of groundwater controlled by the hydraulic characteristics of the geology, and (3) atmospheric-soil-vegetation-water exchange controlled by climate and surface conditions. It also identifies the core data needed to answer the questions and provides an explanation of the observing strategy for each area, identifying equipment, sites, and measurements. It also estimates costs for constructing and operating the observatory.

Given the simpler water budget models being used now for basinwide water resource planning, the highly complex basin water budget conceptualized in this report and the observatory visualized to make it possible could seem far-fetched. For instance, is it possible to integrate into a basin water budget numerous system feedbacks such as the loop in which surface wetness controls surface temperature and water fluxes to influence atmospheric processes and the formation of clouds and precipitation within the region, and precipitation then influences surface wetness, which then . . . or the way in which increased precipitation from—say an EL Nino—increases soil moisture that results in enhanced vegetative growth that increases evapotranspiration and negates the impact of increased precipitation on groundwater recharge?

The answer is, given enough time and money, “yes.” Descriptions of monitoring technologies and advances in modeling do make the scientific project described in the report seem within the realm of possibility. What may not be within grasp is the \$9 million in capital cost and \$3 million in annual operating cost estimated for the observatory.

Under the CUAHSI program, a

## Voiland, Sea Grant director, appointed acting director of WRRRI

North Carolina Sea Grant Executive Director Michael Voiland has taken on additional duties as acting director of the University of North Carolina Water Resources Research Institute (WRRRI). Voiland will serve in the WRRRI role until a permanent director is named and in place.

“The university needed someone in an acting role while the search and hiring process for a new director ran its course. I was asked if I might help, and was happy to fill in,” Voiland said. “It’s a pleasure to work with the Institute’s veteran staff, and I appreciate the chance to learn more about a program structured similarly to Sea Grant.”

Both Sea Grant and WRRRI are located in the Flex Lab Building on Varsity Drive in Raleigh.

Voiland joined North Carolina Sea Grant in June 2006. He previously had served 30 years at Cornell University, including roles with New York Sea Grant and Cornell’s Cooperative Extension, Agricultural Experiment Station and Government Affairs Office.

In 2006-07, Voiland chaired the N.C. Waterfront Access Study Committee, which made recommendations to the N.C. General Assembly. As North Carolina Sea Grant executive director, he oversees the program’s research and outreach efforts on coastal topics.

number of hydrological observatories have been described across the nation, but none has been funded. An offshoot of CUAHSI, called WATERS is funding 11 “test bed sites”—two-year projects to test various aspects of observatory design and operation. One is the “Pamlico Sound and FerryMon,” which involves collection of continuous water-quality data capitalizing on regular ferry crossings in Pamlico Sound, NC. In addition, to advance the concept of integrated hydrological system study, CUAHSI has developed the CUAHSI Hydrologic Information System (CUAHSI-HIS) which provides web services, tools, standards and procedures that allow scientists to more easily share water observation data for hydrologic analysis (<http://his.cuahsi.org/>).

While we may not see the construction of a large-scale basin hydro-

logical observatory in the Neuse—or anywhere else—anytime soon, *Designing Hydrologic Observatories: A Paper Prototype of the Neuse Watershed* is intriguing for the hypotheses it poses relating to the hydrology of the Neuse River Basin, particularly those involving urban stormwater management, and it is important for identifying the range of advanced ecological monitoring and measuring technologies available to support sophisticated ecological research. It could certainly be mined for important individual research projects.

For those who would like to read the report right away, it can be downloaded from the CUAHSI website at: [http://www.cuahsi.org/publications/Neuse\\_Report\\_final.pdf](http://www.cuahsi.org/publications/Neuse_Report_final.pdf)

## Events

### NCWRA Forums/Luncheons

September 11, 2009  
Energy Conservation Measures  
McKimmon Center, Raleigh, NC

December 7, 2009  
Integrated Hazard Risk Management for  
Water Resources  
McKimmon Center, Raleigh, NC

February 22, 2010  
Israeli Water Technology  
McKimmon Center, Raleigh, NC

April 19, 2010  
Urban Stream Restoration  
Marshall Service Center, Charlotte, NC

<http://www.ncsu.edu/wri/events/ncwra/>

### 2nd International Conference on Forests and Water in a Changing Environment

September 14-16, 2009  
Raleigh, NC

Registration deadline: July 1, 2009  
<http://www.sgcp.ncsu.edu:8080/>

### 2009 NCAPWA Water Resources Conference Comprehensive Water Resources & Stormwater Management

September 28-29, 2009  
Wilmington, NC

[http://northcarolina.apwa.net/  
?MODE=EVENTS&id=4340](http://northcarolina.apwa.net/?MODE=EVENTS&id=4340)

### 2009 AWRA Annual Water Resources Conference

November 9-12, 2009  
Seattle, WA

<http://www.awra.org/meetings/Seattle2009/>

## SAVE THE DATE!

**March 30-31, 2010**  
**WRRI Annual Conference &  
NCWRA Symposium**  
**McKimmon Center**  
**Raleigh, NC**

**More information will be  
available in this fall:**

<http://www.ncsu.edu/wri/conference/>

## Information sources

Presentations from the 2009 North Carolina GIS Conference "Capitalizing on Spatial Data" available on the N.C. Center for Geographic Information and Analysis (CGIA) website include the following:

- "Evaluating Feature-Extracted Impervious Surfaces in Support of Stormwater Utility Billing," Nick Harvey, GISP, City of Asheville and Frank Obusek, NC CGIA.  
[http://204.211.239.202/NCGISConference2009/presentations/HarveyObusek\\_Friday\\_830.pdf](http://204.211.239.202/NCGISConference2009/presentations/HarveyObusek_Friday_830.pdf)
- "Analyzing Ground Water and Surface Water Data in Web Applications," Melinda Chapman and Chad Wagner, US Geological Survey.  
[http://204.211.239.202/NCGISConference2009/presentations/Wagner\\_Thursday245.pdf](http://204.211.239.202/NCGISConference2009/presentations/Wagner_Thursday245.pdf)
- "Land Cover Change in the Catawba River Watershed," Rodney Jackson, GISP, Central Piedmont Community College.  
[http://204.211.239.202/NCGISConference2009/presentations/Jackson\\_Rodney\\_Thursday\\_130.pdf](http://204.211.239.202/NCGISConference2009/presentations/Jackson_Rodney_Thursday_130.pdf)
- "Land Cover Change in the Catawba River Watershed," Rodney Jackson, GISP, Central Piedmont Community College.  
[http://204.211.239.202/NCGISConference2009/presentations/Wolfe\\_Thursday\\_130.pdf](http://204.211.239.202/NCGISConference2009/presentations/Wolfe_Thursday_130.pdf)