

L&S Water Power, Inc. et al. v. Piedmont Triad Regional Water Authority

Appeals court decision puts entities with eminent domain on notice

by Jeri Gray

In April, the N.C. Court of Appeals upheld a lower court ruling that the Piedmont Triad Regional Water Authority (PTRWA) owes five downstream hydroelectric producers compensation for their loss of generating capacity because, by constructing the Randleman Dam, it permanently reduced the flow of the Deep River. The decision is based on an interpretation of the riparian rights doctrine and application of the takings clause of the Fifth Amendment.

PTRWA was organized by Randolph County and the municipalities of Greensboro, High Point, Jamestown, Archdale and Randleman to develop a public water supply for the partners. In 1992, the N.C. Environmental Management Commission authorized PTRWA to use the power of eminent domain to condemn land to build the Randleman dam and reservoir and to transfer up to 30.5 million gallons of water per day from the Deep River Basin to the Haw and Yadkin river basins.

In 2008, as the reservoir was filling, a group of hydroelectric producers on the Deep River filed a complaint of inverse condemnation (law or rulemaking that prevents use of private property) and asserted that PTRWA had taken their riparian rights by permanently decreasing flow in the river. The case was heard in Guilford County Superior

Court, and in October 2009 the trial court handed down a decision agreeing with the hydroelectric producers. PTRWA appealed, and a Friend of the Court brief was filed by the N.C. League of Municipalities.

The Appeals Court agreed with the lower court's ruling that riparian rights held by owners of land bound or traversed by navigable water are vested property rights and that, under the Fifth Amendment, when an entity with eminent domain power exercises that power to take private property, it owes the owner of the property just compensation.

The court rejected PTRWA's contention that the "reasonable use" principle should apply. The reasonable use principle says that a riparian owner is entitled to the undiminished

natural flow of a stream "except as may be caused by the reasonable use of water by other riparian owners."

Said the court, "When the interference is effected by a government entity . . . the principle of reasonable use is superseded by the constitutional mandate of eminent domain."

According to the authors of a paper recently presented at a meeting of the N.C. Bar Association, the decision "appears, at least as a practical matter, to define the modern scope of water use and compensation in North Carolina." In their paper, Ryke Longest of the Duke University School of Law and Thomas Griffin of Parker, Poe, Adams & Bernstein say that the reasonable use principle still applies to private landowners who interfere

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Legislation makes big changes in environmental management and regulation in North Carolina

When the 2011 Session of the N.C. General Assembly adjourned on June 18th, lawmakers left behind legislation with far-reaching implications for the way the state's natural resources are managed and protected. Richard Whisnant, Professor of Public Law and Government in the UNC School of Government, says that the burdens imposed by new requirements for rulemaking may lead to agency paralysis.

The budget bill

In addition to reducing the budget and staff for almost all environmental activities, House Bill 200, "Current Operations and Capital Improvements Appropriations Act of 2011," made

extensive organizational changes affecting the Department of Environment and Natural Resources (DENR).

- DENR's Division of Soil and Water Conservation was transferred to the Department of Agriculture and Consumers Services (DACs). DSWC was given responsibility to implement a new Agricultural Water Resources Assistance Program, which will provide cost-share funding for development of agricultural water conservation BMPs and water storage. The bill sets aside \$1 million of DENR's budget for the new program.

- DENR's Division of Forest Resources, including state recreation *continued on page 3*

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with the flow of surface waters. They can be liable only if the interference is "unreasonable and causes substantial damage."

PTRWA has petitioned the N.C. Supreme Court for review. It is likely to be October before the Supreme Court announces the petitions it will grant.

If the Appeals Court decision stands, municipalities and other entities with eminent domain, such as electric utilities, that withdraw and do not return water (consumptive use) will find themselves facing uncertainty, said Richard Whisnant, Professor of Public Law and Policy with the UNC School of Government. The appeals court decision may provide an argument that entities with eminent domain are potentially liable to any riparian owner who can show and quantify injury from permanent de-

crease of flow of a river. The decision also implies that entities with eminent domain do not have the right to try to prove reasonable use in claims of damages. However, the decision does not address questions of how to establish natural flow or how far back a riparian owner can look to claim damages.

Whisnant, one of the principal investigators on the N.C. Water Allocation Study, said "It is as we said in the water allocation study report: If you let the courts decide questions of water rights, it will be unpredictable. It would be better to have an allocation process that would establish rights with certainty.

"In a way this decision is a return to natural flow doctrine," he said. "This is not the direction that surface water law has taken in the rest of the country."



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- ational forests, was transferred to DACS and is now known as the North Carolina Forest Service.
- DENR's Division of Environmental Health (DEH) was abolished.
 - DEH's vector and tick control programs were abolished.
 - DEH's Public Health Management Section was abolished.
 - DEH's onsite water protection program (onsite wastewater) was transferred to the Division of Public Health in the Department of Health and Human Services (DHHS).
 - DEH's radiation protection program was transferred to the Division of Health Safety Regulation in DHHS.
 - DEH's Public Water Supply program was transferred to the Division of Water Resources in DENR. The Division of Water Resources will now take applications for the Drinking Water State Revolving Fund. The DWSRF is now available to investor-owned utilities.
 - DEH's shellfish sanitation program was transferred to the Division of Marine Fisheries in DENR.
 - The budget bill requires review of DENR's regional offices, although what "review" entails is not specified.
 - The budget bill requires that the Division of Water Quality's Groundwater Investigation Unit bid to contract to provide well-drilling services to other divisions in DENR that need monitoring wells drilled. The purpose is to fully utilize the unit and reduce the need for contracts with private well drillers.
 - The budget bill adds to the section on DENR Civil Penalty Assessments a requirement that DENR extend by 10 days the time between when the violator is sent a notice of violation of an environmental statute or an environmental rule and the date the violator is sent an assessment of the civil penalty for the violation.
 - The budget bill directs DOT's Division of Motor Vehicles and DENR's Division of Air Quality to study exempting from emissions inspections (1) the three newest model year vehicles, (2) all vehicles. They are to study the impacts on emissions levels and air quality and whether the exemptions might make the state out of compliance with the State Air Quality Implementation Plan and air quality standards. They are to study the fiscal impacts of the exemptions on vehicle owners, inspection stations, DOT and DENR. A joint report is due March 1, 2012.
 - The budget bill redirects money from the Leaking Underground Storage Tank program to the Highway Fund for system preservation.
 - The budget bill had set limits on rule making by DENR, the Department of Labor and DACS by providing that no rule could be more stringent than a federal rule on the same subject and that if a rule has no federal "analog," then the agency must prepare and submit into the record of the rule making an evaluation of costs and benefits. However, S 781 repealed those sections and set its own limitations (see below).
- Legislation affecting rule-making**
- Senate Bill 781, The Regulatory Reform Act of 2011, repeals SL 2011-13 (Senate Bill 22 An Act to Limit New Agency Regulatory Requirements that Result in Substantial Additional Costs passed early in the legislative session) and sections of the budget bill setting limits on rule making and sets its own limitations on and new requirements for rulemaking by environmental agencies. Among the provisions of SB 781 are the following:
- An agency authorized to implement and enforce State and federal environmental laws may not adopt a rule for the protection of the environment or natural resources that imposes a more restrictive standard, limitation, or requirement than those imposed by federal law or rule, if a federal law or rule pertaining to the same subject matter has been adopted, unless adoption of the rule is required by one of the following: (1) a serious and unforeseen threat to the public health, safety, or welfare, (2) an act of the General Assembly or United States Congress that expressly requires the Department to adopt rules, (3) a change in federal or State budgetary policy, (4) a federal regulation required by an act of the United States Congress to be adopted or administered by the State, or (5) a court order. The law states specifically that this limitation applies to The Department of Environment and Natural Resources, Environmental Management Commission, Coastal Resources Commission, Marine Fisheries Commission, Wildlife Resources Commission, Commission for Public Health, Sedimentation Control Commission, Mining Commission, and Pesticide Board.
 - An agency shall not seek to implement or enforce a policy, guideline,

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or other nonbinding interpretive statement that meets the definition of a rule contained in G.S. 150B-2(8a) if the policy, guideline, or other nonbinding interpretive statement has not been adopted as a rule.

- Before a rule is published in the State Register, a fiscal note quantifying the costs and benefits to all parties must be prepared and approved by the rulemaking body. Rulemaking bodies must take public comment on the fiscal note as well as the proposed rule. If the proposed rule will have a substantial economic impact (\$500,000 per year) then the agency must consider two alternatives to the proposed rule and state the reason the alternatives were rejected. (It is not clear if fiscal notes must also be prepared for the alternatives.)
- If a proposed rule purports to implement the requirements of a federal law or is necessary to receive federal funds, a certification must be prepared identifying the federal law and explaining why it requires a state rule. The certification must be posted on the agency's website with the proposed rule and fiscal note.
- Before publishing in the State Register the text of a proposed rule that would require expenditure of State funds, an agency must submit the rule and fiscal note to the Office of State Budget (OSB), which must certify that the funds are available and that the rule complies with state policy. Agencies must also analyze costs to local governments of proposed rules and submit the analysis to OSB. OSB must prepare fiscal notes for agencies if an agency can show

that it has exhausted all resources internal and external to prepare the note.

- In "contested cases" challenging agency actions (such as issuance of a permit), agencies or their rulemaking bodies will no longer make the final decision. Final decisions will be made by the administrative law judges who hear the cases.
- Agencies must review existing rules annually to identify rules that are unnecessary, unduly burdensome or inconsistent with new state policy. OSB must establish a web portal and take public comment on rules that are unnecessary, unduly burdensome or inconsistent with new state policy. OSB is to forward comments to agencies and agencies are to prepare annual reports on whether any of the recommendations contained in the comments have potential merit and justify further action. OSB must track and post on its website progress on reforming rules.

Effects of new rule making requirements

Richard Whisnant of the School of Government said he thinks that the net effect of all the limitations on and requirements for rule making will be agency paralysis.

"These new requirements could make agencies disinclined to do rule-making," said Whisnant, "and that's not good for responsive government."

The requirement for preparation of a fiscal note before a rule is proposed, for instance, "is inherently problematic," according to Whisnant, who formerly served as general counsel to DENR. The final form of a proposed rule is decided through the public comment process and may

be different from the initial proposed rule. "How are you to know which version of the rule to analyze?" he asked. "If there are changes to the proposed rule, do you have to reanalyze the changes?"

Whisnant points out that the requirements for fiscal notes, considerations of alternatives, certifications, and review of existing rules will strain agency resources, which have also been reduced. He is particularly concerned about the extra burden that has been placed on the Office of State Budget, especially in regard to review of existing rules.

"OSB has been given a huge job and no additional staff. How they'll do it is a mystery," said Whisnant. "I think the General Assembly tried to create a way of pruning off dead rules, but it wasn't a thoughtful process. Any changes to existing rules will have to go through a rulemaking process that has just been made longer and more difficult."

In some cases the regulatory changes could delay rulemaking that the regulated community wants. For instance, in July the Environmental Management Commission granted a Petition for Rulemaking from Rhodia, Inc. to amend the groundwater quality standard for 1,1-dichloroethylene (1,1-DCE) and approved initiating rulemaking to change rules for establishing groundwater standards to eliminate the regulatory "catch 22" that has prevented the State from changing the standard for 1,1-DCE even though data indicate the current standard is unnecessarily stringent. Rhodia was quite eager to have the standard changed quickly to avoid expensive groundwater clean-up requirements. It now appears that relief for Rhodia will be delayed since the

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rulemaking will likely fall under the new regulatory requirements.

However, Whisnant said that, to him, the most interesting part of the Regulatory Reform Act is in the first section, which provides that an agency shall not try to enforce a policy, guideline, or other nonbinding interpretive statement that “meets the definition of a rule contained in G.S. 150B-2(8a) if the policy, guideline, or other nonbinding interpretive statement has not been adopted as a rule in accordance with this Article.”

“This has me confused,” he said. “Either the bill is just restating existing law or it is limiting use of nonbinding interpretive statements. I have trouble seeing how an agency can operate without guidance or internal interpretive statements. If that’s what the bill is trying to do, I think it is intruding too far into executive branch operations and could present constitutional problems.”

Whisnant said the constitutionality of limiting the use of internal policy and interpretative documents could be tested in court if the department continues to use such documents and is challenged.

With a number of questions about the intent of Senate Bill 781 hanging fire, it appears that the full effects of regulatory reform may not be known for some time to come.

Digest

Burr proposes consolidating EPA and DOE. In May, N. C. Senator Richard Burr introduced S 892, Consolidation of Department of Energy and Environmental Protection Agency Act of 2011. According to Burr’s office, the purpose of the bill is to save money. A press release from his office said: “The bill would provide cost savings by combining duplicative functions while improving the administration of energy and environmental policies by ensuring a coordinated approach.” Among the ways in which the senator intends to save money are terminating the public water system supervision program under the Safe Drinking Act, the State water pollution control revolving funds program, the State drinking water revolving loan funds program, pollution control programs under section 106 of the Federal Water Pollution Control Act, nonpoint source control programs under section 319 of the FWPCA, the watershed grants program, the U.S. Mexico border water infrastructure program, tribal assistance grants program, and the underground injection control program. On its introduction the bill was read twice and referred to the Committee on Homeland Security and Governmental Affairs, where it remained at last check.

U.S. House passes bill to weaken Clean Water Act. On July 13, the U.S. House of Representatives passed by roll call vote H.R. 2018, Clean Water Cooperative Federalism Act of 2011. The bill was introduced by Rep. John Mica of Florida. It amends the Federal Water Pollution Control Act (Clean Water Act) to prohibit the Environmental Protection Agency (EPA) from: (1) promulgating a revised or new water quality standard if a state standard has previously been approved unless the state agrees that the new standard is needed to meet CWA requirements, (2) overriding a state’s decision on discharge

permits, (3) withdrawing approval of or federal financial assistance to a state NPDES program (4) specifying areas where disposal or discharge of dredged or fill material into navigable waters is prohibited in a permit if the state where the discharge takes place does not agree that the discharge will have unacceptable adverse effects on municipal water supplies, shellfish beds, and fishery areas.

The bill requires the Administrator, before issuing a regulation, policy statement, guidance, or response to a petition to analyze the impact on employment and the economy, disaggregated by state, to post the analysis on EPA’s website, and request that the governor of any state experiencing a loss of more than 100 jobs or a decrease in economic activity of more than \$1 million post the analysis in the state’s Capitol. The EPA must hold a public hearing in each state where the action will cause more than a de minimis negative impact; and give notice of the impact to states’ congressional delegations, governors, and legislatures. The bill is now on the Senate legislative calendar.

On July 12, the Federal Office of Management and Budget released a Administrative Statement saying that the Administration is strongly opposed to the legislation because it would “disrupt the carefully constructed complementary CWA roles for EPA, the Army Corps of Engineers, and States in protecting water quality. It also could eliminate EPA’s ability to protect water quality and public health in downstream States from actions in upstream States, and could increase the number of lawsuits challenging State permits.” The statement said that if the President is presented with this legislation, his senior advisors would recommend that he veto the bill.

Municipal systems are next target

Most investor-owned water and sewer utilities in North Carolina now in the hands of publicly traded and private equity companies

At a June 2011 forum, “The Role of Private Water Industry in Providing Water Infrastructure,” representatives of companies that own water and wastewater systems, provide operational and other services to public water systems, and resell water in North Carolina made their case for the involvement of the private sector in the provision of water and sewer service. The forum was sponsored by UNC-Duke-WRRI and the State Water Infrastructure Commission.

Nathan Leeman of CH2MHill discussed his company’s role in several water and sewer regionalization projects in North Carolina and in the operation, maintenance and capital improvements of water and wastewater plants in Georgia and other states. Gary Stainback of United Water described the public-private partnerships (PPP) under which his company operates 19 facilities for 15 municipal clients in North Carolina.

But the emphasis was on investor-owned water and sewer systems. Michael Dean, executive director of the National Association of Water Companies; Tom Roberts, CEO of Aqua North Carolina—which owns 800 water systems and 60 wastewater systems in North Carolina; and Carl Daniels of Utilities Inc—which owns 120 water systems and 50 wastewater systems in the state—were on hand to discuss investor-owned water and sewer operations, the regulatory environment under which they operate, the benefits of investor ownership and the fact that they are looking for opportunities for additional acquisitions—including municipal systems.

Starting small

Most investor-owned water and sewer systems in North Carolina are small by EPA’s definition—serving fewer than 3,300 people, and most are near fast-growing cities in the Piedmont. Because of North Carolina’s rapid growth over the last three decades—much of it outside municipal water and sewer service areas, the state is home to a high number of small private water and wastewater systems. Between 1985 and 1995, 648 new water systems (not including wastewater systems) were established in the state, with 86% of them being investor-owned utilities.

Until the late 1990s, investor-owned water and sewer systems in North Carolina were home-grown companies, such as Heater Utilities of Cary or, like Utilities Inc., were out-of-state water utilities founded and owned by individual investors. But, at the turn of the decade, a new cast of characters arrived on the scene.

In 2001, Utilities Inc. was bought by n. v. Nuon, a large Dutch energy company with intentions of expanding into water-related businesses. However in 2005, Nuon put Utilities Inc. up for sale, and a number of veteran U.S. water utilities were outbid by AIG Highstar Capital, a group of private equity funds that invest in infrastructure related assets and businesses. Highstar is sponsored by AIG Global Investment Group.

In 2000, Aqua America, which trades on the New York Stock Exchange under the ticker symbol WTR, bought MidSouth Utilities of Sherrills Ford and in 2004 bought Heater Utilities.

Both Aqua N.C. and Utilities Inc. have continued to acquire other small water utilities in North Carolina. According to reports of the N.C. Public Utilities Commission (NCPUC)—which regulates for-profit water and sewer utilities, in 1998 there were 227 for-profit companies operating water and sewer systems in North Carolina. As of March 2011 the number of companies operating for-profit traditional water, wastewater, or water and wastewater systems had dropped to 130, while the number of systems had essentially held steady and the number of customers served had increased. As of March, 1,499 for-profit water and sewer systems served 127,428 water customers and 61,127 wastewater customers.

Today, Aqua North Carolina owns 800 water systems serving 72,614 water accounts (57 percent of the total population served by for-profit companies) and 60 wastewater systems serving 15,388 accounts (25 percent of the total). Utilities Inc. owns 120 water systems serving 38,756 customers (30 % of the total) and 50 wastewater systems with 25,500 customers (41% of the total) in 36 North Carolina counties.

Water a Wall Street target

Aggressive acquisition of private water and sewer utilities in North Carolina by publicly traded and private equity companies is part of a national trend which results from two factors: Because of water scarcity and rising demand, “Wall Street” now sees water as an asset and water-related utilities

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and companies as good investments. And, because the country has failed to invest in its water and sewer infrastructure, there is a great need for capital. Large publicly traded companies and private equity companies have money to invest.

According to Global Water Intelligence, “investor-owned water utilities in the US had a great year in 2010, as our weighted portfolio of stocks steamed ahead by 14%, beating both the S&P 500 and the Dow Jones Industrial Average, which rose by 13% and 11% respectively over the same timeframe.” And, according to GWI, because of their potential for population and rate-base growth, systems in wealthy communities in sunbelt states, including North Carolina, are prime targets for acquisition-oriented companies.

In addition, several exchange traded funds (ETFs) focused on companies that treat and provide potable water and companies that provide related technology and services have already absorbed billions in investments. And Wall Street analysts are looking for additional investment vehicles. A recent idea for raising capital for water infrastructure is the creation of tradable securities backed by future income from water rate payments.

White Knights?

EPA’s 2002 Clean Water and Drinking Water Infrastructure gap analysis estimated that at current investment levels, the funding shortage for drinking water and wastewater infrastructure nationwide could exceed \$500 billion by 2020.

The N. C. Rural Center’s Water 2030 Initiative projected that because of deferred maintenance and population growth the 400 sewer systems and 500 drinking water systems owned

and operated by local governments in North Carolina would need to invest \$16.6 billion (\$1.37 billion a year) in repairing and upgrading aging infrastructure and building new systems between 2005 and 2030. Yet in the prior decade federal and state funding for water and sewer systems and local government borrowing amounted to only \$789.5 million per year, leaving a funding need gap of \$580 million per year.

Moreover, many small and rural water and sewer systems (private and public) have not only aging infrastructure but also technical and managerial problems.

In this fiscal environment, many see investor-owned utilities with access to substantial investment capital as White Knights, capable of and ready to pour money and expertise into troubled systems. Many state commissions that regulate investor-owned utilities provide incentives, such as consolidated rate making and acquisition adjustments, to encourage system consolidation through acquisition.

If the 2011 “Budget Bill” is an indication, the N.C. General Assembly is among those who look to investor-owned utilities for help. With passage (and subsequent veto override) of the Appropriations Act of 2011, the N.C. General Assembly has given investor-owned water utilities in the state access to low-interest loans (one-half the market rate) and grants from the Drinking Water State Revolving Fund (DWSRF). The DWSRF is primarily a loan fund federally funded through the U.S. EPA with a 20 percent match from state monies. Grants from the fund are available only to communities that qualify as “disadvantaged.” Although the Safe Drinking Water Act, which established the funding program, allows private companies to access DWSRF’s

and other states have provided that access, North Carolina had traditionally restricted use of its DWSRF to public or non-profit water systems.

[According to Jeff Hughes of the UNC-CH Environmental Finance Center, investor owned utilities still cannot access the Clean Water State Revolving Fund, which is the federal/state fund that provides loans for wastewater infrastructure. The law under which this fund was established—the Clean Water Act—forbids use of the fund by private companies. However, the National Association of Regulatory Commissioners has adopted a resolution calling on Congress to change the law to allow investor-owned utilities to use CWSRFs.]

Some see trouble

Wall Street’s interest in water and water utilities has a lot of people worried. Many of them are customers of small utilities whose rates have shot up after being taken over by larger investor-owned utilities.

According to Aqua North Carolina’s Tom Roberts, private water utilities are true “cost-of-service companies,” meaning that their water rates cover all costs of system operation, treatment, storage, distribution and investment for the future, while rates set by public utilities may not always cover all costs.

In addition, says Jeff Hughes of the Environmental Finance Center, investor-owned utilities pay taxes, which public systems do not, and they require a higher rate of return on their capital investment than public utilities. While expertise and efficiency in private operations is supposed to compensate for the extra cost, protests against rate increases by investor-owned water utilities across the country suggest this

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is not always the case. Double and, in some cases triple, digit percentage rate increases by investor-owned water utilities are getting the attention of politicians.

In May 2010, after a flood of complaints from constituents in Long Island and Westchester about rate increases, New York Senator Charles Schumer requested that the Government Accountability Office investigate whether Aqua New York's use of DWSRF was consistent with the purpose of the program, which, according to EPA, "emphasizes providing funds to small and disadvantaged communities and to programs that encourage pollution prevention as a tool for ensuring safe drinking water." Schumer contended that Aqua N.Y. used DWSRF loans to improve infrastructure then imposed distribution improvement surcharges as a means to increase rates. [It is not clear if the investigation has been completed.]

During a recent special session of the Texas Legislature—after 2,000 citizens submitted protests against rate hikes planned by Monarch Utilities—a Senate subcommittee was formed to investigate rising water and sewer rates from investor-owned utilities as well as how rate increases are regulated by the state. Monarch is a division of Southwest Water Company which is owned primarily by institutional investors advised by J.P. Morgan Asset Management.

In a news release from the office of Senator Robert Nichols, the senator said, "Texans all across the state don't understand why their water and sewer rates are skyrocketing. Many of them are frustrated by the fact that hard-earned money is going to pad the pocket of Wall Street investment bank executives."

Some of the most heated opposition to rate increases is related to the percep-

tion that consolidated rates—which most investor-owned utilities use—force low-income people to subsidize the wealthy. Recent protests in Raleigh against a rate increase request by Aqua N.C. focused on the fairness issue and has resulted in a recommendation to the NCPUC by its Public Staff for a great reduction in the rate increase requested.

The true cost of water

All the protests over rate increases illustrate that Americans have been conditioned by publicly owned utilities to expect inexpensive water. According to NCPUC, as of January 2009, the average cost of 9,000 gallons of water provided by a group of large publicly owned systems was \$30.47. The average cost of the same amount of water provided by Class B or larger private systems regulated by the commission was \$47.00. For wastewater, 9,000 gallons of publicly supplied service cost on average \$35.47 while the same amount of privately supplied service cost \$52.94.

Analysts say that just as artificially low water and sewer rates charged by most public utilities have discouraged investment in water infrastructure, rates that reflect the true cost of water will encourage investment and that much of the investment is likely to come from Wall Street. Since the need for infrastructure investment in publicly owned water and sewer systems is so high and since a large share of the private systems in the U.S. is already in the hands of investor-owned utilities, municipal systems are the next target for acquisition. That was made clear by representatives of investor-owned utilities at the June forum.

Not so white?

When North Carolina municipalities are approached by investor-owned utili-

ties with offers to buy water and sewer systems, they will have many factors to consider. With the entrance of private equity companies into the water and sewer business, there is a new one.

According to Global Water Intelligence, after AIG outbid veteran utilities for Utilities Inc., Aqua America's CEO Nicholas DeBenedictis warned the Mid-Atlantic Conference of Regulatory Utilities Commissioners that financial groups' investment in water companies may be speculative, focus only on short-term profit and not make the major long-term investment needed to repair and upgrade infrastructure. The report noted DeBenedictis' obvious bias, in that more competition for water companies would drive up their cost to Aqua.

However, at the UNC-Duke-WRRI forum in June, Aqua N.C.'s Tom Roberts said that investor-owned utilities are allowed by regulators to make money only through return on their investment in infrastructure and that lags between rate cases means they can't begin to recover infrastructure investment costs for one or two years. That's a longer investment horizon than many equity investors might like.

Moreover, talk of securities backed by water rates (derivatives) has some people deeply concerned. In an op ed on Bloomberg.com, Bloomberg News columnist Mark Gilbert wrote: "Investors already bet on the outlook for the water industry, buying shares in water companies or exchange-traded funds that invest in several companies at once. Now the same gang that brought you the global credit crisis is itching to flex its financial-engineering skills" on water-related derivatives. (Gilbert is author of *Complicit: How Greed and Collusion Made the Credit Crisis Unstoppable*.)

According to Global Water Intelligence, industry analysts say that there

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are both short-term speculators and utility owners focused on the long-term among financial buyers of water and wastewater systems. Analysts and leaders of veteran water companies say that state regulators will be able to sort the speculators from the legitimate long-term companies. They say acquiring companies must convince regulators that they have a business model that reflects a commitment to long-term investment and service, and that regulators will have to be convinced that investment is being made before granting rate increases. Presumably, that means that customers of municipal systems sold to investor-owned utilities will depend upon the N.C. Public Utilities Commission to find the White Knights and set water rates that reflect system improvement.

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Researchers say tidal freshwater rivers need nutrient limits in discharge permits and their riparian zones need protection from development

Flowing across the North Carolina Coastal Plain are small rivers with low banks and stretches of marsh and bottomland swamp forest on both sides. These are blackwater rivers, which are contained entirely within the Coastal Plain and which arise in swamps and drain wetlands throughout their courses.

Between the upland reaches of blackwater rivers and their downstream estuaries lie zones where freshwater flow is tidally influenced. Rising tides force freshwater that had moved toward the ocean on low tide back upstream and push it into riparian forests, linking the rivers with wide terrestrial zones that are sinks for riverine nitrogen, phosphorus and carbon. This pulsing of energy into tidal freshwater zones creates ecologically unique areas of nutrient cycling that modulate the downstream transport of materials to estuaries

Tidal freshwater zones (TFZ) can include half the total length of coastal blackwater rivers, making them potentially critical nutrient sinks for systems whose drainage basins are becoming more and more densely populated, driving up nutrient discharges from wastewater treatment plants and non-point sources.

Only in the last decades have scientists begun to study the significance of tidal freshwater zones of blackwater rivers. The effects of tidal flow regimes on the ecology and biogeochemistry of blackwater rivers has been particularly neglected. In 2006 with a grant from WRRI, UNC-CH PhD candidate in ecology Scott Ensign and his advisors, Michael Piehler and Martin Doyle at the UNC-CH Institute of Marine Sciences launched a



research project to investigate spatial trends in biogeochemical and ecological processes along the Newport River, from the upland non-tidal area to the river's estuary.

The Newport River, a third order stream in Carteret County, is one of North Carolina's distinctive blackwater rivers. It is in the White Oak Basin, which is a basin in name only since it comprises four small separate rivers. The Newport has 74 stream miles, 34,445 estuarine acres and 25 miles of Atlantic coastline, emptying into the Atlantic through Bogue Sound.

The specific objectives of the Newport study were to determine (1) if processing of materials (nitrogen,

phosphorus, carbon, algal biomass, etc.) in the TFZ is different from materials processing in the non-tidal area of the river and the estuary, (2) what factors limit growth of phytoplankton and bacteria in the TFZ, and are these factors different from limiting factors upstream and downstream of the TFZ, (3) given the distinctive hydrology of the TFZ, what effect does denitrification have on the export of nitrogen from the TFZ.

The research involved characterizing water chemistry and biological parameters along the river, using mesocosm bioassay experiments to

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Investigator Scott Ensign on the boardwalk along the Newport River. From this boardwalk, researchers measured in-situ oxidation-reduction potential of sediment porewater and soil moisture.

explore growth limitation factors, and measuring denitrification using sediment core incubations and sediment redox and porewater saturation measurement in-situ.

Water chemistry and biological parameters

The investigators performed water quality sampling twice monthly for a year at five sites on the river: one above the tidal influence, three along the TFZ, and one at the upper extent of the oligohaline estuary. They measured temperature, salinity, dissolved oxygen, dissolved organic carbon, nitrate plus nitrite, ammonium (NH_4), total dissolved nitrogen (TDN), dissolved reactive phosphorus, chlorophyll a, total suspended solids, solar irradiance and light attenuation, and community respiration. They measured river discharge monthly upstream of the limit of tidal influence and measured cross section bathymetry of the TFZ at 26 sites. They calculated flushing time of the TFZ during times when the dis-

charge was measured. They estimated the contribution of NH_4 , TDN, total phosphorus and biochemical oxygen demand to the river from the Town of Newport wastewater treatment plant outfall located near the most downstream sampling site in the TFZ. In this phase of the research, the investigators found that:

- The nominal flushing time of the TFZ was 3-6 days, with longest residence times during spring low-flow periods;
- Chlorophyll a peaked during long residence times and averaged 6.3 $\mu\text{g/L}$ with a high value of 48 $\mu\text{g/L}$.
- No significant differences in average heterotrophic respiration on dissolved organic carbon was observed between sampling sites.
- Whole-community respiration of particulate matter peaked at the lower end of the TFZ, indicating an increase in the lability of the particulate matter or an increase in heterotrophic metabolism.

- DOC decreased significantly between the non-tidal sampling site and the TFZ and from the TFZ to the oligohaline estuary.
- There was a significant decrease in specific UV absorbance between the non-tidal river site and the estuary, suggesting an increase in DOC lability for heterotrophic consumption.

The researchers say that the data taken together indicate that the TFZ had significantly higher rates of primary production and greater bacterial respiration than the non-tidal river, likely due to a combination of increased residence time, nutrient concentrations, and in-situ conditioning of dissolved and particulate detrital material.

Limiting factors

The investigators performed nutrient limitation bioassay experiments in April and October 2006 and February and March 2007. They collected river water from the sampling site above the limit of tidal influence, from a site within the TFZ, and from the estuary sampling site. At the Institute of Marine Sciences they distributed five liters of water from the sites into 16 10-liter plastic cubitainers and added nitrogen, phosphorus and a combination of N and P, with each treatment replicated 4 times. They floated the cubitainers in ponds at ambient temperature and covered them with screening to reduce irradiance by 25%. After 1, 2, and 4 days they measured phytoplankton and bacterial response.

They found that nitrogen stimulated algal growth in the non-tidal river water during one of four months but that phosphorus alone never stimulated algal growth. However they found that water from the TFZ was limited

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by nitrogen and phosphorus independently and in combination. These results, they say, indicate fundamental differences in response between non-tidal and tidal freshwater rivers.

Denitrification

To measure denitrification, the researchers collected triplicate sediment cores from each of the three sampling sites within the TFZ monthly, along with 50 liters of river water. At the UNC IMS, they incubated cores collected from August-November 2006 for 6 hours with a static volume of headspace and measured dinitrogen in the overlying water every 2 hours. From December-June 2007, they pumped river water through the headspace of cores and collected samples from the inflow and outflow of the cores.

The researchers say that denitrification rates measured using sediment cores reflected rates under continually saturated conditions, while, in reality, the intertidal sediments are continually exposed and inundated by the semi-diurnal tide. To determine redox conditions in the field, they constructed a wooden boardwalk along the river near the Town of Newport wastewater treatment plant and measured in-situ oxidation-reduction potential of sediment porewater and soil moisture from February 7 to March 7, 2007. To put measurements of denitrification and soil redox into context with nitrogen fluxes through the river, they combined rate measurements, redox and topographic data in a spatio-temporal framework to estimate the total amount of denitrification taking place in the TFZ.

Denitrification rates observed in the TFZ were similar to rates observed in other coastal environments, say the investigators. Field measure-

ments showed rapid cycling between oxidized and reduced conditions in the upper 5 centimeters of sediment, which corresponded with tidal height and inversely with soil moisture. This suggests that coupled nitrification-denitrification may have occurred in the sediments, thereby increasing in-situ denitrification above rates observed in fully saturated laboratory cores. When the scientists extrapolated denitrification rates measured across the intertidal area of the Newport river, they estimated system-wide denitrification to be in a range that brackets nitrate load at the lower end of the TFZ, indicating that a substantial fraction of the nitrogen load of the river may be denitrified during transport through the TFZ.

Findings and recommendations

Major findings of the study are that phytoplankton in TFZ's are as sensitive to phosphorus as to nitrogen and that intertidal riparian zones are significant sinks for nitrogen. The investigators say that environmental managers should give consideration to putting nitrogen and phosphorus limits into permits for discharges into blackwater tidal freshwater systems and to protecting riparian zones along tidally influenced freshwater streams. They say that disturbance of these riparian zones by development or hydrologic alternations may damage the their capacity to reduce nitrogen loads and lead to water quality degradation downstream.

■ Ensign, Scott H., Michael F. Piehler, Martin W. Doyle and Ashley R. Smith. (2007) *Effects of Tidal Flow on Riparian Zone Hydraulics and Nitrogen Dynamics: Implications for Nutrient Manage-*

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- Scott Ensign is now Research Ecologist with the U.S. Geological Survey in Reston, VA. Read his explanation of this and related research on his USGS professional page: <https://profile.usgs.gov/ensign/>
- For an excellent primer on blackwater rivers, visit "A blackwater river from sea to source: The White Oak River transect" on the Learn NC website: http://www.learnnc.org/lp/editions/cede_blackwaterriver/47
- Thanks to Scott Ensign for the photos.

Upcoming Events

Water System Auditing and Loss Control Seminar

WHEN: Monday, October 10, 2011 9:30 a.m. – 2:30 p.m.

WHERE: Jane S. McKimmon Center, 1101 Gorman Street, Raleigh NC

COST: \$35 if received by October 4; \$45 at the door (or after Oct 4)

REGISTER at: http://www.ncsu.edu/wri/events/water_audit/forum.html

PDHs: 4.25 PDHs will be available (subject to board approval)

FOR MORE INFORMATION: Contact WRI

email: water_resources@ncsu.edu or call (919) 515-2815

Water Auditing and Loss Control programs are the most effective ways for a utility to conserve water, save operating expenses, and increase revenues. In North Carolina more than 30 systems have recently embraced best-practices for Water Auditing and Loss Control developed by AWWA, and the results are compelling. In this workshop the operational, financial and regulatory perspectives come together to present the state of water efficiency in the industry, and where it goes from here. Presentations will include lessons learned from other NC utilities over the short-term, systems outside NC over the long-term, funding options for performing audits, and a look at the regulatory momentum in the Southeast. A demonstration on the AWWA Free Water Audit Software will also be included.

This workshop is sponsored by: WRI (the Water Resources Research Institute of the UNC System), SWIC (the State Water Infrastructure Commission), Cavanaugh & Associates, Duke University's Nicholas Institute for Environmental Policy Solutions, NC League of Municipalities, the NC Association of County Commissioners, and the Carolinas AGC and American Rivers.

Southeast Stormwater Association 2011 Annual Conference

October 3-5, 2011 - Asheville, North Carolina

SESWA's Annual Conference provides stormwater managers and policy-makers with information on new and emerging EPA regulations, strategies to implement TMDLs, new interpretations of MEP, numeric criteria for nutrients, permit requirements for Phase 1 and 2 MS4's, and updates on the status of litigation throughout the Southeast. If you want to stay ahead of the curve, you need to attend this conference! And what better time to be in Asheville, North Carolina than during the peak of leaf season!

Visit the Annual Conference page of the SESWA website (www.SESWA.org) for more information.

REGISTER NOW Fall 2011 Erosion and Sedimentation Control Planning and Design Workshops

October 25-26, 2011

Wilmington, NC

November 9-10, 2011

Hickory, NC

More information available at

<http://ncsu.edu/wri/erosionworkshops.html>

DUKE-UNC-WRI WATER SEMINAR

A Fundamental Change in Managing Our Community Water Infrastructure

WHEN: October 14, 2011 - 10:00 am to 12:00 pm

WHERE: Junior League of Raleigh's Center for Community Leadership, 711 Hillsborough Street, Raleigh 27603.

SPEAKER: Trevor Clements, Director of Water Resources, TetraTech, RTP

In recent years many experts and practitioners have come to the conclusion that we must fundamentally change the way we conduct business with regard to our water, wastewater and stormwater infrastructure and operations if we are to overcome the challenges of aging infrastructure, limited financial resources, increases in impaired waters, impacts of changing weather patterns, the need to reduce energy consumption and more. Mr. Clements was the Principal Investigator for research on defining a new paradigm for water management sponsored by the Water Environment Research Foundation and the Electric Power Research Institute. He will share with us some of his latest thoughts on the subject and answer follow-up questions.

No registration is required, but RSVP is appreciated. Please email Nicole_Saladin@ncsu.edu.