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CONTENTS

CONCERN MOUNTS OVER DEVELOPMENT IN DRINKING WATER SUPPLY WATERSHEDS

Urbanization, industrialization, and agricultural developments in water supply watersheds is impacting water quality, reducing water storage, and limiting the use of some waters. Areas around the country are faced with conflicting pressures to develop watersheds, while the public wants the cleanest water possible for recreation and drinking.

This problem, now facing area decision makers, is explored in a recently published book entitled, *Drinking Water Supplies--Protection through Watershed Management*. It notes water supply systems and local governments must formulate watershed management strategies, incorporating a variety of measures and institutional arrangements, to protect raw water supplies from polluting land uses. The authors, Raymond Burby, Edward Kaiser, Todd Miller, and David Moreau, explain that "because it is difficult to mandate exactly how privately owned land may be used, watershed management programs must rely on a carefully thought-out management process and a broad range of tactics to bring about and maintain proper types of watershed development."

This complicated issue of watershed management has emerged as a controversy over controlling development in the Falls Lake-Jordan Lake watersheds. On one side are developers, who realize that lakeside residential areas are in demand, and they want to meet that demand. Also, the entire area is growing and developers see a need for more housing. Recently, though, there has been a great deal of interest in controlling, or managing, the growth and development, especially around Falls Lake, which threatens to diminish the value of this $169 million public investment. Efforts to limit development are based on concern for the water quality of what is to be Raleigh's primary source of drinking water by 1985. There are already 49 wastewater discharges upstream from Falls Lake. But it is the location of private sewage treatment plants in the watershed that has ignited much of the recent public interest and spurred public officials into further consideration of the issue.

Now there are fears that private treatment plants could malfunction and contaminate the water by releasing raw sewage into the lake. Another problem is that current wastewater treatment facilities do not remove nutrients (nitrogen and phosphorus), so it is likely that the lake will experience nuisance algal blooms. Wastewater treatment plants are also unable to remove synthetic chemicals, such as solvents and pesticides, and these could pollute the water. There are also concerns for the urban and agricultural runoff contributions of sediments, nutrients, and other pollutants to the lakes.

Some officials have stated that it is much better to adopt measures to protect water quality before an area becomes urbanized. Thus, action now could encourage the use of best-management and least-cost solutions to the problem. A major difficulty in dealing with this issue is that there are multiple jurisdictions involved. The Falls Lake watershed encompasses several counties and numerous cities and towns. Thus, the critical question is not only what management plan *should be* adopted, but also who should carry it out. Triangle J Council of Governments' Water Resources Planning Committee has asked NRCD for help in developing appropriate management strategies. NRCD Secretary Grimsley called a meeting on June 15 of planners, county commissioners, mayors, and other leaders in the watershed to discuss the issues and initiate management approaches.

Some of the technical solutions that have been suggested to protect the lakes are requiring wastewater treatment plants to remove phosphorus, a phosphate detergent ban, sediment control, implementation of agricultural best management practices, density limitations or zoning, detention basins, and buffer zones.

The North Carolina Environmental Management Commission has imposed a temporary moratorium on sewage discharge permits and has asked for an upgrading of the stream classification in the Falls Lake and Jordan Lake watersheds to provide increased areas to be suitable for drinking water and for swimming.

The Environmental Management Commission is also considering the need to classify these lakes "nutrient sensitive waters." High nutrient levels of nitrogen and phosphorus accompanied by nuisance algae problems could result in the nutrient-sensitive waters classification and set into motion requirements to remove nutrients at wastewater treatment plants as currently required by communities on the Chowan River.

NUTRIENT MANAGEMENT STRATEGY DEVELOPED FOR NEUSE RIVER BASIN

A nutrient management strategy for the Neuse River Basin has been developed by the N. C. Division of Environmental Management (DEM). The strategy recommends immediate short-term actions to reduce nutrient inputs from the basin as well as steps to develop a long-term management plan. These plans are described in a new DEM report, *Nutrient Management Strategy for the Neuse River Basin.*

DEM plans to work toward implementation of some controls as soon as feasible, according to the report. The enactment of a phosphate detergent ban in the basin is being considered. In addition, efforts will begin to make contributors of nutrients--both point and nonpoint sources--aware of the Neuse's eutrophication problem.

The commercially important Neuse, which drains 6,200 sq mi in the North Carolina Piedmont and Coastal Plain, is overenriched with nutrients, and algal blooms have been a problem. For more than a decade, reports from the lower river have cited a dark substance that clings to boats and nets. The substance was identified as a bloom of a green filamentous algae that entraps diatoms.

Studies of the Neuse have included an intensive ambient monitoring program by DEM, begun in 1978, and Institute-sponsored research by Dr. Hans Paerl of the UNC Institute of Marine Sciences and Dr. Donald Stanley of East Carolina University. Information gathered shows that levels of chlorophyll a, an indicator of algal biomass, have doubled since the early 1970s.

Further studies are necessary to determine which nutrient, nitrogen or phosphorus, is more important to control and the magnitude of reductions necessary. However, studies to date indicate that the river is nitrogen limited, pointing to the need for nitrogen controls in the basin. According to the report, only 20 percent of the nitrogen appears to be coming from point sources so control measures for that nutrient would need to be targeted primarily for agricultural sources. Phosphorus reductions are also desirable, since reducing only nitrogen inputs would tend to favor nitrogen-fixing blue-green algae. Also, phosphorus appears to be readily controllable, with almost 50 percent estimated to come from point sources such as municipal wastewater treatment plants.

Recommended short-term actions to reduce nutrient inputs to the Neuse include working with the N. C. Agricultural Task Force toward implementing a specific program of voluntary best management practices (BMPs), such as the one developed in the Chowan-Albemarle basin. Also, a presentation on the Neuse River problem should be made to state Division of Forestry personnel so they can be aware of the situation and determine if any change of emphasis is required in their BMP program for the Neuse basin, the report stated.

DEM is beginning a detailed evaluation of available means for reducing point-source nutrients. One step being considered, a phosphate detergent ban, could reduce phosphorus concentration in effluent from municipal wastewater facilities by at least 30 to 40 percent, resulting in a 15 to 20 percent reduction in phosphorus inputs from the Neuse basin. The report also states that "all point source dischargers should be put on notice that some nutrient control may be required in the future. Municipal facilities should begin investigating means to reduce nitrogen to less than 3 mg/l and phosphorus to less than 1 mg/l."

The short-term actions will be followed by a two-phase work plan: (1) A one-year effort leading to a detailed "Action Plan" will involve refining short-term actions taken this year and addressing key issues such as the magnitude of nutrient reductions necessary and the effectiveness of point-source phosphorus reductions. (2) An additional two-year effort to develop a water quality management plan will involve answering several monitoring, analysis, and research questions as well as working with agricultural and forestry groups on nutrient-reduction programs.

Additional funds to carry out this work are being sought from the Legislature.

WHITE OAK RIVER ESTUARY INVESTIGATION COMPLETED

A year-long multidisciplinary investigation of the White Oak River estuary has been completed. The study, funded by both a special appropriation of $50,000 from the 1981 N. C. General Assembly to the Department of Natural Resources and Community Development (DNRCD) and a grant of $10,000 from the UNC Sea Grant College Program, was initiated because of concerns expressed by local citizens about sedimentation, water quality, and fisheries in the White Oak River.

This project was administered through the Water Resources Research Institute and directed by project manager Dr. David A. Adams of N. C. State University. He was assisted by a team of university scientists: Larry K. Benninger of the University of North Carolina-Chapel Hill, Paul E. Hosier of the University of North Carolina-Wilmington, and Margery F. Overton and James P.

Reed of N. C. State University. This investigation also involved representatives from the Department of Natural Resources and Community Development's Office of Water Resources, Office of Coastal Management, Division of Marine Fisheries, Division of Environmental Management, and Geodetic Survey Section; Henry Von Oesen and Associates; Water Resources Research Institute; the Department of Transportation's Division of Highways; UNC Sea Grant College Program; U. S. Army Corps of Engineers; East Carolina University; and members of the White Oak River Advisory Council.

The study team had three objectives: (1) define water circulation and sediment patterns within the White Oak estuary, (2) determine their impact upon water quality, navigation, and fisheries, and (3) analyze the effects of proposed alternative channel modifications upon (1) and (2). The results of the investigation are presented in a report set consisting of a final summary report, five technical appendices, and a preliminary engineering report. The major conclusions from the research are:

1. Sedimentation is occurring in the estuary above the Swansboro-Cedar Point causeway (N. C. Route 24 causeway and bridge).

2. Sandy sediments being deposited in the lower estuary originate in the Bogue Inlet environment and do not come from the White Oak River. Attempts to improve circulation within the lower area by dredging new channels may extend the deposition zones farther upstream unless steps are taken to eliminate the sediment source in the Bogue Inlet area.

3. The total amount of ocean water entering the lower river during the flood cycle will not be changed by improvement of existing channels or creation of new ones. Additional channels will reduce the velocities in existing ones.

4. Channels and shoaling patterns south of the causeway have changed considerably over the past 100 years, with Bogue Inlet proper migrating over an area about 1.5 miles wide. These patterns are expected to continue into the foreseeable future.

5. No evidence of a declining fishery was found. The White Oak River estuary supports populations of fish and clams comparable to other North Carolina estuaries. Production of marketable oysters has been meager since the late 1800s. This can be attributed to overcrowded conditions where the density of oysters is very high. Commercial fisheries landings of most species have been high during the past five years when compared to preceding years.

6. None of the channel modification alternatives considered produced any measurable change in habitat quality for oysters, clams, spot, croaker, or brown shrimp.

The 1982 session of the General Assembly appropriated an additional $10,000 to follow up on the investigative efforts of the White Oak River. Potential uses of these funds could be implementation of some of the following currently proposed management plans: (1) a new navigational marking system for existing channels so that public convenience and safety can be achieved, (2) specific monitoring or scientific test required to complement the completed research, (3) engineering work on small navigation projects to enhance recreational boating and fishing opportunities, and (4) further demarcation protection of primary nursery areas.

Additional details on the White Oak River project are available from Bob Pellegrini, Office of Water Resources, North Carolina Department of Natural Resources and Community Development.

VIRGINIA STARTS FILTER STRIP INCENTIVE PROGRAM

A new $500,000 program in Virginia is aimed at reducing the amount of harmful runoff from farmland draining into the Chesapeake Bay and Chowan River systems. According to B. C. Leynes, Jr., Director of the Virginia Soil and Water Conservation Commission, farmers in the watersheds who have signed up for the USDA payment-in-kind (PIK) program are eligible for the "Virginia Filter Strip Incentive Program." Participants will be paid 10 cents per linear foot (20 cents for *both* sides of a waterway) to plant and maintain grass filter buffers averaging at least 20 feet wide beside streams and rivers on their farms. About 12,000 Virginia farmers are eligible for the 3-year program and may sign up between May 16-July 15, 1983.

> Filter strips are considered an effective measure that anchors soil along the waterways' banks and protects banks against scour and erosion. By trapping eroded soil from land uphill, the strips keep sediment out of streams and rivers. The strips further improve water quality by filtering out herbidices, pesticides, fertilizer and microorganisms that might otherwise reach waterways. The buffers also provide food, cover and travelways for wildlife.

The program money will be distributed on a first-come, first-served basis with payment being made at the rate of 50 percent the first year and 25 percent the following two years. Farmers would be paid a total of more than $200 per acre. The Virginia Soil and Water Conservation Commission will administer the program through the state's soil and water conservation districts. The USDA's Agricultural Stabilization and Conservation Service will help distribute information to eligible farmers and sign up participants.

. . . *NACD Tuesday Letter 5/17/83*

SMALL COMMUNITIES FACE LARGE COSTS OF WASTEWATER TREATMENT

The May *Journal Water Pollution Control Federation* contains an article entitled "Cost of Clean Water--Impact on Small Communities," which points out that smaller communities pay a higher per capita cost for wastewater treatment. As higher levels of treatment are required, treatment costs have risen for all. But small communities face other difficulties, such as higher bond interest rates because of lower per capita revenues and lower bond rating. (Also, many small communities must bear the cost of building sewers.)

Federal grant money has been available for water pollution control facilities such as wastewater treatment plants. However, small communities have received a disproportionately small share of these funds. The paucity of federal grants has created a backlog of needed projects, but now the grant program is scheduled for reduction--grants after October 1984 will pay 55 percent of the eligible costs, whereas current grants pay 75 percent. Thus, the wastewater treatment projects of small communities will now have to be funded with reduced federal grant support or possibly none at all.

It is recommended that less costly treatment processes like oxidation ponds, lagoons, and filters be used wherever possible. This article also indicates that low-interest loans such as the 5 percent, 40-year loans available from the Farmer's Home Administration can help offset the reduction in grant monies. Such a loan, in combination with a 55 percent grant, can result in approximately the same user charges as a 75 percent grant. This loan program has limited funds, but this article calls for it to be "available to smaller communities on a wider scale to help them deal with water pollution problems."

BURLINGTON INDUSTRIES RECEIVES WASTE MANAGEMENT AWARD

Governor James B. Hunt, Jr., presented the first Governor's Award for Outstanding Achievement in Waste Management to the Furniture Division of Burlington Industries, Inc. Joe McCauley, executive vice president of Operations for Burlington Furniture, said during the ceremony, "I am pleased to accept this award on behalf of all employees of Burlington Furniture, and especially our division engineering staff for their creativity and hard work in making this project a success."

The new awards program, sponsored by the Governor's Waste Management Board, is designed to publicly recognize industries and institutions in North Carolina that have exhibited outstanding achievement in protecting North Carolina's environment through superior waste management practices.

The award-winning project both saves money and conserves energy. The Lexington plant of Burlington Industries was nominated by the North Carolina Textile Manufacturers Association for its innovative Furniture Refuse Energy System. The system uses an incinerator to burn hazardous wastes, which produces steam to heat the plant, and for other purposes. In addition to recovering energy for usage in plant operations, the system also saves the plant approximately $900,000 per year in avoided waste disposal costs.

"Burlington Industries can be proud of its accomplishments," Governor Hunt said. "It will serve as a fine example to other industries in this state that good waste management practices can bring environmental and economic benefits."

"Achievements in Waste Management," a booklet detailing the 1982 award entries, is available from the Office of the Governor's Waste Management Board at 919/733-9020.

. . . *Waste Line*

OPEN MARSH WATER MANAGEMENT BEING EVALUATED FOR MOSQUITO CONTROL

The Ad Hoc Committee for Open Marsh Water Management appointed by Dr. Ronald H. Levine, State Health Director, Division of Health Services, has completed its initial charge to identify assessment, beneficial and otherwise, studies that should be made in conjunction with a pilot Open Marsh Water Management project in salt marshes near Hobucken in Pamlico County and West Onslow Beach at the Onslow/Pender County line.

Their report, recognizing physical differences in salt marshes along the eastern seaboard and within the state, recommends two years of pre-alteration and two years of post-alteration data for the assessment.

Open Marsh Water Management designs include combinations of shallow ditches and small ponds. These are configured to reduce mosquito populations by biological and physical means in lieu of insecticide applications. Salt marsh mosquitoes that breed in selected portions of the marsh are fierce biters and strong fliers. The study is being supported by the Vector Control Branch of the Division of Health Services, N. C. Department of Human Resources.

MOUNTAIN CONSTRUCTION IMPACTING WATER QUALITY

Summer home development is posing serious damage to watersheds in western North Carolina. This is the conclusion drawn by the North Carolina Sedimentation Control Commission following a three-day tour of western North Carolina counties, June 1-3.

"The rapid growth of vacation home development is jeopardizing the water quality of many of our mountain streams," said Dr. Joseph A. Phillips, chairman of the eleven-member commission. "The problem is not the number of new developments, but rather the lack of planning for proper erosion control by the developer before construction begins."

Under the North Carolina Sedimentation Pollution Control Act, a developer must file an erosion control plan with the state for any development larger than one acre. Failure to follow such a plan could result in fines of up to $100 a day.

"Many times developers fail to file an erosion control plan until they are found in violation; and because of this, severe erosion and sediment problems have already occurred," Phillips said. "We're now seeing that the growing popularity of summer homes in our mountains is encouraging many developers to construct roads and homes on slopes so steep that even the best erosion control practices couldn't hold up under a heavy rain," he added.

In a meeting following the tour, the commissioners pointed out that the cost of stabilizing erosion on steep slopes could in some cases cost more than a lot itself.

"Prospective home buyers should also beware," Phillips said. "Once the property has been purchased the homeowner may become responsible for erosion control, and on the steeper slopes that can be very expensive in the long run, often requiring constant maintenance. Landslides and loss of the roadways are very likely to occur in many instances, creating access problems as well as sediment damage."

The western North Carolina field trip was part of an annual inspection tour by commission members. The commission is a part of the North Carolina Department of Natural Resources and Community Development.

U.S. SENATE AND HOUSE INTRODUCE WATER RESEARCH LEGISLATION

Both the Senate and House have introduced the Water Resources Research Act of 1983. The Senate version, S. 684, was introduced by James Abdnor and Daniel Moynihan and a similar House version, HB 2911, by Congressman James McNulty. Co-signers of the House version included Congressmen Ike Andrews and James Clarke of North Carolina.

The new legislation, if enacted, would authorize an ongoing program of water resources research. Under the program funds would be provided to the state Water Institutes to assist the nation and the states in augmenting a water resources science and technology program that could identify and find practical solutions to water and water resource problems and to coordinate the nation's water research program.

Federal funds would be authorized and matched by state funds to carry out the provisions for research, information dissemination, and graduate training.

Both bills also contain provisions for a matching-grant program which would authorize grants to be made to universities, private foundations, private firms, individuals, and agencies of local and state government for research concerning any aspect of a water resource-related problem which the Secretary of Interior may deem to be in the national interest.

For details,contact your own congressman or senator. If you need to contact the sponsors of the legislation, their names and addresses are:

Senator James Abdnor
Subcommittee on Water Resources
Senate Committee on Environment and Public Works
Senate Office Building
Washington, DC 20510

Telephone: 202/224-2321

or

Congressman James F. McNulty, Jr.
House Committee on Interior & Insular Affairs
House of Representatives
Washington, DC 20515

Telephone: 202/225-2542

NATIONAL URBAN RUNOFF PROGRAM ENDS, RESULTS IN ON WINSTON-SALEM STREET-SWEEPING STUDY

The final meeting for the Nationwide Urban Runoff Program (NURP) was held in Washington, DC, this past April. The closing of one of the most extensive data collection and urban runoff management study efforts conducted by the Environmental Protection Agency brought together the results, recommendations, and questions of the 28 nationwide participants.

The NURP was initially established in 1978 by EPA to solve a need for additional data in order to characterize water quality from urban runoff so that viable planning decisions could be made. Previous water quality studies had indicated urban runoff as a probable nonpoint water quality problem source and suggested various best management practices such as retention, detention, infiltration, grassy swales, and street sweeping. The latter practice was evaluated in several projects across the nation, including the one in Winston-Salem, North Carolina. The Division of Environmental Management, the lead agency for the Winston-Salem NURP study, is presently putting the final touches on the study report to Congress. DEM supplied the following information on some of the NURP findings.

Besides the primary objective, each study area was involved in the following secondary objectives: (1) characterization of pollutant types, pollutant loads and their effect on receiving waters; (2) the determination of the need for runoff control; and (3) the evaluation of stormwater pollution controls.

The results of the studies indicated that certain best management practices (BMPs) were effective and others were not. Street sweeping fell into the latter category for the majority of the nation, approximately 80 percent. The remaining 20 percent, where there is a definite wet and dry season, would perhaps have a better chance of using street sweeping as a BMP. A few of the problems that were associated with street sweeping ineffectiveness were:

1. the inability to collect street solids precisely before the occurrence of a rain event as required;
2. the breakup of large size particles, making them more susceptible to washoff, or an armoring effect in which larger-size particles,which had previously blocked the small sizes from washing off,are removed;
3. the inability to sweep during seasons in which removal is hampered, as by snow in winter and heavy leaf accumulation in autumn; and
4. curbside parking and sweeper efficiency, which, however, were minimal in the overall review.

Though hundreds of pounds of street solids were collected on a daily basis, there was no evidence of a beneficial effect on water quality. In at least two projects, a detrimental effect was evidenced by incorporating a sweeping program. What is strongly suspected in these instances was the break-up of the street solids or an armoring effect. One major problem that makes a sweeping program very ineffective is the high pollutant loading rates associated with rainwater. Up to 60 percent of the loading for certain parameters in the runoff could be associated with the rainfall.

The recommendations that can be made in view of the problems for existing sweeping programs are:

1. sweeping where the accumulation is greatest, (80 percent of the total accumulation), from one foot from the curb to the curb;
2. sweeping immediately prior to a rain event (accumulation on the streets peaks after approximately two days and rains occurred on the average of every four days);
3. concentrating on the 45-micron particle size and larger, since these were the largest percentage of the accumulation by weight;
4. proper street-sweeping speed;

5. effective parking regulations, which allow sweeper access to the curb area;

6. concentrating on areas of watershed where accumulation is highest;

7. disposal of street solids where they will not be readily available for washoff; and

8. proper training of drivers and regular maintenance of the street sweepers.

Preventing a problem is usually easier and more cost effective than eliminating it. For an existing urban area where a water quality problem due to runoff might already exist, "urban housekeeping" through public awareness has considerable potential. One of the NURPs compared two neighborhoods, one rundown and the other "well kept." The residents of the well-kept neighborhood were concerned about their area and, unlike those in the rundown area, practiced urban housekeeping. The preliminary results of the study suggest that the well-kept neighborhood had better water quality because of the residents' concern and practices. Various urban-housekeeping techniques that could work towards better water quality in urban streams that the public could be made aware of are:

1. proper fertilizer and pesticide application (when, where,and how to apply)

2. eliminating refuse (litter) disposal into streams and surrounding stream banks

3. detergent, oil,and other chemical disposal

4. animal litter control

Public involvement, awareness, and pride are important factors in cleaning, and keeping clean, urban streams.

Water quality management in areas that have the potential to become urbanized is another topic that has brought much discussion from planners, developers, and concerned citizens. A number of best management practices have been suggested as possible preventive measures before runoff becomes a problem. A few of the preventive measures would require legislation, whereas others would require structural modifications. Legislative action could include:

1. limited and controlled growth in watersheds

2. maximum allowable impermeable surface area in a development (develop an impermeable vs. permeable surface-area ratio)

3. stricter erosion-control ordinances (controls on smaller tracts of developing land)

4. limited access or denial of hazardous material transport through watersheds

5. eliminating the practice of accumulating leaves in the streets for municipal pickup

6. limited or no application of sand or salts to street surfaces

7. eliminating illegal discharges

In order to help finance such controls or their enforcement, some areas have adopted a runoff rate charge.

A structural best management practice that offers the most promise is detention basins. A number of basins are currently in effect and appear to have a beneficial effect on water quality if designed properly. Dry basins and those designed primarily for flood control do not work as effectively. However, there is current research to determine whether these can be modified for water quality. Detention basins are probably far more likely to be incorporated into a proposed development than into an existing one due to land limitations, though land acquisition may be determined to be cost effective if the need is perceived.

Infiltration for certain areas also has had beneficial effects on urban water quality, with no reports of degradation to groundwater.

EPA is working on their conclusions and recommendations to Congress concerning the effects of urban runoff and a final report which should be out the latter part of this year.

A great deal has been learned from this study, and it is expected that more will be gained with the broad data base that will be extensively used for comparisons for years to come.

REPORT ON POCOSINS AND CAROLINA BAYS RELEASED

The Fish and Wildlife Service has published a report entitled, "The Ecology of Southeastern Shrub Bogs (Pocosins) and Carolina Bays: A Community Profile" by Rebecca R. Sharitz and J. Whitfield Gibbons. This work is a synthesis of available literature. It describes the shrub bogs of the Atlantic Coastal Plain; details the physical, chemical, and biological features of pocosins and Carolina bays; and discusses the impact of human activities on these ecosystems. Increasing development poses a threat to many kinds of wetlands, and this threat makes clear the need for ecological information on these communities.

This publication explains that Southeastern shrub bogs occur in areas of poorly developed internal drainage that typically but not always have highly developed organic or peat soils. Pocosins and Carolina bays are two subclasses of shrub bogs on the coastal plains of the Carolinas and Georgia. They share roughly the same distribution patterns, soil types, floral and faunal species composition, and other community attributes, but differ in geological formation. Pocosins and Carolina bays harbor a number of animal groups and may be locally important refuges for a variety of species.

Carolina bays may contain pocosin as well as other communities but are defined more by their unique elliptical shape and geomorphometry. According to this profile, the pocosin community is largely defined by its vegetation, a combination of dense shrub understory and a sparser canopy. It, too, is part of a complex successional sequence of communities (sedge bogs, savannas, cedar bogs, and bay forests) that may be controlled by such factors as fire, hydroperiod, soil type,and peat depth.

The shrub bog community of pocosin and Carolina bay ecosystems is, according to the authors, one of the most poorly understood of the natural wetlands in the eastern United States, and the rapid disappearance of of these habitats due to environmental alterations associated with land use and development is, thus, of critical importance.

The information in this community profile should be useful to all environmental planning groups, ecosystem managers, and concerned laymen in the Coastal Plain, as well as to students and professional wetland ecologists.

A copy of this report is available on loan from the Institute or may be requested from:

Information Transfer Specialist
National Coastal Ecosystems Team
U.S. Fish and Wildlife Service
NASA/Slidell Computer Complex
1010 Gause Boulevard
Slidell, LA 70458

UPDATE OF FEDERAL EFFORTS IN WATER CONSERVATION PUBLISHED

The General Accounting Office (GAO) has produced a report entitled, "Water Conservation: An Update of Federal Activity," which has as its stated purpose--to determine the status of federal involvement in water conservation. It is well known that adequate supplies of clean water are vital to our nation's economic and physical well being. There is a finite amount of water; yet, demand for water is increasing. Even now there are areas of inadequate water supply, and many people believe that we will experience major water shortages in the future.

This study points out that there are basically two strategies to be used to combat water shortages--increase the amount of water available or decrease the amount consumed. Current economic realities dictate that we can no longer solve our water supply problems by costly building projects. Instead, we must reduce the demand on our present water supplies by using water more wisely.

According to the GAO report, the current administration believes that state and local governments have the primary responsibility for assuring that future water needs are met. It believes that the cost of water should be allowed to reach its true market value and that state and local governments should assume a greater share of project costs. The administration believes that the "free market" will allow water, water project development, and/or water conservation techniques and devices to establish their own relative values and costs. It is thought that pricing water at its market value will encourage sound water conservation and management practices. The administration intends to (1) continue to support related research activities, (2) provide technical and financial assistance to state and local water managers, (3) gather and disseminate water quantity and quality data, (4) continue its efforts to recover from beneficiaries more of the cost of existing water projects, and (5) advocate cost-sharing for new ones.

This GAO report surveys the water conservation activities of seven federal agencies--Office of Management Budget, Corps of Engineers, Department of Agriculture, General Services Administration, Department of Interior, Environmental Protection Agency, and Department of Housing and Urban Development. It also summarizes state and local conservation efforts.

A copy of this report is available on loan from the Institute. Also, copies may be obtained from:

U. S. General Accounting Office
Document Handling and Information
Services Facility
P. O. Box 6015
Gaithersburg, MD 20760

NEW INSTITUTE REPORTS

Factors Regulating Nuisance Blue-Green Algal Bloom Potentials in the Lower Neuse River, N. C. by Dr. Hans W. Paerl, UNC Institute of Marine Sciences. Segments of the lower Neuse River between Goldsboro and New Bern have shown signs of accelerated eutrophication, including nuisance blue-green algal blooms and high levels of nitrogen and phosphorus, which are algal nutrients. The study described in this report examined the physical, chemical, and biological factors that promote and regulate algal bloom potentials.

The following conclusions were reached:

Excessive (for algal growth) concentrations of both nitrogen and phosphorus are present during most of the year. Reductions in both must be considered immediately. (The magnitude of reductions necessary is being addressed in a continuation of this study, now in progress.)

Biologically available nitrogen is most stimulating to algal growth in the lower Neuse. However, reductions in nitrogen inputs without parallel phosphorus reduction could lead to dominance by nuisance species of blue-green algae that can supply their own nitrogen through the nitrogen-fixation process. The problem algae in the Neuse, the blue-green Microcystis, do not fix nitrogen.

Periods of low river flow, present during 1981 but not during 1982, increase the potential for bloom development and proliferation. The physical environment, including sunlight, river turbulence, and temperature, strongly affects the magnitude of bloom development, since excess nutrients are present year round.

In the Neuse's darkly colored water, the problem blue-green algae, because they are surface dwellers, are able to get the sunlight they need. For this reason, they are favored over the more desirable species, which are more evenly distributed in the water.

Salt-water intrusions into the river above New Bern are not substantial enough to arrest blooms of known blue-green algal species.

These and other conclusions are included in the report, No. 188. The study has provided information to the N. C. Division of Environmental Management for use in formulating a Neuse management plan.

The Freshwater Asian Clam Corbicula fluminea as a Factor Affecting Nutrient Cycling in the Chowan River, NC by Dr. Samuel C. Mozley and Diane D. Lauritsen, N. C. State University Department of Zoology. Bottom-dwelling river organisms can affect nutrient cycling by such means as burrowing, sediment reworking, and excretion. One such source of nutrient recycling in the Chowan River is the Asian clam Corbicula fluminea, whose presence in the river was revealed in a 1980 study by the Investigator.

The study reported here was conducted to find out more about the clam's occurrence in the Chowan and its importance as a source of recycled nutrients, which can contribute to the growth of nuisance blue-green algae.

The project consisted of two parts. First, it was important to determine whether Corbicula is able to use the blue-green algae as a food source. Experiments were done to determine how efficiently the clam assimilates the algae. The second part was to measure the nutrients excreted by the clam.

Among the study's findings are the following:

Corbicula is able to rapidly recycle forms of nitrogen and phosphorus important for algal growth. In parts of the river where the clam is abundant, excretion rates are significantly higher than sediment flux rates of the same nutrients.

Feeding experiments using radiolabeled algae indicate that the clam may not suffer any negative effects of blue-green algal blooms in the river, although long-term feeding and survival studies are needed.

Corbicula appears to have reached stable densities in the Chowan, having invaded the upper river and tributaries between 1974-1978.

Any attempts to model nutrient cycling in the river must take Corbicula abundance into consideration. Efforts are currently underway to more accurately quantify the relationship between Corbicula excretion rates and important variables such as temperature and particular food concentrations.

The report is No. 192.

Copies of these reports may be obtained free from the UNC Water Resources Research Institute, North Carolina State University, 124 Riddick Building, Raleigh, NC 27650-5999, telephone (919) 737-2815. A fee of $8.00 prepaid is charged for out-of-state requests.

TVA TO COSPONSOR WATER-POWER CONFERENCE

Waterpower '83, an International conference which will focus on issues ranging from the development of small hydro projects to building massive pumped storage facilities, will be held in Knoxville, Tennessee, September 18-21.

The conference, the third in a series of biennial waterpower gatherings, is cosponsored by TVA and The University of Tennessee-Knoxville Department of Conferences in cooperation with several other agencies.

TVA is responsible for the technical program, and technical sessions have been arranged into eight subject areas: small and micro/minihydro; conventional hydro and pumped storage; modernization of existing conventional hydro plants; operation; research and development; environmental impacts; financing, licensing and legal issues; and dam safety.

Ely Driver, Chief of the TVA Water Systems Development Branch and conference chairman, said there are more than 150 sessions on the technical program. "We will address a wide range of interests. Not only will the engineers find a number of interesting subjects, but persons with interests in the financial, legal and licensing aspects of water power will be able to attend several sessions dealing with these topics," Driver said.

A preregistration form for the conference may be obtained from The University of Tennessee-Knoxville Department of Conferences, 2106 Lake Avenue, Knoxville, TN 37997-3515.

Other organizations cooperating in the conference include the U. S. Army Corps of Engineers, the Bureau of Reclamation, the Federal Energy Regulatory Commission, the American Society of Civil Engineers, the Institute of Electrical and Electronic Engineering, and the departments of Agriculture, Energy and Housing and Urban Development.

HEALTH EFFECTS SEMINARS AUGUST 11 IN CHARLOTTE-- AUGUST 12 IN RALEIGH

Two health effects seminars, one in Charlotte on August 11 at the Quality Inn Downtown and the other in Raleigh on August 12 at the McKimmon Center, will provide a briefing for water industry professionals on the scientific procedures involved in determining the health effects of contaminants in drinking water. The seminars will present acknowledged national authorities in the chemistry and toxicology of drinking water contaminants. Speakers include Edward J. Calabrese, University of Massachusetts, John Doull, University of Kansas, Russell Christman, University of North Carolina, and Jack Mannion, AWWA Foundation. These speakers are thoroughly familiar with EPA's regulations and procedures and provide an objective appraisal of the science and process used by the Agency in setting drinking water standards.

The seminars are presented by the AWWA Research Foundation in cooperation with the Water Resources Research Institute of The University of North Carolina, the North Carolina Section of AWWA, and North Carolina Division of Health Services. Support for the seminars is provided by the U. S. Environmental Protection Agency, Region IV, Atlanta, GA

Registration for either one of the seminars can be made by writing to the Water Resources Research Institute, 124 Riddick Building, North Carolina State University, Raleigh, NC 27650-5999.

POSITION AVAILABLE

Extension Specialist in Water Management available July 1, 1983. Duties of the position will include development of educational programs and extension materials on water management systems for poorly drained soils to include combination drainage-subirrigation methods. The specialist will work in the water management research program and will interface research results with the educational programs of county extension personnel and technical assistance programs of the Soil Conservation Service. M.S. in Agricultural Engineering or a related discipline required. Applicants should contact Dr. F. J. Hassler, Head, Biological and Agricultural Engineering, P. O. Box 5906, North Carolina State University, Raleigh, NC 27650. Telephone: 919/737-2694.

WATER RESOURCES CONDITIONS IN NORTH CAROLINA

For the fourth consecutive month, streamflow was above normal throughout the State. Rainfall occurred during every week of the month and total amounts in most areas were also above normal. On May 19-21, locally heavy rains caused minor flooding along many small streams in the eastern Piedmont. Minor flooding of low woodlands and croplands occurred along several major streams in the central and southern Coastal Plain region.

Compared to long-term records for the month, mean flows at index gaging stations ranged from 55 percent above normal in Contentnea Creek at Hookerton (Greene County) to 24 percent above normal in South Yadkin River at Mocksville (Davie County).

Ground-water levels in water-table wells rose in the Mountains and declined slightly elsewhere. Levels were generally 2 to 6 feet above long-term averages for the month. For the second consecutive month, water levels in the observation well at Blantyre (Transylvania County) were the highest ever recorded (records began in 1932).

...U.S. Geological Survey

WATER RESOURCES LEGISLATION IN NORTH CAROLINA

Bills Introduced

Senate

S 605 Neuse River basin water study

"To appropriate funds for the development of a Water Quality Management Plan for the Neuse River Basin and to create a Legislative Commission to review water pollution problems and water resources needs, and oversee the development of the Neuse River Basin Water Quality Management Plan." As title indicates. Cited comm'n to consist of three Senators and two nonlegislative residents of Neuse River basin area appointed by the President of the Senate and three Representatives and two nonlegislative residents of Neuse River basin area appointed by the Speaker. President and Speaker are each to designate one legislator as a cochairman of comm'n.

Comm'n and Dep't of Natural Resources and Community Development are jointly to conduct cited review, to make interim report to legislature by Feb. 1, 1985 on action needed to improve water quality of Neuse River, and to submit final "Neuse River Basin Water Quality Management Plan" to General Assembly by May 1, 1986. Also provides for Intensification of analysis and monitoring of Neuse River basin algal problems and development of "Neuse River Basin Action Plan" by June 1, 1984.

Appropriates $6,000 for fiscal 1983-84 and $4,000 for fiscal 1984-85 from General Fund to General Assembly to fund operation of comm'n, and $122,000 for fiscal 1983-84 and $105,000 for fiscal 1984-85 from General Fund to Dep't of Natural Resources and Community Development for purposes of act.

Effective July 1, 1983.

House

H 1246 Chowan/Albemarle study continued

"To continue a Legislative Commission to study the water pollution problems and water resource needs of the Chowan River Basin and the Albemarle Sound Basin." As title indicates. Provides that cited comm'n, created in Ch. 1090, SL 1981 is to continue in order to monitor the progress of the implementation of five-year water quality restoration and protection plan recommended by comm'n. Comm'n is to report its findings to General Assembly by Jan. 1, 1986. Changes comm'n's membership from eight to nine, with additional member to be a resident of area studied who is appointed by the Speaker (other members include two Senators and two area residents appointed by the President of the Senate and two House members and two other area residents appointed by the Speaker).

Appxopriates $5,000 from General Fund to General Assembly for each year of 1983-85 biennium for comm'n's operations, and $10,000 from General Fund for Dep't of Natural Resources and Community development for each year of 1983-85 biennium for printing, operating, and seminar expenses. Effective July 1, 1983.

H 1257 (Joint Res) Haw/Jordan water LRC study

"To authorize the Legislative Research Commission to study the quality of the water in the Haw River and Jordan Reservoir." As title indicates. Comm'n authorized to report findings and recommendations to either 1984 session of 1983 General Assembly or 1985 session.

H 1283 Subdivision water system dedication

"To prohibit cities from requiring dedication of water systems as part of subdivision regulations applicable to areas outside of the city limits." Amends GS 160A-374 (concerning dedication to public of lands or facilities in subdivisions) to prohibit cities, as part of extraterritorial subdivisions regulation, from requiring dedication of water systems or water system facilities as a condition for subdivision approval. Effective Oct. 1, 1983.

AMENDMENTS AND COMMITTEE SUBSTITUTES

House

H 220 Coastal land clearing study (digested in WRRI News No. 205, April 1983 issue, p. 8) Committee substitute reported favorably in House 6/16/83 completely rewirtes original bill so it now provides as follows: (1) authorizes Legislative Research Comm'n to study the impact of large-scale land clearing and peat mining in the coastal area and the adequacy of state management of such activities; (2) requires study to include analysis of the amount of such activities completed and planned, the impact of those activities on water quality, fish and wildlife, groundwater, and finances, the scope and adequacy of existing state laws and regulations, the long-term impact of the activities, and whether environmental impact statement should be required for such activities; (3) requires report and recommendations to 1984 General Assembly; and (4) effective July 1, 1983.

H 232 Water pollution control LRC study (digested in WRRI News No. 205, April 1983 issue, p. 8) Committee substitute reported favorably in House 6/16/83 completely rewrites bill, making it a joint resolution authorizing Legislative Research Comm'n to study the adequacy of existing water pollution control programs. Study is to address the impact of specified waste discharges to NC surface waters, and may include a review of existing water quality classifications and standards, permit and monitoring programs, and cumulative impact of localized and basinwide pollutant contributions on water quality. Comm'n is to report to 1984 General Assembly session.

...Daily Bulletin--The General Assembly of North Carolina Institute of Government, University of North Carolina at Chapel Hill

NEW PUBLICATIONS RECEIVED BY THE INSTITUTE

(Residents of North Carolina may borrow these from the Institute for a two-week period. Where individual copies are desired, readers are encouraged to request copies from the organization issuing the publication. The addresses are provided by the News for this purpose.)

Water Resources Planning

"Proceedings of the National Water Symposium Changing Directions in Water Management--An Infrastructure Financing Policy Symposium," 11/17-19/82, by APWA, Avail. from WPCF Publications Order Dept., 2626 Pennsylvania Ave., NW, Washington, DC 20037, $8 Member WPCF; $10 nonmember. (06C)

"An Investigation of the Carrying Capacity of the Monocacy River as a Scenic and Recreational Resource (#67), 12/82, by F. R. Kuss, et al., WRRC, U. of MD, College Pk., MD 20742. (06A Recreation)

- Vol. I - Maryland Scenic Rivers: The Monocacy Resource Summary Report
- Vol. II - Characteristics and Interpretations of Selected Social and Environmental Considerations Important to the Monocacy River
- Vol. III - The Monocacy River Analysis of Existing Situation and Recommendations for Protecting the River Resource

"Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies," 3/10/83, by WRC, for sale by Supt. of Doc., USGPO, Washington, DC 20402. (06A)

"Federal Register Part III--Water Resources Council Repeal of Water and Related Land Resources Planning Principles, Standards and Procedures; and Adoption of Economic and Environmental Principles and Guidelines for Water Related Land Resources Implementation Studies," 3/10/83, avail. from Supt. of Doc., USGPO, Washington, DC 20402. (06A)

Water Quality Management

"Process Design Manual for Phosphorus Removal," (EPA 625/1-76-001a) 4/76, by USEPA, Nonferrous Metals and Minerals Br., Cincinnati, OH 45268. (05D)

The following summary reports on Metal Finishing are by the Industrial Environmental Research Lab., Nonferrous Metals and Minerals Br., USEPA, Cincinnati, OH 45268. (05D):

- "Control and Treatment Technology for the Metal Finishing Industry - Ion Exchange," (EPA 625/8-81-007), 6/81
- "Control and Treatment Technology for the Metal Finishing Industry - Sulfide Precipitation," (EPA 625/8-80-003), 4/80
- "Control and Treatment Technology for the Metal Finishing Industry - In-plant Changes," (EPA 625/8-82-008), 1/82

"Wastewater Treatment in Soil as a Function of Residence Time in the Root Zone," (Bul. 137), 3/83, by W. L. Magette, et al., VPI&SU, 617 N. Main St., Blacksburg, VA 24060. (05D Land Treatment)

"Environmental Pollution Control Alternatives: Centralized Waste Treatment Alternatives for the Electroplating Industry," (EPA 625/5-81-017), 6/81, by Industrial Environmental Research Lab., Nonferrous Metals & Minerals Br., USEPA, Cincinnati, OH 45268. (05D)

Water Quantity Management

"Hydrology Subcommittee - Guidelines for Determining Flood Flow Frequency," (Bul. #17B), 3/82, by Interagency Adv. Comm. on Water Data, USDI, Geological Survey, Office of Water Data Coordination, Reston, VA 22092. (02E)

"Water Conservation: An Update of Federal Activity," (Study by the Staff of the U.S. General Accounting Office), (GAO/RCED-83-113), 4/83, avail. from U.S. General Accounting Office, Document Handling and Info. Services Facility, P.O. Box 6015, Gaithersburg, MD. 20760, Tel. No. 202/275-6241. (03D)

WATER RESOURCES RESEARCH INSTITUTE
OF THE UNIVERSITY OF NORTH CAROLINA
124 RIDDICK BUILDING
N. C. STATE UNIVERSITY
RALEIGH, NORTH CAROLINA 27650-5999

ITEMS OF INTEREST:

AND MORE ...

SPECIAL ANNOUNCEMENT

ANNOUNCING . . .

TWO HEALTH EFFECTS SEMINARS

Presented by

The AWWA Research Foundation
in Cooperation with the
Water Resources Research Institute of The UNC
The North Carolina Section of AWWA
North Carolina Division of Health Services
With Support From
U.S. Environmental Protection Agency
Region IV
Atlanta, Georgia

Dates & Time	*Location*
8:30 a.m. to 4:30 p.m. August 11, 1983:	Quality Inn Downtown 201 S. McDowell St. Charlotte, NC 28204 (704) 372-7550
August 12, 1983:	McKimmon Center N.C. State University Western Blvd. & Gorman St. Raleigh, NC 27650 (919) 737-2277

An Eye-Opening Educational Experience

AN EYE-OPENING EDUCATIONAL EXPERIENCE. That's what has been said about this program at its six previous presentations. Developed by the water industry's Research Foundation, the program is a briefing for water industry professionals on the scientific procedures involved in determining the health effects of contaminants in drinking water.

Program

Contaminants in Drinking Water: What and How We Know

Recent advances in analytical instrumentation have opened our eyes to a volume of data we are barely beginning to understand. There are serious issues confounding our ability to manage and interpret the data correctly. These issues have practical implications for utilities, regulators, researchers, and the public. Dr. Russell Christman explains and demonstrates the issues and provides simple, straightforward explanations of monitoring techniques, their limitations and applications.

Principles and Procedures of Toxicology

Dr. John Doull, a distinguished scientist with many years of experience in applied research, explains the basic principles of toxicology, including dose-response relationships, acute vs. chronic effects, reversible vs. irreversible damage, local vs. systematic effects, allergic and genetically determined reactions, and how these are used in setting drinking water standards. He surveys the testing procedures used to determine toxic effects, and describes how safe levels are established, considering exposure from all sources, and safety factors. The "no-threshold" approach to carcinogens is explored, along with its implications for estimating risk to humans.

Validity of Methodologies Used to Estimate Risk

This presentation builds on the preceding topics and comments on a validity and weaknesses of tests used to assess mutagenicity, genotoxicity, carcinogenicity, and reproductive toxicity and how they're used in standard setting. The Ames Assay is described, as is the concept of using a battery of animal tests. Dr. Edward Calabrese also evaluates the bio-medical basis of existing standards for inorganic substances and TTHMs, in view of the fact that the drinking water regulations are soon to be revised.

Risk Assessment and Standard Setting

Dr. Calabrese explains the principles of risk assessment with emphasis on high risk groups and the problems they present in setting standards. He comments on the models used to predict cancer risk at low levels of exposure and what that means to the industry. The topic also covers the use of these methods in establishing Maximum Contaminant Levels and suggested toxic levels for unregulated contaminants.

The Making of a Regulation

Mr. Mannion briefly outlines the process used by EPA in developing a drinking water regulation, including the documentation required. He highlights the points where industry and the public have the opportunity to participate in the process and influence the outcome. Recommendations for improving the quality and effectiveness of the dialogue between EPA, industry, and the public will be offered.

Implications for the Water Supply Industry and State Agencies

The audience and the speakers will engage in questions and answers and a general discussion of the implications of this briefing for utilities, State, and Federal personnel.

Speakers

The Speakers

Edward J. Calabrese, Ph.D., Ed.D.
Professor
Environmental Health Program
Division of Public Health
University of Massachusetts

Russell F. Christman, Ph.D.
Chairman and Professor
Dept. of Environ. Sciences and Engineering
School of Public Health
University of North Carolina

John Doull, M.D., Ph.D.
Professor of Pharmacology & Toxicology
University of Kansas

John B. Mannion, Chairman
Director of Development
AWWA Research Foundation

These seminars present acknowledged national authorities in the chemistry and toxicology of drinking water contaminants. They are thoroughly familiar with EPA's regulations and procedures and provide an objective appraisal of the science and process used by the Agency in setting drinking water standards. Their backgrounds and ability to communicate in everyday terms are the outstanding strengths of this seminar.

For information, contact:

Water Resources Research Institute of The UNC
124 Riddick Building
N.C. State University
Raleigh, NC 27650
(919) 737-2815

Information

If You're Asking These Questions . . .

—Is animal testing really a valid way to predict health effects in humans?
—Is it a fair comparison to give very high doses of chemicals to animals when man is exposed to trace amounts?
—Can gas chromatography accurately identify all the compounds found in a given sample?
—Do we have believable data on the health effects of thousands of chemicals?
—Are we going to be confronted by many new MCLs?
—How can States and utilities take a more influential role in setting standards?

. . . YOU'LL GET ANSWERS AT THESE MEETINGS IN CHARLOTTE AND RALEIGH

REGISTRATION FORM

HEALTH EFFECTS SEMINARS

August 11 & 12, 1983

Please send this form to:

Water Resources Research Institute of The UNC
124 Riddick Building
N.C. State University
Raleigh, NC 27650

Check one: ___ August 11, 1983, Charlotte, NC
Quality Inn Downtown

___ August 12, 1983, Raleigh, NC
McKimmon Center

Name and Title: ____________________

Organization: ____________________

____________________ Phone: ____________________

Address: ____________________

____

____________________ Zip code: ____________________

NOTES:

(1) Please register as early as possible. Late registrations will be accepted on a space-available basis only.

(2) Registrations will be acknowledged.

(3) This form registers you for the conference; participants must make their own motel arrangements directly.