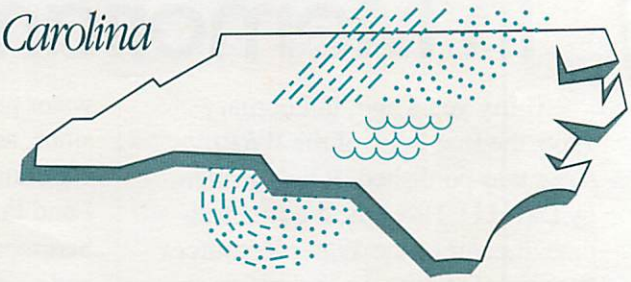
Water Resources Research Institute News
of The University of North Carolina



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# Reckhow named Director of WRRI

Kenneth H. Reckhow, associate professor in the School of the Environment at Duke University and a specialist in environmental modeling and decision analysis, has been named director of the Water Resources Research Institute of The University of North Carolina effective January 1, 1996.

As WRRI's new director, Reckhow replaces David H. Moreau, professor in the Department of City and Regional Planning at UNC-Chapel Hill, who stepped down last August.

Reckhow received the bachelor's degree in engineering physics from Cornell University and the master's and PhD degrees in environmental science and engineering from Harvard. He served on the faculty of Michigan State University from 1977 to 1980 and joined the Duke faculty in 1980.

At Duke he has taught courses in water quality management, water resources modeling, natural resource data analysis, water quality modeling, applied regression analysis, lake modeling, and decision theory and risk analysis. His research interests are in the development, application, and evaluation of water quality models and in decision and risk analysis for water quality management. His current research involves analysis of regional atmospheric deposition data and is funded through the U.S. EPA. He is the author of two books on lake management and numerous journal articles and technical papers related to environmental modeling and environmental decision analysis.

Reckhow is past-president of the North American Lake Management Society and has served as president of the N.C. Water Resources Association and on the editorial board of several professional journals. He has served on international, national, and local study groups and advisory committees related to water resources and is currently a member of the Technical Advisory Subcommittee of the Triangle J Council of Governments' Water Resources Committee and several review panels, including the Liaison Committee for the USGS National Water Quality Assessment Program for the Albemarle-Pamlico Basin.

Reckhow's wife, Ellen, is a Durham County Commissioner. They have two children and live in Durham.

**IN THIS ISSUE** **Jan/Feb 1996**


| | Page |
|---|---|
| In Memoriam: David H. Howells | 2 |
| Dec 1995 action of the N.C. Environmental Management Commission | 3 |
| EMC hearing officers agree on Water Quality Certification (wetlands) rules | 3 |
| Neuse River gets attention from EMC Water Quality Committee and Senate Select Committee on Water Quality | 5 |
| Risk assessment and its role in environmental protection | 6 |
| Senate passes Safe Drinking Water Act bill, House begins work | 10 |
| Water related courses offered by N.C. universities fall semester | 12 |

PLUS . . . Digest . . . Workshops & Conferences . . . Water Resources Conditions . . . Publications Received . . . and more.

# In Memoriam: David H. Howells

Thirty years ago, in February 1966, the first issue of the *WRRI News* was published. It was written by David H. Howells, the first full-time director of the Water Resources Research Institute. For many years afterward, Mr. Howells produced the newsletter, making it, as he intended, as "a genuinely useful medium for North Carolinians working in the field of water resources."

Mr. Howells died Nov 24 in an automobile accident. At a memorial service on Dec 22 and in numerous environmental publications and at numerous events, he has been memorialized as a true defender of North Carolina's natural resources. At its meeting in December, the N.C. Environmental Management Commission passed a resolution honoring his memory and contributions to the citizens and environment of North Carolina.

Mr. Howells became director of the North Carolina Institute in 1965 after serving 10 years with the U.S. Public Health Service. He guided the Institute during its formative years and established it as a highly respected source of scientific information about water resources issues in the state.

During his tenure as director of WRRI, Mr. Howells also served as a professor in the Biological and Agricultural Engineering Department at N.C. State University and in the Environmental Sciences and Engineering Department at the University of North Carolina at Chapel Hill. He published numerous journal articles on technical water pollution control topics and pollution control policy and edited many volumes of conference proceedings for the Institute.

In addition, he served on a number of national and international water program evaluation commissions, as Chairman of North Carolina's Advisory Committee on Land Policy and as a member of its Sedimentation Control Commission and as chairman of the executive board of the Universities Council on Water Resources (UCOWR).

Mr. Howells received numerous honors for his dedication to water pollution control and public health. He was the recipient of the U.S. Public Health Service Commendation Medal, the Secretary of the Interior Conservation Service Award, the Governor's Award for Water Conservation, and a Presidential Citation. He was a Fellow and Life Member of the American Society of Civil Engineers, and a diplomate of the American Academy of Environmental Engineers.

Following his retirement in 1976, Mr. Howells was named Professor Emeritus at NCSU and continued to devote time and energy to the Institute, completing for Institute publication a history of public water supplies


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### *of The University of North Carolina*

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and a history of stream pollution control in North Carolina.

He also served a term on the state's principal environmental policy making body, the N.C. Environmental Management Commission, and did volunteer work with the Sierra Club, the Triangle Land Conservancy, the N.C. Natural History Museum, and the Umstead Coalition. An accomplished black-and-white photographer, Mr. Howells provided photos for an upcoming book on the history of Umstead State Park. Some of his most memorable photos of rivers, lakes and other water features hang in the WRRI offices.

Mr. Howells was a civil engineering graduate of Oregon State University and received the master's in sanitary engineering from the Massachusetts Institute of Technology.

He is survived by his wife, Virginia, of Chapel Hill, three children, nine grandchildren and one great grandchild.

Memorials may be made to the Triangle Land Conservancy, P.O. Box 13031, Research Triangle Park, NC 27709-3031. Contributions in Mr. Howells' memory are being put toward TLC's Land for Tomorrow campaign, through which TLC is acquiring ten of the most significant natural areas in the region and building its capacity to protect significantly more land in the future.

The North Carolina Lake Management Society will hold its 1996 Annual Meeting on February 23, 1996, at the Training Lodge, Durant Nature Park, Raleigh, NC.

For information call Bryn Tracy at (919) 733-6946 during the day or (919) 779-7575 in the evening.

# December 1995 action of the N.C. Environmental Management Commission

At its regular meeting on Dec 14, 1995, the N.C. Environmental Management Commission took the following action:

- Approved $878,922 in increases in supplemental emergency revolving loans to sewer districts set up to deal with failed low pressure pipe systems in five subdivisions in Wake County. The loans are in addition to $500,000 in state grants already made to the sewer districts. Loan totals for these systems now stand at $2,070,288.

- Approved publication of a Notice of Rulemaking to establish groundwater quality standards for: acenaphthene, acenaphthylene, anthracene, atrazine, benzo(a)anthracene, benzo(g,h,i)perylene, bromodichloromethane, carbon disulfide, caprolactam, chloroethane, chrysene, 1,3-dichloropropene (cis and trans), diphenyl(1,1-diphenyl), fluoranthene, isopropyl ether (diisopropyl ether), methyl alcohol, pyrene and simazine.

- Approved the final Tar-Pamlico Nutrient Management Strategy.

- Approved revision of the Water Supply Watershed Protection model ordinance to reflect changes in watershed protection rules which add flexibility for local governments in administering their watershed protection programs.

- Heard a report from the Division of Water Resources on the voluntary Eno River Water Management Plan. The plan was agreed to in 1988 by local governments in Orange County to deal with damage to water quality, fish habitat, and recreational uses brought about by increasing withdrawals from the river. Staff reported that compliance with the voluntary plan has basically been good and recommended continuation of the voluntary plan.

- Heard a report on the status of the proposed Clean Water Act Section 401 Water Quality Certification (wetlands) rules. The four hearing officers for the rules reported consensus on rules to be presented to the EMC in February 1996. (See following story.)

# EMC hearing officers agree on Water Quality Certification (wetlands) rules

At the December meeting of the N.C. Environmental Management Commission (EMC), the four commissioners who served as hearing officers for the so-called wetlands rules announced that they had reached consensus on proposed rules to recommend to the full EMC in February. The rules are actually being promulgated under Section 401 of the Clean Water Act (CWA), which requires states to certify that activities in wetlands regulated under CWA Section 404 will not lead to water quality degradation.

*continued page 4*

## Water Quality Certification rules continued

The four commissioners who served as hearing officers for the rules (Daniel V. Besse, Robert Epting, Dennis C. Loflin, and Lawrence R. Zucchino) were responsible for reviewing oral and written comments from the public and other agencies and deliberating to modify the proposed rules to reflect pertinent concerns. EMC Chairman David H. Moreau said that the deliberation process had "required an extraordinary effort on the part of the hearing officers and a lot of give and take."

Moreau also said that the process of adopting the 401 Water Quality Certification rules is "delicate in terms of our relationship with the General Assembly." He said that the draft report of the hearing officers containing the proposed rules will be reviewed by relevant committees in the N.C. General Assembly before the EMC takes action on the rules.

### Development of rules

Development of the Water Quality Certification rules has been contentious because the rules have been identified by the interested public as implementing wetlands protection policy—in spite of environmental officials' efforts to separate the two. Following is a chronology of events related to development of the rules:

- In 1992, the Division of Environmental Management (DEM) introduced "conceptual" rules that staff had developed to codify the Water Quality Certification process and criteria and to comply with EPA requirements for defining, classifying and rating wetlands.

- A "Wetlands Work Group," which included a number of interested parties outside DEM, met six times in 1993 to debate the conceptual rules.

- In April 1994, the EMC approved holding public hearings on the proposed rules. However, hearings had to be postponed when the State Director of the Budget, acting on objections from the N.C. Department of Transportation, refused to certify that DOT had enough money to implement the mitigation requirements of the rules.

- In May 1994, the EMC passed a resolution calling on Secretary of Environment, Health, and Natural Resources Jonathan Howes to create a Wetlands Task Force to examine overall wetlands policy. Later, Gov. James B. Hunt, Jr. asked the Secretary to convene a task force to assure that any wetlands rules proposed by the department did not duplicate what other levels of government were doing. A task force chaired by Dr. Norm Chistensen, Dean of the School of the Environment at Duke University, began meeting in January 1995 and issued a report in March recommending broad principles to guide state wetlands policy.

- Public hearings on Water Quality Certification rules were finally held in January 1995 and comment was taken until March 20, 1995.

- Because questions were being raised about the EMC's authority to adopt the proposed Water Quality Certification rules, both the EMC and Senator Beverly Perdue requested an Advisory Opinion of the N.C. Attorney General's office as to the body's rulemaking authority and legality of the proposed rules. In March 1995, the Attorney General's staff issued an Advisory Opinion stating that the proposed rules were adequately authorized by N.C. General Statutes and consistent with federal law.

- During the 1995 legislative session, legislation was introduced that would have prevented the department from implementing the proposed Water Quality Certification rules, and the Legislative Study Commission on Wetlands was established to review the state's regulations relating to wetlands and assess the need for changes to current regulations.

### Proposed rules

According to Commissioner Zucchino, who described the proposed consensus rules to the EMC, the rules are very narrow in scope, focus on minimizing impacts to riparian and headwaters wetlands that are most important to water quality, and are based on the principle that "not all wetlands are created equal."

According to Ron Ferrell, DEM wetlands scientist, the rules establish the concept of a 50-foot stream buffer area and require no review for projects that impact less than one acre and are outside the 50-foot stream buffer. No review is required for projects of less than one-third acre. Mitigation requirements are based on size of impact and distance from surface waters.

Commissioner Besse said that the concept of focusing on distance from surface waters was suggested by legislation introduced in the last session of the General Assembly.

Chairman Moreau said that under the Administrative Procedure Act, March 20, 1996, is the "drop dead" date for adopting the Water Quality Certification rules. If the EMC has not adopted rules by then, the entire process must start all over.

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*More than 12 million outboard motors operate in U.S. waters. Almost a third of the gasoline that goes through two-stroke outboard motors does not burn; it is vented into the water. In 1998, new EPA regulations will force manufacturers to reduce hydrocarbon emissions 75 percent by the year 2006.*

# Neuse River gets attention from EMC Water Quality Committee and Senate Select Committee

At its Dec 13, 1995, meeting the Water Quality Committee of the N.C. Environmental Management Commission heard a presentation from the Water Quality staff of the Division of Environmental Management (DEM) on possible options for revising the Neuse River nutrient management strategy. Secretary of Environment, Health and Natural Resources Jonathan Howes had requested in October that the EMC reexamine its plan for managing nutrients in the Neuse River following a summer and fall of algal blooms, fish kills, and angry citizen protests.

Staff told the Water Quality committee that the area of most concern is the stretch of estuary from New Bern to Oriental and said that nutrient reduction must focus on "exerted load," or what actually arrives in New Bern. They presented graphs of monitoring data from 1982-1994 at Kinston upstream from New Bern showing a downward trend in loadings of phosphorous and only a slight upward trend (bordering on statistical insignificance) in nitrogen loadings.

Estimates are that 19 million pounds per year of nitrogen enter the Neuse River from pipes and runoff throughout the basin. About 13 percent of the total nitrogen comes from point sources (municipal and industrial discharges). The rest comes from nonpoint sources, including agricultural and urban runoff. However, DEM staff said that only about 15 percent of the nitrogen introduced into the river near Falls Lake actually gets to New Bern, while almost all discharged near the estuary arrives.

Staff said one way to accomplish nitrogen reductions is to require major municipal and industrial facilities to meet mass limits based on effluent limitations of 3.5 milligrams per liter. They admitted, however, that the technology to accomplish this reduction is not available. Alternatively, they suggested major point source dischargers could meet effluent limitations of 6 milligrams per liter and make payments to help control nonpoint sources such as agricultural runoff or malfunctioning septic tanks.

Water Quality Chief Steve Tedder characterized the work done by staff on a revised Neuse nutrient management plan as a starting point for discussion and asked commissioners for input. (Just before the News went to press, a special meeting of the EMC Water Quality Committee was called for Jan 25 to give interested parties an opportunity to comment on the draft revised Neuse River nutrient management plan. This meeting will be reported on in the next issue.)

## Senate Select Committee

The Senate Select Committee on Water Quality, co-chaired by Senator Beverly Perdue, has held a series of meetings to discuss water quality in the Neuse River. At the first meetings, the committee heard from residents near New Bern and users of the river about problems. At the last three meetings, the committee has heard from university scientists about research findings and management recommendations and from state agency personnel about regulatory and voluntary nutrient control programs and management recommendations.

At the committee's meeting on Jan 11, Senator Perdue announced that a meeting would be held Jan 30 to announce voluntary initiatives to help improve water quality in the Neuse.

## Water Resources Research 1996 Seminars

The Water Resources Research Institute is continuing a seminar series on current issues and research projects. Presentations take place either in the Ground Floor Hearing Room of the Archdale Building (downtown Raleigh) or in Room 1132 of Jordan Hall on the campus of N.C. State University. Seminars begin at 10:00 am.

**Feb 27, 1996, Jordan Hall**
*Denitrification Dynamics of an Estuarine Headwater Creek Receiving Agricultural Runoff*
Professor Hans Paerl
Institute of Marine Sciences
UNC-Chapel Hill

**March 25, 1996, Archdale**
*The Control of Cryptosporidium: Where Do We Stand?*
Professor Emeritus Daniel Okun
Department of Environmental Sciences and Engineering
UNC-Chapel Hill

**April 23, 1996, Jordan Hall**
*Efficacy of Carbon Adsorption and Membrane Separation*
Professor Fran DiGiano
Department of Environmental Sciences and Engineering
UNC-Chapel Hill

**May 20, 1996, Archdale Building**
*Grass and Riparian Buffer Treatment of Runoff from Land Receiving Animal Waste*
Professor Wendell Gilliam
Department of Soil Science
N.C. State University

# Risk Assessment and Its Role in Environmental Protection

*In 1994, Congress directed the U.S. Environmental Protection Agency to ask the National Academy of Public Administration (NAPA) to review EPA's relationships with states and communities and how the Agency sets environmental priorities and to determine if the nation is focusing its resources on the most pressing environmental problems.*

*NAPA convened a panel of experts in public administration and environmental issues which worked 10 months and issued its report,* ***Setting Priorities, Getting Results: A New Director for EPA****, in the spring of 1995.*

*Two principal recommendations of the review panel were that EPA turn over more responsibility for environmental programs to states and that the Agency refine and expand its use of risk assessment and use comparative risk assessment to help set environmental priorities.*

*In the Nov/Dec issue of the* ***WRRI NEWS****, we examined the issue of passing on to states more responsibility for environmental programs. In this issue, we examine the analytical technique of risk assessment and perspectives on its value for setting environmental priorities.*

Many scientists, policy analysts, and lawmakers think the American public is irrational when it comes to health and the environment. They also think that when politicians respond to citizen's fears and enact health and environmental laws that the public demands, the government spends a lot of tax money on the wrong things and burdens the economy needlessly. As evidence that public irrationality drives environmental policy they point to examples such as the following:

In a 1989 Roper poll, Americans identified chemicals and other hazardous substances as the most serious environmental risks, and because the public is so afraid of toxic chemicals, Superfund, the program to clean up hazardous waste sites, has accounted for a major share of the U.S. Environmental Protection Agency's budget for more than a decade. However, scientists say the public exaggerates the danger from hazardous substances, and EPA considers the risk posed to human health and the environment by most abandoned hazardous waste sites low.

Similarly, for 30 years, U.S. government efforts to cite a disposal facility for high-level radioactive waste have been blocked by overwhelming public opposition. In a 1989 poll, more than 80 percent of Nevadans said their state government should do all it could to prevent citing a nuclear waste facility at Yucca Mountain. However, technical experts believe that nuclear wastes can be stored safely in deep, underground isolation and that the accumulation of waste at nuclear sites around the country poses a greater hazard than a single site would.

In the same vein, a 1992 review of polls on perception of drinking water safety revealed a substantial slide in confidence between 1987 and 1988 persisting into 1990, with 45 percent of those polled saying their drinking water was worse than it had been five years ago. People expressed these opinions at the same time drinking water across the country was being more and more tightly regulated.

Experts think that public irrationality stems from lack of technical understanding of the degree of risk posed by specific environmental conditions and lack of awareness of the economic consequences of unexamined reactions to perceived threats. They believe that if the public better understood risks and economic consequences, it would be easier to realign environmental policy with what experts think is rational. Therefore, policy experts and risk scientists have, for at least a decade, been calling on Congress to "communicate risk" to the American public and to adopt a formal analytical method called "risk assessment" to help set "rational" environmental priorities.

In its 1985 annual report, the Council on Environmental Quality (CEQ) concluded that the nation's environmental protection effort could make little additional progress without a change in strategy. Rather than continuing to focus on eliminating all pollution, said the CEQ, "we must accept that the main business of environmental protection is the reduction of risk." The council recommended a strategy of focusing resources on a "few obtainable, measurable objectives" and accepting that "given the inevitable limitation of society's resources, . . . less important objectives will not be completely carried out." To choose objectives for environmental protection programs, CEQ recommended EPA use "risk

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calculations, or at least some explicit comparative statements about the extent to which various options prevent damage to environmental values."

### Risk Assessment: What is it; where did it come from?

Methods for conducting the "risk calculations" CEQ referred to had been developed in the 1970s by EPA and other agencies to meet requirements that regulation of toxic substances be based on firm scientific foundation. These quantitative risk assessments involve estimating the toxicity of a substance, estimating the exposure of a population to the substance, and combining information from these estimates to produce an upper-bound point estimate that describes the cancer risk for the population exposed. The estimate is expressed as the number of additional cancers expected to result in a certain number of exposed people, such as 1 in 10,000 or 6 in one million. The assessments are used to demonstrate the threat from substances and to justify controlling them in the workplace or general environment.

Because information on toxicity and exposure is often lacking or incomplete, quantitative risk assessments require the use of assumptions based on professional judgment. They are, therefore, rife with uncertainty: Sometimes they produce wide ranging upper and lower estimates. In addition, they are sensitive to the assumptions being used, and, therefore, vulnerable to manipulation and open to disagreement about assumptions.

Nevertheless, when it was suggested that various risks can be estimated and compared to produce a ranking and identify problems to which resources should be devoted, risk assessment became a policy tool.

As the 1985 CEQ made clear, proponents of risk assessment assert that the nation has only so much money to spend on environmental problems and that we should take care of the worst problems first. Performing risk assessments, based on scientific knowledge of the nature of threats to health and the environment, they contend, allows us to discover and address the worst problems.

## Risk: Two views

Technical experts and the general public view risk differently. Experts focus on hard facts about potential harm when they try to determine which risks should be addressed and how much money should be devoted to specific risks.

The general public, however, considers many other factors when they decide which risks or what level of risk they are willing to accept. Risk "perception" has been the focus of much recent psychological and sociological research. This research has revealed that, when thinking about risk, the public also considers whether risks are:

- involuntary (Voluntary risks are more acceptable than risks forced on people.)
- uncontrollable (If people have the ability to prevent or reduce the risk, the risk is more acceptable.)
- immoral (Any risk viewed as evil is not acceptable regardless of the level of risk.)
- unfamiliar (A familiar risk like driving a car is more acceptable than a risk from an unpronounceable chemical.)
- dreadful (Cancer risk is unacceptable because cancer is much feared.)
- uncertain (If scientists are uncertain about the level of risk, the risk is less acceptable.)

*Source: Walter, Martha, ed. 1995. Reporting on Risk: A Handbook for Journalists and Citizens. Michigan Sea Grant College Program.*

### The rise of comparative risk assessment in EPA

During his second stint as EPA Administrator from 1983 to 1985, William Ruckelshaus identified risk assessment as a tool for priority setting and initiated action on CEQ's recommendations for the use of comparative risk assessment. He established EPA working groups to develop cross-media comparative risk methodology for ranking broad environmental problem areas. His successor, Lee Thomas, continued the effort to apply risk assessment to priority setting. The result of the Ruckelshaus-Thomas efforts was a 1987 self-study of EPA priorities titled *Unfinished Business: A Comparative Assessment of Environmental Problems*. This study ranked 31 environmental problems in terms of relative risk and showed that EPA's budget priorities (determined by Congress) were not in line with what the agency's own experts considered the biggest environmental risks.

After requesting an evaluation of *Unfinished Business* by EPA's Science Advisory Board, the next EPA Administrator William Reilly, also embraced comparative risk assessment. He vigorously promoted the use of risk assessment for setting environmental priorities. However, Reilly's announcement that EPA would use comparative risk assessment for internal priority setting provoked ire in the environmental community and congressional hearings in 1991 and 1993. Since it is the role of Congress to set environmen-

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tal priorities through legislation, Reilly's use of comparative risk assessment to reset priorities within the Agency did not please some in Congress. Although some in Congress favored use of comparative risk assessment (Senator Daniel Patrick Moynihan introduced legislation in 1991 that would have institutionalized the ranking of environmental risks to assist in policy making*), other lawmakers were steadfastly opposed.

### Objections to comparative risk assessment for priority setting

Not everyone agrees with the 1985 CEQ assertions that the nation should abandon the effort to eliminate pollution and that there must be arbitrary limits on spending for environmental protection. In a 1991 Senate committee hearing, Senator David Durenberger asserted that the nation does not have to take a "zero sum approach" to environmental protection.

"The assumption is that resources are limited. [I]t seems to me that repealing the requirement that service station owners clean up leaking tanks would in no way affect private dollars available for ozone depletion or indoor air pollution or drinking water contamination. Even if these are higher priorities, I don't see how they could be used to justify unabated pollution of groundwater by gasoline tanks."

Many challenge the assertion that risk assessment always reveals the worst problems. Opponents of risk assessment—among them most environmental organizations—point out that many assumptions go into risk assessments and cite actual instances within EPA in which such assumptions have been politically influenced. Most environmental organizations view risk assessment as a methodology which applies a veneer of objectivity to disguise political and value judgments inherent in policy and regulatory decisions. Joe Thornton of Greenpeace characterized risk assessment as "scientific language used to justify oppressive policies."

At the 1991 Senate committee hearing, Senator Howard Metzenbaum agreed that it makes sense "to tackle problems according to the danger they pose" but noted that EPA's Science Advisory Board admitted that without better scientific data, conclusions about relative risk are tenuous and depend in large measure on professional judgment.

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**On Jan 4, 1995, Senator Moynihan introduced S 123 which would require the Administrator of EPA to identify and rank risks to public health and the environment, evaluate the costs associated with various risks, and report the rankings periodically to Congress. The bill is pending.*

## Duke University Center for Hydrologic Science Spring Speaker Series

*Presentations will be in 116 Old Chemistry and refreshments will be served 15 minutes prior to the lecture.*

Kirk Nordstrom
U.S. Geological Survey
*Negative pH Ultra-acidic Mine Waters & the Challenge of Environmental Restoration*
January 26th, 3:00

Philip Bennett
University of Texas
*The Hydro-bio-geo-chemistry of a Petroleum Contaminated Aquifer*
February 16th, 3:00

Gerald Grisak
Interra, Incorporated
Title TBA
February 23rd, 3:00

Linda Abriola
University of Michigan
Title TBA
March 1st, 3:00

Wilfried Brutsaert
Cornell University
Date & Time TBA

For information contact:
Stuart Rojstaczer, Director
Phone: 919-684-3159
FAX: 919-684-5833, r
Web site:
http:/www.geo.duke.edu/hydro.html

## EROSION AND SEDIMENTATION CONTROL WORKSHOPS

*To familiarize design professionals with erosion and sediment control requirements and design applications*

**Marriott-Crabtree, Raleigh NC**
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- Successful Case Histories in Bioengineering for Streambank Protection
- Phosphogypsum & Basins
- Field Work Training: Inspections
- Plan Review: What do you look for?

**Fee:** $35. Covers materials, breaks, and two lunches.

**Bring:** Your erosion and sedimentation control design manual, engineering scale, and a calculator.

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"Frankly," said Metzenbaum, "I don't think that's very reassuring. The idea that scientists and technicians might use 'professional judgment' and not real scientific evidence to decide whether the problems at toxic waste sites, for instance, are of relatively low risk, is troubling."

At the same hearing, Donald Hornstein of the UNC School of Law argued that use of risk assessment to target activities for regulation would magnify the advantage that special regulated interests with technical lobbyists now have over the larger, dispersed population that bears environmental risks. Use of formal, scientific decision making would provide even stronger motivation for special interests to deploy technical specialists "to represent their interests at all important decision and predecision points," Hornstein argued.

Others reject the use of risk assessment because they reject the idea that public opinion leads to irrational policy. At a forum on risk assessment in 1992, Barry Commoner asserted that public opinion was the "guiding force" that brought about the substantial improvements in environmental quality accomplished since the 1960s.

## The two faces of the current risk assessment controversy

In 1994, the issue of risk assessment leapt to prominence in the nation's capitol when the effort to promote comparative risk assessment for priority setting converged with efforts to change the quantitative risk assessment practices EPA uses to estimate cancer risks from chemicals.

The perception had been spreading in Congress that when faced with lack of data or uncertain data needed for risk assessments, EPA uses assumptions that produce overly protective and unjustifiably expensive regulations. In efforts to force more rational regulation, specific requirements for conducting risk assessments were coupled with requirements for conducting benefit-cost analysis and attached to numerous pieces of proposed legislation.

Amendments requiring EPA to consider the costs versus health and environmental benefits of cleanup actions at abandoned hazardous waste sites were attached to legislation to reauthorize the Comprehensive Environmental Response, Compensation and Liability Act (Superfund). Requirements that federal agencies compare the risks of environmental health hazards and the cost of controlling them were attached to the Safe Drinking Water Act. Amendments to require the Environmental Protection Agency to assess and compare the relative risks of environmental problems when crafting regulations were attached to the Clean Water Act.

Environmental groups mounted strong opposition to the risk assessment/benefit-cost analysis requirements, and disagreement between environmentalists and regulatory reformers not only sank efforts to reauthorize most of the nation's principal environmental laws but also helped to scuttle plans to elevate the U.S. Environmental Protection Agency to cabinet status.

In Nov 1994, the complexion of Congress changed, and the new Republican majority took up the torch of "rational" environmental policy. Requirements for using risk assessment/benefit-cost analysis to set environmental priorities and develop environmental regulations are a central part of this continuing effort. Among the bills passed by the House during the first 100 days of the 104th Congress was H.R. 1022, the Risk Assessment and Communication Act of 1995, which declares: "To provide more cost-effective and cost-reasonable protection to human health and the environment, regulatory priorities should be based upon realistic consideration of risk; the priority setting process must include scientifically sound, objective, and unbiased risk assessments, comparative risk analysis, and risk management choices that are grounded in cost-benefit principles." The bill requires that risk assessments present not only the upper-bound, or protective, estimate of risk but also the plausible lower bound estimate.

## NAPA's recommendations for use of risk assessment

In its report, the NAPA panel suggests that Congress's interest in risk assessment reflects a desire to "reduce policy

*continued page 10*

### Call for Papers

The Texas State Soil and Water Conservation Board, U.S. EPA and others have issued a call for papers for the **Second National Workshop on Constructed Wetlands for Animal Waste Management** to be held May 15-18, 1996, in Fort Worth, TX. Submit paper title, authors' names, affiliations, and abstract (max one page) by Feb 1, 1996, to: Paul J. DuBowy, Dept. Wildlife and Fisheries Sciences, Texas A&M University, College Station, TX 77843-2258. (Questions to DuBowy at 409/845-5765; p-dubowy@tamu.edu) Requests to be placed on the mailing list for future announcements about the workshops should be directed to the same address.

A call for papers has been issued for the **1996 Stockholm Water Symposium: Safeguarding Water Resources for Tomorrow—New Solutions to Old Problems** to be held Aug 4-9, 1996, in Stockholm, Sweden. Prospective authors should submit a one-page abstract to the Symposium Secretariat no later than Feb 1, 1996. Full details of the submission process are included in the Call for Papers available from Stockholm Water Symposium, Stockholm Water Co. S-106 36 Stockholm Sweden (phone +468-736 2021; Email: sympos@sthwat.se).

problems to ones that can be solved by mechanistic procedures." But, it warns, "members of Congress and other decision-makers who have displayed a strong desire for more objective and precise quantitative estimates of environmental risks and of the costs and benefits of environmental protection will be disappointed."

According to the NAPA panel, neither risk assessment nor benefit-cost analysis can answer the most crucial questions about environmental problems, and it is a mistake to assume that environmental policy should be science driven.

"That assumption is flawed in two respects: first, the scientific tools available today are not precise enough to yield crisp answers about risk; and second, subjective, value-laden decisions influence every step of the process. Neither risk assessment nor environmental policy can be made objective."

Nevertheless, the report says, EPA needs but does not have a mechanism to help it select risks for priority attention and help Congress identify policy choices for addressing the risks. For these purposes risk assessment can be useful, but not sufficient.

**Comparative risk assessment.** The NAPA panel proposes that the principal mission of EPA should be to set national standards for reducing risks to human health and the environment and to build knowledge about opportunities to reduce those risks. EPA should attempt to anticipate serious risks and develop strategies for preventing or reducing these risks, it says.

To help identify serious risks, EPA should engage the public or its representatives in comparative risk assessments in which the technical results of formal risk assessments are considered along with social and economic values to rank risks. These risk-ranking exercises should be regularly reported to Congress so that the information can be reviewed when Congress writes environmental statutes or reviews EPA's budget proposals.

**Quantitative risk assessment.** Because formal quantitative risk assessments can provide useful information to inform policy and regulatory decisions, EPA should continue to use risk analyses but should improve its risk assessments by

- dedicating additional resources to collecting and analyzing baseline environmental data;
- using scientific data rather than default assumptions whenever possible;
- broadening the scope of analysis to include non-cancer risks, cumulative health risks, ecological risks, economic impacts, and a fuller knowledge of societal impacts;
- making assumptions and uncertainties explicit.

The NAPA panel also warns against taking the interest in analysis to "counterproductive extremes," cautioning both Congress and EPA to not let risk analysis become "an expensive and time-consuming endeavor that contributes little additional insight into environmental problems . . . or a basis for transferring decision-making from EPA to the courts."

Finally, noting that current environmental priorities reflect the public's sense of what is important and that Congress is not likely to change those priorities without a signal that the public agrees, the NAPA panel also concluded that a significant change in public attitudes may be necessary before any reordering of environmental priorities is possible. The report echos the decade-long call for a "dialogue between citizens and risk experts about the risks they face and the various public and private tools available for reducing those risks."

# Senate passes Safe Drinking Water Act bill, House begins work

On November 29, the Senate unanimously passed S 1316 "To reauthorize and amend the Safe Drinking Water Act." The senate bill reauthorizes the entire act, authorizes a $1 billion-a-year drinking water State Revolving Fund, and introduces several new features and requirements.

In December, a narrow bill to provide money for public drinking water systems (H.R. 2746) was introduced by the House Transportation Committee. The House Commerce Committee has jurisdiction over health aspects of the Safe Drinking Water Act and is expected to introduce a reauthorization/reform bill soon.

The Senate bill has the backing of a number of utility and government organizations, including the American Water Works Association and the National Governors' Association.

Among the features of S 1316 are the following:

- overhauls the standard-setting process (see Nov/Dec 1995 News for description of some provisions regarding development of regulations and standard setting);
- provides that up to $300,000 of annual state grants to State Revolving Funds (SRFs) may be used to provide technical assistance to small systems;
- requires that states obtain the legal authority to ensure that all new community water systems and new nontransient, noncommunity water systems commencing operation after Oct 1, 1998, demonstrate technical, managerial, and financial capacity to implement national primary drinking water regulations and provides for withholding of part of SRF grants for states that do have that authority;
- provides that loans may be made from SRFs to localities to purchase land for source water protection purposes and provides for establishment of Source Water Quality Protection Partnership Programs by states;

- authorizes EPA to list point-of-use treatment devices as best available technology; and
- requires that EPA provide public documents in support of regulations that make clear the populations affected by a health risk, upper-bound and lower-bound estimates of the health risk, uncertainties involved in the risk assessment, health risk reduction benefits of the regulation, and costs expected as a result of compliance with the regulation.

A section which would have directed EPA to annually identify and rank health and environmental risks and report the risk ranking to Congress was deleted from the bill.

# Digest

**Progress report on State Water Supply Plan.** The N.C. Division of Water Resources (DWR) has produced a progress report on the State Water Supply Plan. The report covers the period Sept 1, 1994, to Aug 31, 1995. According to the report, 93 percent of the local water systems that are required by law to develop local water supply plans have demonstrated some effort to comply. As of July 10, 1995, DWR had approved 247 local plans and was working with an additional 244 systems that had submitted a plan. DWR has entered into its State Water Supply Plan database data on 41 percent of the state's local supply systems representing 65 percent of the state's population served by public water suppliers. The progress report also addresses water withdrawal and transfer registrations and interbasin transfers, and includes a sample of the analyses that will be used to prepare the State Water Supply Plan, including population growth, growth in water use, technical assistance needs, and water loss reduction programs. For more information or a copy of the report, contact the Division of Water Resources at (919) 733-4064 or visit the division's web page at http:// www.dwr.ehnr.state. nc.us/dwrhome.htm.

**North Carolina Environmental Indicators.** The first report on the status and trends of environmental quality within North Carolina has been published by the State Center for Health and Environmental Statistics. The information presented in North Carolina Environmental Indicators generally represents monitoring data collected by the state from 1989 through 1993 to meet requirements of regulatory programs in the areas of air, water, waste and natural resources. Data on marine fisheries, however, cover a 20-year time span (1975 through 1994). Among the troubling information presented are plummeting stock indicators for some of the state's commercially important fish and shellfish species, including bluefish, summer flounder, weakfish, and oysters. Also of concern are data showing an increase in the amount of hazardous waste being treated at in-state facilities for ultimate disposal and an accompanying decrease in the amount of hazardous waste being recycled in state. Also of interest is an increase in the number of industrial facilities generating and shipping low-level radioactive waste. See Publications Received for information on obtaining *N.C. Environmental Indicators*.

**Infrastructure Needs.** Rebuild America—a coalition of engineering, contracting, and public works professional organizations—says it is concerned about the deteriorating condition of the nation's physical infrastructure. Among the concerns are water supply and wastewater infrastructure. The coalition cites EPA as the source for information showing that annual costs of meeting mandates of the Safe Drinking Water Act will reach $3 billion per year for the next two decades and that capital needs for the nation's drinking water systems are more than $150 billion. It also says that $137.1 billion will be needed to meet requirements of the Clean Water Act by the year 2012 and that, by that year, the nation will need to increase the number of facilities providing wastewater treatment by 3,353. According to the coalition, North Carolina ranks number 4 among the states in its need for wastewater treatment projects, with an investment of more than $7 billion needed.

**Final bottled water rule.** Nearly two years after publication of the proposed rule, the U.S. Food and Drug Administration has issued the final rule establishing a standard for identifying bottled water. The rule means that as of May 13, 1996, bottled water labels must identify the water using terminology prescribed by the regulations. The regulations define artesian water, ground water, purified water (including demineralized, deionized, distilled, and reverse osmosis water), sparkling bottled water, spring water, sterile water, and well water. The rule requires that bottled water that is taken from a community water system and not treated so as to qualify as "purified" or "spring" water must be labeled "from a community water system" or "from a municipal source." It also requires that when labeling implies (as by a picture) that the water is for use in feeding infants but the

*continued next page*

**Solutions: A Technical Conference on Water Quality**

**March 19-21, 1996**
**Jane S. McKimmon Center**
**NCSU Campus, Raleigh**

For conference information contact Joe Zublena: (919) 515-3252
For registration contact the McKimmon Center: (919) 515-2277

product is not sterile according to standards of the rule, that the label must bear the statement "Not sterile. Use as directed by physician or by labeling directions for use of infant formulas." The bottled water industry had pressed for the standard of identity rule to deflect charges that some companies intentionally use misleading labeling. The final rule was published in the Nov 13, 1995, *Federal Register*.

**Lake bed is hot bed of dust storms.** Built in 1913 to bring water to the young community of Los Angeles, California, the LA Aqueduct was considered the engineering marvel of its time. While it helped turn a small town into a major metropolis, the aqueduct had another unforeseen consequence—a lake bed that's a hot bed of dust storms. Owens Dry Lake kicks up more dust than any other single place in North America. Sometimes, it gets so bad that dust fills the sky from one end of the 120-mile-long Owens Valley to the other. It's estimated the lake bed lofts four million tons of dust particles into the air each year, including between two and four million tons of salt brought to the surface by groundwater evaporation. The U.S. EPA has found the dust in southern Owens Valley in serious violation of $PM_{10}$ air quality standards, which means it poses hazards to public health. EPA has ruled that by February 1997, a plan must be developed that will reduce Owens Lake dust emissions to acceptable levels by December 2001. The plan is to be developed by the Desert Research Institute of the University and Community College System of Nevada. — *DRI News* Second Quarter 1995

**Flood form required for loans.** As of January 2, 1996, lending institutions are required to complete a Standard Flood Hazard Determination Form for every loan secured by improved real estate or a mobile home. This requirement is set forth in the National Flood Insurance Reform Act of 1994, Title V of the Riegle Community Development and Regulatory Improvement Act of 1994 (PL 103-325). It requires any bank, savings and loan association, Farm Credit System institution or credit union to complete the form to determine whether a building or mobile home is located within an identified Special Flood Hazard Area, whether flood insurance is required, and whether federal flood insurance is available. Use of the form will help ensure that required flood insurance is purchased. The final rule requiring the form was issued jointly by several agencies in the *Federal Register*, Vol 60, No 129 July 6, 1995. The form is available via the Federal Emergency Management Agency's fax-on-demand systems FEMA FAX. Dial (202) 646-3362 and request document #16002. On the internet it can be obtained at http://www.fema.gov/fema/whatsnew/html. — *Natural Hazards Observer* Sept 1995

**Financial losses from recent weather extremes.** A list of the most costly U.S. insured disasters published by the *Wall Street Journal* May 15, 1995, included seven weather-related disasters that occurred in the last 15 years. Included were Hurricane Andrew, with $15.5 billion worth of claims; winter weather of 1983, with damages of $880 million; and the May 1995 storms in Texas and New Mexico, with claims of $1.1 billion. According to the German insurance company Munich Re, high costs associated with weather extremes in the U.S. have been part of a global increase in such losses. The company predicts that average annual loss burdens from natural disasters could reach $25-30 billion by the end of the decade. One cause for the increased cost associated with weather disasters is that people are building more frequently in vulnerable areas. But, the company says, "the evidence that emerging climate changes are having an ever greater influence on the frequency and intensity of natural disasters has become stronger." — *Global Change* August 1995

# Water-related courses offered by N.C. universities fall semester

**Duke University**

**Center for Hydrologic Science**

**Mechanics**
ENV 230 Weather & Climate
GEO 221 Hydrogeology
GEO 251 Physics of the Earth (introduction to geophysics)
**Transport**
CE 225 Dynamic Engineering Hydrology
CE 260 Vadose Hydrology
ENV 234 Watershed Hydrology
GEO 200 Beach & Coastal Processes
**Chemistry**
ENV 221 Soil Resources
GEO 269 Theoretical Geochemistry
**Quantitative Methods**
ENV 225 Water Quality Modeling
GEO 250 Applied Mathematics for the Environmental & Earth Sciences
*For information contact Stuart Rojstaczer at (919) 684-5833 or hydro@geo.duke.edu.*

**Department of Civil and Environmental Engineering**
CE 122L Fluid Mechanics
CE 245 Pollutant Transport Systems
CE 270 Environmental and Engineering Geophysics
EGR 115 Engineering Systems Optimization
*For additional information contact Pauline A. Roberts at (919) 660-5200.*

**School of the Environment**

ENV 242 Environmental Aquatic Chemistry
ENV 290 Physical Oceanography
ENV 312 Wetlands Ecology and Management
ENV 356 Environmental Fluid Mechanics
*Contact Bertie Belvin (919-613-8071) for registration.*

## North Carolina State University

**Department of Civil Engineering**

CE 381 Hydraulic Systems Measurements Lab
CE 382 Hydraulics
CE 383 Hydrology and Urban Water Systems
CE 384 Introduction to Environmental Engineering
CE 474 Environmental Engineering Laboratory
CE 481 Environmental Engineering Project
CE 484 Water Supply and Waste Water Systems
CE 571 Theory of Water and Waste Treatment
CE 574 Chemistry & Microbiology for Environmental Engineers I
CE 575 Modeling and Analysis of Environmental Systems
CE 586 Engineering Hydrology
CE 589 Special Topics - Air Pollution Control
CE 689 Hazardous Waste Management

**Department of Chemical Engineering**

ChE 5980 Special Topics Waste Minimization: Advances in Pollution Prevention Environmental Management for the Future
*For additional information contact Michael Overcash at (919) 515-2325*

**Department of Forestry**

FOR 401 Watershed and Wetlands Hydrology
FOR 472 Renewable Resource Policy and Management

**Department of Marine, Earth and Atmospheric Sciences**

MEA 101 Geology I (Kimberley 5-7831)
MEA 110 Geology I lab (Stoddard 5-7939)
MEA 130 Intro. to Weather and Climate (Watson 5-7076)
MEA 135 Intro. to Weather and Climate lab (Watson 5-7076)
MEA 200 Intro. to Oceanography (Knowles 5-8705)
MEA 210 Intro. to Oceanography Lab (Knowles 5-8705)
MEA 311 Physical Climatology (Davis 5-7243)
MEA 313 Meteorology Lab I (Riordan 5-7973)
MEA 411 Marine Sediment Transport (Leithold 5-7282)
MEA 430 Scientific Issues and Global Problems (Hopkins 5-7771)
MEA 460 Principles of Physical Oceanography (Morrison 5-7449)
MEA 463 Fluid Physics (Janowitz 5-7837)
MEA 463L Fluid Physics Lab (Janowitz 5-7837)
MEA 468 Invertebrate Paleo Biostratigraphy (Showers 5-7143)
MEA 468L Invertebrate Paleo Biostratigraphy Lab (Showers 5-7143)
MEA 473 Principles of Chemical Oceanography (DeMaster 5-7026)
MEA 501 Environmental Fluid Mechanics (Janowitz 5-7837)
MEA 501L Environmental Fluid Mechanics Lab (Janowitz 5-7837)
MEA 510 Geological Oceanography (Snyder 5-7912)
MEA 511 Marine Sediment Transport (Leithold 5-7282)
MEA 540 Fourier Analysis of Geophysical Data (Shaw 5-7276)
MEA 560 Principles of Physical Oceanography (Morrison 5-7449)
MEA 565 Hydrogeology (Evans 5-7015)
MEA 571 Principles of Chemical Oceanography (DeMaster 5-7026)
MEA 574 Biogeochemistry (Blair 5-7883)
MEA 591* Evolution of Ocean Margins (Snyder 5-7912)
MEA 593* Climate Modeling (Semazzi 5-1434)
MEA 622 Marine Plankton Ecology (Kamykowski 5-7894)
MEA 664 Perturbation Method in Fluid Mechanics I (Janowitz 5-7837)
*Instructors and NCSU phone numbers are given for course information. Courses will be assigned a letter in place of the '*' prior to Fall 1996.*

**Department of Soil Science**

SSC 200 Soil Science
SSC 461 Soil Physical Properties and Plant Growth
SSC 511 Soil Physics
SSC 621 Advanced Soil Chemistry
SSC 680 Transport & Fate of Chemicals in Soils and Natural Waters

*NCSU students may sign up for courses listed above through the TRACS system. Degree students at other universities participating in the inter-institutional program may sign up through inter-institutional registration. Non-degree students may sign up through the NCSU Division for Lifelong Education (919) 515-2261 (non-credit) or (919) 515-2265 (credit).*

## North Carolina Agricultural & Technical State University

**Department of Natural Resources and Environmental Design**

AGEN 410 Hydrology
AGEN 600 Conservation, Drainage and Irrigation
AGEN 701 Soil and Water Engineering
EASC 622 Environmental Sanitation and Waste Management (Water Quality Analysis)
*Interested individual can obtain information from the Registrar's Office at 910/334-7595 or course information from Godfrey A. Gayle at 910/334-7543.*

**Department of Civil Engineering**

CIEN 362 Hydraulics
CIEN 363 Hydraulics Laboratory
CIEN 310 Environmental Engineering
CIEN 311 Environmental Engineering Laboratory
CIEN 560 Water Resources Engineering Design
*For course information contact Emmanuel Nzewi: E-mail: nzewi@ncat.edu Phone: (910) 334-7737.*

## University of North Carolina at Chapel Hill

**Department of City and Regional Planning**

PLAN 200 Regional Environmental Planning
*For course information contact David H. Moreau at (919) 962-4756.*

**Department of Geology (tentative)**

GEOL 125 Coastal Sedimentary Environments
*For course information contact Cathy Cash (919) 966-4516.*

**University of North Carolina at Charlotte**

**Department of Civil Engineering**

CEGR 5146 Engineering Hydraulics
CEGR 5090 Groundwater Pollution Analysis
CEGR 5892 Individual Study: Advanced Water Treatment Technology
*For course information, contact Dr. Jy S. Wu (704-547-4178 or jwu@uncc.edu) or Dr. Jack Evett (547-4139).*

**Department of Geography and Earth Sciences**

ESCI 2101 Environmental Dilemma
ESCI 3124 Sedimentology
ESCI 3170 Environmental Quality Management
ESCI 3250 Dynamic Meteorology
ESCI 4140 Hydrologic Processes
ESCI 4145 Fundamentals of Hydrogeology
*For course information contact Becky Guy at (704) 547-2293. Individuals wishing to enroll should contact the UNC-C Office of the Registrar (704) 547-3487 for enrollment information.*

**University of North Carolina at Wilmington**

**Center for Marine Science Research**

BIO 236 Biology of the Sea
BIO 460/567 Limnology
BIO 560 Estuarine Biology
BIO 564 Biological Oceanography
CHM 377 Environmental Chemistry
CHM 435 Aqueous Analytical Chemistry
GLY 150 Oceanography
*For course information contact James Merritt (910) 256-3721.*

## North Carolina Precipitation/Water Resources

| | November | December |
|---|---|---|
| **Rainfall** | | |
| Asheville | 3.66" (+0.07") | 1.43" (-2.09") |
| Charlotte | 5.05" (+1.82") | 1.23" (-2.25") |
| Greensboro | 3.49" (+0.52") | 1.36" (-2.00") |
| Raleigh | 4.67" (+1.69") | 1.88" (-1.36") |
| Wilmington | 1.56" (-1.55") | 2.09" (-1.54") |

**Streamflow**

| Index Station (County, Basin) | Nov mean flow (CFS) (% of long-term median) | Dec mean flow (CFS) (% of long-term median) |
|---|---|---|
| 1 Valley River at Tomotla (Cherokee, Hiwassee) | 340 (254%) | 217 (95%) |
| 2 Oconaluftee River at Birdtown (Swain, Tenn) | 774 (207%) | 447 (85%) |
| 3 French Broad River at Asheville (Buncombe, FB) | 2700 (165%) | 1860 (91%) |
| 7 South Fork New near Jefferson (Ashe, New) | 443 (126%) | 344 (74%) |
| 8 Elk Creek at Elkville (Wilkes, Yadkin/Pee-Dee) | – --- | 51 (58%) |
| 9 Fisher River near Copeland (Surry, Yadkin/Pee-Dee) | 193 (138%) | 120 (73%) |
| 11 South Yadkin River near Mocksville (Rowan, Yadkin/PD) | 435 (187%) | 263(81%) |
| 15 Rocky River near Norwood (Stanley, Yadkin/Pee-Dee) | 3292 (644%) | 855 (76%) |
| 16 Deep River near Moncure (Lee, Cape Fear) | 3302 (910%) | 946 (86%) |
| 17 Black River near Tomahawk (Sampson, Cape Fear) | 809 (238%) | 592 (83%) |
| 19 Trent River near Trenton (Jones, Neuse) | 129 (230%) | 94 (65%) |
| 20 Contentnea Creek at Hookerton (Greene, Neuse) | 1388 (504%) | 719 (122%) |
| 22 Little Fishing Creek near White Oak (Halifax, Pamlico) | 195 (319%) | 105 (71%) |
| 23 Potecasi Creek near Union (Hertford, Chowan) | 116 (310%) | 88 (60%) |

**Groundwater**

| Index well (Province) | Nov depth below surface (ft) (departure from average for month) | Dec depth below surface (ft) (departure from (average for month) |
|---|---|---|
| 5 Blantyre (Blue Ridge) | 26.85 (+6.83) | 27.52 (+5.99) |
| 10 Mocksville (Piedmont) | 14.12 (+3.87) | 14.29 (+3.17) |
| 21 Simpson (Coastal Plain) | 3.79 (+1.32) | 3.98 (-0.13) |

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

# Upcoming workshops and conferences

The N.C. State University Industrial Extension Service and Division of Continuing Studies will present **ON THE FRONT LINE: AN ENVIRONMENTAL REGULATORY UPDATE FOR ENVIRONMENTAL PROFESSIONALS** Feb 19-20, 1996, at the Jane S. McKimmon Center in Raleigh. The course is intended for individuals who operate within the regulatory auspices of the U.S. Environmental Protection Agency. Professional Engineers and Registered Land Surveyors can receive 7 or 14 Professional Development Hours. For information on program content call Linda Taylor, P.E. at 919/515-5958. For registration information contact Gertha Heggie at 919/515-8175.

The International Ground Water Modeling Center of the Colorado School of Mines in Golden will present **GROUND WATER STATISTICS AND REGULATIONS** March 25-26, 1996, and **APPLIED GROUND WATER MODELING: PRACTICAL USE OF GROUND WATER MODELS IN MICROSOFT WINDOWS** March 27-29, 1996, in Atlanta. For information about course content contact (303) 273-3103. To register by phone call (303) 273-3321.

The Ontario Ministry of Environment and Energy, EPA, AWWA and others are sponsoring a **CONFERENCE ON STORM-WATER AND WATER QUALITY MANAGEMENT MODELING** Feb 22-23 and a three-day, hands-on workshop on the **USEPA SWMM4 MODEL WITH PCSWMM, AND SHELLS**

Feb 19-21, 1996 in Toronto. For information call CHI in Guelph, Ontario, Canada at 519-767-0197 or email: wjames@net2.eos.uoguelph.ca.

The UNC School of Public Health and the N.C. Section of AWWA will present a videoconference **CURRENT DRINKING WATER REGULATORY CONCERNS: CRYPTOSPORIDIUM AND DISINFECTION BY-PRODUCTS** Feb 14, 1996. Video conference locations are UNC-Asheville, UNC School of Public Health in Chapel Hill, UNC-Charlotte, PPPCC Health Department in Elizabeth City, Cumberland County Health Department in Fayetteville, East Carolina University in Greenviile, Catawba Health Department in Hickory, Department of Public Instruction in Raleigh, New Hanover Regional Medical Center in Wilmington, and Bowman-Gray School of Medicine in Winston-Salem. For information contact the Office of Continuing Education, School of Public Health at (919) 966-4032 or oce@unc.edu.

The North American Lake Management Society will present the 5th Annual Southeastern Lakes Management Conference, **ON THE EDGE: PROTECTING LAKES THROUGH WATERSHED MANAGEMENT** March 20-23, 1996, at the Hilton Hotel in Huntsville, Alabama. For information call NALMS at (303) 781-8287.

## Position Available

The Atlanta Regional Commission announces a vacancy for a Senior Environmental Planner. Master's in environmental planning, water resources management or related field and one to two years experience. Knowledge of statistical techniques and GIS. Database management ability and ability to run water resources computer models and analyze issues. No closing date announced, but will not close before Jan 17. Send resumes to Human Resources Division, Senior Environmental Position, Atlanta Regional Commission, Building 200, Suite 300, 3715 Northside Parkway, Atlanta, GA 303027-2809. For additional information call (404) 364-2500.

## Nature Conservancy Internships

Several seasonal internships are available with the N.C. Chapter of the Nature Conservancy. Interns have the opportunity to gain experience in conservation biology and natural resource management while making valuable contributions to efforts to preserve rare and endangered plants, animals and natural communities. Internships are: Naturalist/Environmental Education Intern at Nags Head Woods, Southwest Mountains and Seasonal Mountain Stewardship Ecologists, and Southeast Coastal Plain Ecologists. Application deadlines are in early February. For more information contact The Nature Conservancy, N.C. Chapter, 4011 University Drive, Suite 201, Durham, NC 27707 (910/762-6277).

## Relevant World Wide Web Sites

The Aquatic Plant Information Retrieval System is now online, available through the Internet as a World Wide Web site: http://aquat1.ifas.ufl.edu.

The Regulatory Resource Center has established a Web site to track proposed state regulations. The North Carolina section of the site provides access to more than 1,600 regulations culled from the North Carolina Register: http://www.netscan.com/rrc/nc/nc_main.html.

Rand Corporation abstracts can be searched by choosing Research Areas, then Publications options at: http://www.rand.org/

## Publications Received

*Residents of North Carolina may borrow these publications from the Institute for a period of two weeks. If you need copies to keep, please request them from the organizations issuing the publications. Addresses are provided for this purpose.*

**Groundwater**

Biological Treatment of Contaminated Air Streams Created during the Cleanup of Contaminated Soils and Aquifers. 1994. Project Report A-129 of the Oklahoma State University Environmental Institute, 003 Life Sciences East, Stillwater, OK 74078-0281. (56 pages) (04-B)

**Soils and Sediments**

Soil Survey of Beaufort County, North Carolina. 1995. USDA Natural Resources Conservation Service, 4405 Bland Rd., Ste 205, Raleigh, NC 27609. (132 pages plus maps) (08-D)

Soil Survey of Camden County, North Carolina. 1995. USDA Natural Resources Conservation Service, 4405 Bland Rd., Ste 205, Raleigh, NC 27609. (106 pages plus maps) (08-D)

Risk of Pore Water Hydrogen Sulfide Toxicity in Dredged Material Bioassays. 1995. Miscellaneous Paper D-95-4 of the Dredging Operation Technical Support Program of the U.S. Army Corps of Engineers, Waterways Experiment Station, 3909 Halls Ferry Road, Vicksburg, MS 39180-6199. (16 pages plus tables) (08-D)

**Water Quality**

Water-Quality Conditions at Selected Landfills in Mecklenburg County, North Carolina, 1986-92. U.S. Geological Survey WRI Report 95-4067. Available from Earth Science Information Center, Open-file Reports Section, Box 25286, Mail Stop 517, Federal Center, Denver, CO 80225. (112 pages) (05-E)

Falls Lake Watershed Study Final Report. Oct 1995. Vols I & II. The Cadmus Group Inc. 1920 Highway 54, Executive Park, Ste 100, Durham, NC 27713. (Falls of the Neuse)

**GAO Reports**

RURAL DEVELOPMENT: USDA's Approach to Funding Water and Sewer Projects. GAO/RCED-95-258.
NATIONAL PARKS: Difficult Choices Need to Be Made About the Future of the Parks. GAO/RCED-95-238.
SUPERFUND: System Enhancements Could Improve the Efficiency of Cost Recovery. GAO/AIMD-95-177.
HAZARDOUS WASTE: Benefits of EPA's Information System Are Limited. GAO/AIMD-95-167.
*U.S. General Accounting Office, P.O. Box 6015, Gaithersburg, MD 20884-6015 (202/512-6000)*

**Miscellaneous**

North Carolina Environmental Indicators. June 1995. State Center for Health and Environmental Statistics, N.C. Department of Environment, Health, and Natural Resources, P.O. Box 29538, Raleigh, NC 27626-0538 (or call David Vogt at 919/715-4474).

Assessing Immunotoxicity Risks from Exposure to Complex Mixtures of Environmental Contaminants. 1994. Project Report A-128 of the Oklahoma State University Environmental Institute, 003 Life Sciences East, Stillwater, OK 74078-0281. (11 pages)

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