

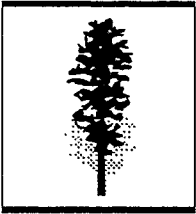


Robert Llewellyn

Clean Water— A Threatened Resource?

by Frank Tursi and Bill Finger

Water quality and water supply problems have reached the 17 river basins and 820,000 wells in North Carolina (no state has more wells). Fish kills, oxygen-depleted water, and other evidence point to a lethal mixture of pollutants in the state's surface waters. Meanwhile, underground storage tanks and other pollution sources endanger the state's groundwater system. As the population grows, water supply needs increase along with sources of pollution. How can North Carolina manage the dual challenge of protecting water quality and ensuring an adequate water supply?



The blue crabs spilled out of the plastic bucket onto the big wooden table. They scurried in all directions, trying to outrun the gloved hand that approached. One male stood his ground and raised his claws defiantly.

Bill Mayo grabbed the crab and held it out for inspection. Almost a quarter of the crab's shell was gone, as if it had just dissolved away. Its organs were visible through the hole.

"I ain't seen nothing like it," said Mayo, who's been a commercial crabber on the Pamlico River for most of his 50 odd years. "I've been working the water all my life and I didn't think nothing could eat through a crab's shell." Bacteria can, and last summer they started eating holes in crabs in the Pamlico River in Beaufort County.

Four years ago, a mysterious fish disease leaving ugly red sores on its victims began killing millions of menhaden, causing fishermen to begin to notice that things weren't right on the river. Once common sea grasses were disappearing, and the oysters were vanishing. So were the striped bass.

"Something's wrong out there," Mayo said one day in late summer as he unloaded his day's meager catch at a crab packing house on the south side of the river. "I don't know what it is but something ain't right."

The Pamlico is being slowly poisoned by a lethal cocktail of industrial, urban, and agricultural wastes. Into the river flow the by-products of modern society—herbicides and insecticides, phosphorus and nitrogen, heavy metals such as lead and mercury, and toxins. They are robbing the Pamlico of its life forces.¹

Two hundred and seventy miles inland, lush Piedmont farmland straddles the line between Guilford and Randolph counties. In the 1940s, a dam on the Deep River was envisioned to flood this farm country, as both a flood control project and as a source of water for the post-war Greensboro population. Never built when land was cheap and "wastewater" was not yet in the dictionary, the project remains on the drawing board today. Wastewater problems in the Deep River, which flows by High Point and would be captured by Randleman Dam, have delayed the project. A 1984 editorial in the *Greensboro News & Record* cautioned that pollution in the Deep River could make the Randleman reservoir "a giant cesspool."²

While the dam would be built in Randolph County, much of the reservoir would back up into Guilford. When federal money appeared to be

available, the Randolph County commissioners, including stock car racer Richard Petty, objected, but the Guilford County commissioners favored it. By the time all the local officials signed on, the dam was no longer needed to control floods, and hence the federal funding was lost. The Randleman Dam reservoir, in short, has hardly gotten past the checkered flag.

If the Randleman Dam project moves no further than it has in the last 40 years, the Guilford officials may have to turn to the Dan River basin. "This alternative would involve a transfer of water from a river basin outside the Greensboro area," says David H. Moreau, director of the Water Resources Research Institute, part of the University of North Carolina system. This process is called an "inter-basin transfer."

With a few notable exceptions, North Carolinians have always been able to count on a clean, abundant supply of water. Fish kills and water shortages have not plagued this state. The horrors of Boston Harbor, the Chesapeake Bay, and oil spills on the Monongahela River in Pittsburgh have always been someone else's problems. But with the dying fish and scores of other signals of declining quality, together with droughts in 1986 and 1987, North Carolinians cannot take bountiful, clean water for granted any longer.

In the last decade, the state's population has grown rapidly, about 1.5 percent a year, to 6.3 million people, the 10th most populous state. More people mean more demand for water, and shortages have begun to appear regularly in some parts of the state. With those new residents come new businesses and industries, new housing subdivisions and condominiums. Growth may be good for the state's economy, but it may be overpowering its rivers and streams. Likewise, groundwater is no longer invulnerable to the abuses that pour into the streams and rivers. More than half of the state's residents depend on underground aquifers for their drinking water. But now, leaks from underground storage tanks, seepage from sanitary landfills and septic tanks, and pesticides from farm runoff threaten the state's groundwater supplies.

The number of industrial, municipal, and private sewage-treatment plants that dump their wastewater into the state's waterways is growing rapidly. North Carolina now has the somewhat dubious distinction of having the most federal wastewater dis-

Frank Tursi, a reporter and editor for the Winston-Salem Journal since 1978, currently covers environmental issues. Bill Finger has been editor of North Carolina Insight since 1979.

charge permits of any state in the Southeast, including the boom-state of Florida. The cumulative number of such permits in North Carolina jumped from 1,500 in 1980 to 3,159 in 1986, an 111 percent increase.

The N.C. Division of Environmental Management (DEM) has the job of processing these permits and inspecting the facilities for compliance. The engineers are working nights and weekends just to keep up with the 100 or so new requests for permits that come in *each month*. The inspectors cannot possibly get to all the permit sites, some of which go years without an inspection. "We've still got over 600 requests for discharge permits on backlog," says George T. Everett, deputy director of DEM. "We

can't catch up at the rate we're going." Meanwhile, the added wastes are damaging rivers and streams. Some can no longer absorb large amounts of additional wastes and still spawn fish or remain sources of drinking water. Other rivers and streams are approaching that point (see sidebar on page 66).

The state's water system is divided into two parts—the overland system of streams, rivers, basins, lakes, estuaries, and reservoirs known as *surface water*; and the underground system of waters known as *groundwater*. Separate legal and administrative systems regulate and monitor surface water and groundwater. In addition, the systems regulating water *quality* are different from those that affect water *supply*. The state agency that sets most of the rules and regulations for water is the N.C. Environmental Management Commission (EMC), composed of 17 citizen appointees meeting monthly.

Water may be to the 1990s what energy was to the '70s: an abundant, undervalued resource taken for granted, but with the potential for great economic disruption if mismanaged. How much time does the state have to change its rules and the public to change its habits?

"The decisions made over the next three to five

years will determine the ability of this state to grow economically and socially and still preserve environmental quality," says R. Paul Wilms, director of the Division of Environmental Management, the primary staffing office for the EMC.³ "I am hopeful that we still have three to five years to make those decisions, that the time hasn't slipped past us."

The Federal Carrot and Stick— The Clean Water Act

North Carolina has 37,000 miles of streams and rivers and millions of acres of reservoirs and lakes. Forty years ago, nobody gave all that water much thought. Like most states, North Carolina

didn't make a serious effort to curb water pollution until after World War II. In 1950, there were about 250 communities with more than 2,500 people. About two-thirds either weren't treating their sewage at all or had very minimal treatment. The city of Raleigh was dumping raw sewage into the Neuse River.

In response to such actions, the 1951 General Assembly directed the State Stream Sanitation Committee, the forerunner of the Environmental Management Commission, to begin the state's first comprehensive water-pollution program. The committee classified waters as to their "best uses," surveyed the extent of the pollution, and started pollution-control programs.

The "best-use" classification system begun in the 1950s has been refined over the years. Today, all surface fresh water is classified into two general categories: water supplies (6,380 miles) and fishable/swimmable (30,998 miles). There are sub-classifications in each category and new classes such as "nutrient sensitive" and "outstanding resource waters."⁴

The federal government got into the act in 1956 by making technical and financial assistance available to local governments for water pollution controls. The federal role expanded in 1965 when

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Volunteer fireman helps people near Pittsburgh, Pennsylvania, fill containers with drinking water. When an Ashland Oil Co. storage tank burst and sent one million gallons of diesel fuel into the Ohio River, towns had to import water for their needs.

to the discharge of dredged or fill materials into U.S. waters, including wetlands.

In addition, the act recognized that “*nonpoint sources*”—runoff from agricultural fields, animal pens, parking lots, and streets, for example—were major contributors of pollution. To control those, the act called for “*areawide waste-treatment management planning*” which could include stricter land-use measures and programs to reduce pollutants carried by soil erosion and stormwater runoff.

Along with all this came more than the usual government red tape and the grumbling of local officials who resented the federal muscle. Even so, local officials couldn’t very well ignore all those federal dollars that were building sewer systems and treatment plants and keeping water and sewer bills so low. So the Clean Water Act became the nucleus around which states built their water-pollution programs.

Federal money, though, has been cut back severely since the gravy days of the mid-1970s and will be phased out totally after 1995.⁶ “The federal hooker in this thing has always been the money,” says Moreau of the Water Resources Research Institute. Under the Clean Water Act, the Environmental Protection Agency (EPA) has the responsibility of monitoring water pollution, and it can delegate the NPDES permit system to individual states. The states generally want to administer their own permit system, to control the program in-state. Local governments, meanwhile, had another kind of incentive to meet the wastewater treatment regulations.

Since 1973, under the Clean Water Act, nearly \$700 million in federal dollars have gone into public wastewater-treatment plants in North Carolina. To get that money, communities had to develop plans on wastewater treatment. When the federal money ends, local communities will no longer have to develop such plans, since state law does not require them. “The only way the feds have been able to get them to do this stuff is by hanging those big bucks out there,” says Moreau. “Now comes the question of

Congress established minimum criteria for state water-quality standards. Congress took the next step in 1972 with the passage of the Federal Water Pollution Control Act. Amendments to the act in 1977 gave the law its popular name, the Clean Water Act.⁵

The law mandated a clean-up of the nation’s waters and included a range of regulatory management features. Local governments found them easier to swallow because of the hefty financial incentives that came with them. The carrots for stiff new regulations were grants for municipal sewage treatment plants. The federal money covered up to 75 percent of eligible costs.

Two sections of the 1972 act had the most impact on regulating water quality. Section 402 required that all so-called “*point sources*” of pollution have a permit with the ponderous title of National Pollutant Discharge Elimination System, or NPDES. *Point sources of pollution* are places where industries and sewage-treatment plants (private or governmental) discharge wastes into the state’s surface waters. The NPDES permit sets limits on each pollutant that these facilities can discharge into rivers and streams. Second, Section 404 required a permit from the U.S. Army Corp of Engineers prior

what to do in place of that.”

The carrot and stick approach has worked on the water *supply* side as well. Federal funds have helped build water supply projects while the Section 404 dredge-and-fill permit generally has applied to dam construction for water supply projects. As with water quality, the ballgame is changing for water supply. “The federal government, pushed by the budget deficit crisis, is rapidly withdrawing from its previous role of assisting with water supply projects,” says John Morris, director of the N.C. Division of Water Resources. “There are no more Corps reservoir projects on the planning horizon for North Carolina.”

With such changes underway, the need for more state and local initiatives are critical. “We’ve never had a comprehensive water-supply planning program on the state level,” says Moreau. “What are we offering in place of the federal planning requirement?” asks Moreau. “Nothing.”

North Carolina towns aren’t alone. A survey of 700 communities in the Southeast by Moreau’s institute found very few do adequate planning for water supply and quality.⁷ The Commission on the Future of the South, a project of the Southern Growth Policies Board, found the same thing. The commission recommended in 1986 that states adopt strategic statewide management plans by 1992 that would provide strong protection for water quality and assure adequate water supply.⁸ Florida has moved closest toward reaching this goal.

Permits for Point Pollution— A System Overwhelmed

In 1975, the EPA delegated the responsibility to North Carolina for administering the NPDES permits. The state has built a water-quality program that includes monitoring for problems, inspections for compliance, and, starting in February 1987, limits on the amount of toxins that can be dumped into the water. Meanwhile, the state has gradually become more involved in regulating groundwater.

The Water Quality Section in the Division of Environmental Management has the job of issuing permits, inspecting the facilities once they’re operating, and checking the monthly *self-monitoring* reports that each permit holder is required to file. Until recently elevated to deputy director of the division, George Everett directed the water quality staff. With the current staff and budget, the section can administer 2,500 permits, says Everett. As of January 1988, 3518 facilities had NPDES permits in North

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Carolina, more than any other state in the Southeast. In addition, 577 other facilities have requested new or renewal permits which have not yet been processed. No other state in the Southeast has as big a backlog.

In 1982, the state issued 341 NPDES permits. Four years later in 1986, 943 permits were granted. Last August, a typical month, the state issued 84 permits and got 88 new requests. And these numbers only refer to the initial permit request (see Table 1).

Inspectors can’t possibly visit each plant regularly. Major municipal treatment plants are checked yearly for compliance, Everett says. Some smaller dischargers go five years between inspections. More than half of the 266 public water supplies that rely on surface waters now are downstream from at least one discharge point. Since inspections are so rare, the water quality staff has to rely on the monthly reports filed by the dischargers themselves. The inspections and reports indicate that about 40 percent of the municipal treatment plants and 21 percent of all other N.C. dischargers currently *do not* meet the standards of their permits.⁹

“Plant inspection is a real problem,” says Lisa Finaldi, executive director of the Clean Water Fund

of North Carolina, a nonprofit research and advocacy organization based in Raleigh. "The state could go beyond a self-monitoring system and inspect more plants more frequently but not without more funding for more inspectors."

State Rep. Joe Hackney (D-Orange) goes further. "The NPDES program does not work," he says. "In our state, we depend largely on self-monitoring. You can't protect the water quality relying on self-monitoring." Hackney has sponsored much of the legislation promoted by environmental groups in recent years.

Regular monitoring becomes particularly important, Finaldi says, when it comes to so-called *package-treatment plants*. These are small, private plants that treat mostly domestic wastewater from residential subdivisions or condominiums, each dumping 5,000 to 1 million gallons a day into streams and rivers. Some of that discharge meets standards and some doesn't, depending on how well the plants are operated and maintained.

There are about 1,500 such plants in North Carolina, and they represent the bulk of the new NPDES permits being issued.¹⁰ On the Yadkin River, for instance, five such plants are discharging about two miles upstream from Winston-Salem's freshwater intake. Wake County has about 40 of them. In all, package plants make up about one of every seven NPDES permits (14 percent), so many that state inspectors check each one only about once in five years.

"I'm disturbed by the poor record of the reliable operation of these plants," says Finaldi. "For example, in New Hanover and Pender counties, there has been a history of poorly maintained and operated package plants. Sludge is being discharged into creeks, and some plants are providing no chlorination for extended periods of time."

State officials do not view package-treatment plants with such alarm. First, these facilities work well if they are properly operated and maintained, explains Wilms. "They do have to file monthly reports. It's very difficult, despite what people say about the fox watching the henhouse, to falsify these reports," he adds. Wilms thinks these small plants have a compliance record that is at least as good as municipal plants.

But Everett isn't so sure. "Probably not," he says. "Our problem is that we don't get to them enough to tell you."

That should change. The General Assembly last year allowed the Division of Environmental Management to raise its fees for an NPDES permit from

a maximum of \$1,500 for a five-year permit to \$7,500. The increase will raise an additional \$1.7 million which could be used to hire about 45 people.¹¹ The results should be more frequent inspections, better monitoring, and more careful permitting. If it's not, Everett's not afraid to ask the legislature for more. Some states, says Everett, charge \$900,000 for a five-year permit—*more than 100 times* what North Carolina can charge even under the new enabling legislation.

The Nonpoint Sources— The Toughest Challenge?

As problematic as the permit system is, the bulk of surface water pollution in North Carolina comes not from wastewater discharges directly into the waterways but from nonpoint sources. That includes runoff from farmland, feedlots, and cleared land; residue from car exhausts washed off highways into drainage ditches; failing septic systems; and stormwater runoff. The data on the "best-use" of water systems show the damage done by nonpoint sources.

All surface waters have a best-use classification (drinking, swimming, etc.). With increased pollution, a stretch of water can move down to a lower level "best-use" category. When this happens, the water does "not support its best use." In 1987, 71 percent of the rivers and streams that *did not support their best uses* were being polluted by nonpoint sources (for lakes/reservoirs, it was 50 percent; for sounds/estuaries, it was 65 percent).¹²

"What we don't have a good handle on yet in this state are the unregulated and certainly more ubiquitous and probably more important inputs from nonpoint sources," says Wilms.

Herbicides, insecticides, and heavy metals flow into the water system from nonpoint sources. The most important pollutants may be the organic nutrients phosphorus and nitrogen, which are the basis of many fertilizers and are also in animal wastes. They wash off of fields and feedlots, and even backyard lawns, with each rain and eventually settle in the water. A certain amount of the nutrients keep a river, stream, or lake healthy and productive. But too much will lead to excessive plant and algae growth, called algae blooms, which can deplete water of its dissolved oxygen and can contribute to fish kills.

Coastal rivers and sounds are especially susceptible to excessive nutrient loading. The Pamlico River is a case study. The river is little more than a



Go underneath the river bed;
To burn the river down;
This is where they walked,
swam;
Hunted, danced, sang;
Take a picture here;
Take a souvenir. Cuyahoga.
—From “Cuyahoga,” by R.E.M.

settling pond for the Tar River, which drains from 16 coastal and Piedmont counties, mostly in prime farmland. Corn requires heavy doses of nitrogen-based fertilizer, which runs off in the Tar River and ends up in the Pamlico. State officials estimate that 78 percent of the nitrogen that enters the Pamlico each year comes from non-point sources.¹³

When nonpoint and point sources of pollution combine, the lethal cocktail goes to work. In the Pamlico River, the nonpoint nitrogen mixes with phosphorus entering the river from sewage-treatment plants and from Texasgulf Chemicals Company. Texasgulf operates a massive phosphate mine and fertilizer plant on the river and legally dumps about 3,000 pounds of phosphorus *a day* into the river.¹⁴ The result of all of this is algae blooms, now common on the river, and episodes of oxygen-depleted or “dead” water, as the fishermen call it. Dead water used to occur only on the hottest days of the summer and in the deepest part of the river. But now fish kills happen year-round at all depths.

Another source of pollution, the phosphate used in detergents, also contributes to the fish kills. In 1987, after several years of strident debate, the legislature passed a ban on phosphate detergents.¹⁵ Some environmentalists feel the bill was watered down in the legislative process, but the new law does apply to the two major sources, household and commercial laundry detergents. The Environmental Management Commission has also adopted regulations to reduce the phosphate load at wastewater discharge plants.

Rep. Hackney, who spearheaded the phosphate-ban bill, thinks the state’s programs to control non-

point sources have “made great strides. The money is not wasted,” he says. “It has a long-term payback.”

In administrative and legal systems, nonpoint pollution falls into three groups—agriculture, land development, and coastal development. These types of pollution flow together, if looking at it from the water’s point of view. But separate agencies are in charge of each program.

Agriculture. In 1984, the state began encouraging landowners to control sedimentation and runoff through such means as crop rotation, conservation tillage, and animal-waste systems—called “best management practices” or BMPs. The state offers technical assistance and will help pay for the programs. Since the cost sharing began, almost 2,500 landowners have signed three-year agreements to use BMPs on some 200,000 acres. State officials believe the program has saved about 570,000 tons of soil a year. Estimating the extent to which this soil retention reduced nonpoint pollution is difficult, however.

The N.C. Division of Water and Soil Conservation, which coordinates the program, began working in 23 coastal counties. In 1987, the program was expanded to 33 more counties, many in the west. Called the Agriculture Cost Share Program for Non-Point Source Pollution, it also covers “nutrient sensitive” areas. The Environmental Management Commission has designated as nutrient sensitive areas Jordan Lake and Falls Lake in the Raleigh-Durham-Chapel Hill Triangle, the Chowan River (which separates four counties in the northeast before spilling into the Albemarle Sound), and just this January, the entire Neuse River area from below

Falls Lake all the way to New Bern. This classification requires more stringent pollutant levels in NPDES permits and various land-use controls.

A three-year old federal law also should help with the nonpoint pollution. The conservation compliance provisions of the federal Food Security Act of 1985 require that farms with highly erodible land prepare a conservation plan by 1990.¹⁶ Plans have to be in effect by 1995. Landowners who don't comply with this and two other provisions already in effect (the "sodbuster" and "swampbuster" sections) will not be eligible for price supports, crop insurance, disaster relief, and other federal programs.

Water pollution from agriculture highlights the conflicts that can occur with state economic development goals. As poultry farms have sprung up across North Carolina, for example, most economic development specialists have applauded this diversification of the state's agricultural base. (The state now ranks number one nationwide in poultry production, which has also moved ahead of tobacco as the state's number one agricultural product.)¹⁷ "But poultry manure is a serious non-point pollution problem," says George Everett. "Few farmers have enough land to absorb all the chicken droppings as fertilizer in their fields. It has to go somewhere."

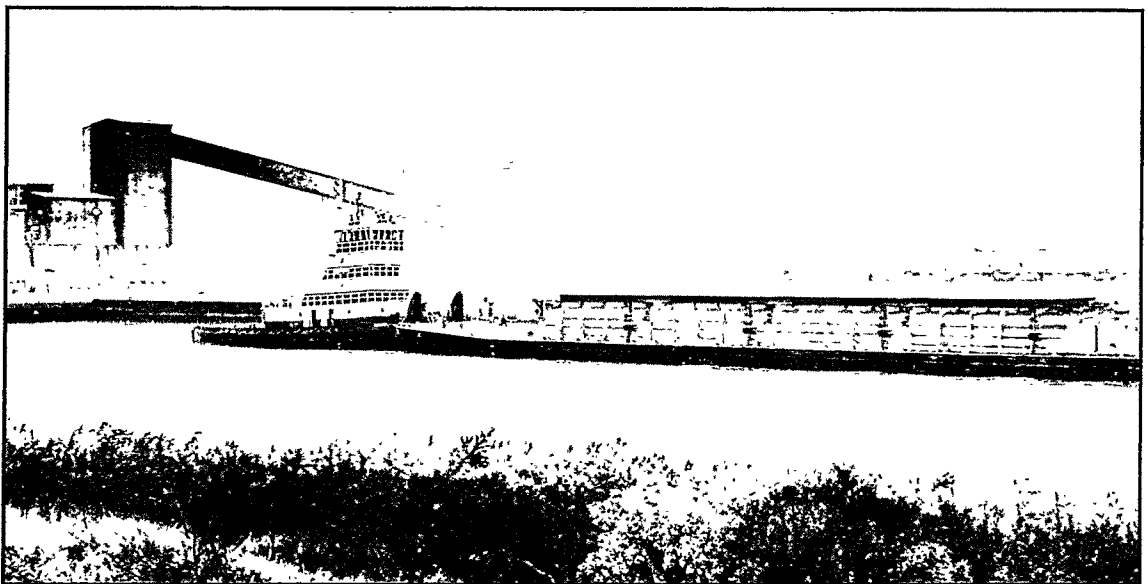
Land Development in General. Engineers know that when concrete replaces trees and other vegetation, more pollutants can run into the surface

water faster. Development allows water to flow across the land and pavement and into the surface water rather than seeping into the vegetation and the groundwater. With disturbances of natural vegetation, water carries red clay, sand, and other sediments that settle to the bottom of streams and ponds.

The N.C. Sedimentation Control Commission sets standards regarding how sediment must be managed on any development project disturbing more than one acre. Developers must construct retaining ponds or use other means to mitigate the damage caused by excessive sedimentation. Agricultural and forestry lands are exempt from the standards. The monitoring and enforcement of the sedimentation regulations are considered a land-management, not a water-quality, function. Hence, the Land Quality Section within the Division of Land Use Resources has responsibility for this program (see article on page 94 for more).

Coastal Development. Nonpoint pollution issues in the coastal area have special problems due to both the fragile ecosystem involved and the special governmental systems established by the Coastal Area Management Act (CAMA). "Large-scale land clearing, draining, and agriculture has a much more significant impact on coastal water quality than does urban development," says David Owens, director of the Division of Coastal Management. The draining of coastal wetlands for peat mining and other uses

A barge pushes a load of phosphate from Texasgulf Chemicals Company near Aurora to the coast for shipment worldwide.



The Charlotte Observer

has been particularly controversial. This has altered the drainage patterns in many eastern counties, thus contributing to a reduced salinity and a decline in shellfish in many estuaries, including the Pamlico. (For more, see the coastal article on page 70.)

Of growing significance in the coastal area, however, is the impact of development patterns. Until 1985, the state had no comprehensive regulations designed to control stormwater runoff in coastal areas. The concern about stormwater runoff increased because of rapid developments along the shoreline and adjacent to shellfish waters. Like agricultural nonpoint runoffs, rain water washing across developments carry bacteria and other pollutants into the surface water system. Condominiums, shopping centers, and other high-density or commercial projects were causing the runoffs to increase sharply, contributing to the fish kills and contaminating drinking water supplies.

The Coastal Resources Commission, created by CAMA, regulates development in 20 coastal counties through a permit system and other means which focus on land development rather than water quality. A land-use density regulation would have addressed the stormwater issue directly because higher-density developments create a greater stormwater problem. The coastal commission was tackling the stormwater issue in the context of its long history of addressing water quality issues through land regulations. It had already prepared draft regulations when NRCDC Secretary Thomas Rhodes asked the commission to stop working on them. "Secretary Rhodes preferred that the EMC do it because they had greater jurisdiction," says Karen Gottovi, a member of the Coastal Resources Commission.

In 1986, the Environmental Management Commission adopted interim stormwater runoff regulations.¹⁸ The regulations required developers of more than one acre within 575 feet of shellfish waters to limit density or to hold up to 4.5 inches of rain (from a 24-hour storm) on the development site. Later in 1986, the EMC proposed permanent regulations which would expand the stormwater runoff requirements to the entire 20-county area covered under CAMA but reduce the amount of rainfall that had to be contained to 1.5 inches. At four public hearings on the proposal, coastal residents and environmental groups strongly objected to what they viewed as a weakening of the standards. Developers objected somewhat to expanding them to all 20 counties but viewed the 1.5-inch standard as less costly.

On Oct. 8, 1987, the EMC adopted the proposed

rules. But N.C. Attorney General Lacy Thornburg found that a closed and secret gathering on the night of October 7 of the 10 EMC members appointed by Gov. James G. Martin had a chilling effect on the full EMC meeting the next day. In responding to a question raised by a member of the EMC, Thornburg advised the EMC to consider the October action to be null and void in order to avoid litigation challenging the regulations.¹⁹ The Governor in turn advised the EMC to vote on the stormwater regulations again. On Nov. 12, 1987, the EMC did so and passed the final regulations again, basically the same ones as had been proposed—the 20-county, 1.5-inch rules.²⁰

Some observers wondered why the rules could not retain the 4.5-inch standard adjacent to shellfish waters and adopt the 1.5-inch level for the rest of the 20 coastal counties. This combination would have ensured low-density development around shellfish waters. Mary Joan Pugh, NRCDC assistant secretary for natural resources, says, however, "It is not the EMC's job to determine development densities or the pattern of land-use [but] to set standards that protect the quality of the environment, in this case, water."

The Water Under the Ground

Stormwater runoff, other nonpoint pollution sources, wastewater discharge, NPDES permits—all affect the quality of the state's system of surface waters. The federal Clean Water Act and most state laws have emphasized this system. But the quality of groundwater in North Carolina is gaining attention, as the dangers to this resource increase.

Statewide, 55 percent of North Carolinians depend on wells for drinking water; in rural areas, the figure is 85 percent. The state has 820,000 domestic wells, more than any other state, and 5,100 community wells, fourth highest among the states.²¹ But it doesn't have good laws to protect them, agree experts such as Moreau and Wilms. In 1983, groundwater aquifers were classified under the state's water quality statutes.²² That is a cumbersome way to protect an extremely valuable water supply, says Wilms.

"We need a groundwater protection act in this state, and that's one of the things I'm going to be pressing for," says Wilms. "It will be a significant piece of legislation and a significant debate."

Currently, an elaborate system of test wells around the state checks on groundwater supply and quality. All of the water in the state's eight principal

underground aquifers is classified as drinking water. So far, no major groundwater supplies have been lost to pollution. Two, though, may soon be reclassified as so polluted that they will never be potable again. One area is near a chemical plant in Buncombe County, and the other is under a landfill in New Hanover County. If this happens, people living in these areas would not be allowed to use well water, as they currently do.

"We know we're just seeing the fringe through a lot of isolated, small cases," says Perry Nelson, head of the Groundwater Section in Wilms' division. Each year, Nelson's staff investigates about 200 reports of groundwater pollution. Last August, there were about 300 cases still active. About 75 percent of the incidents, says Nelson, are caused by leaks in underground storage tanks. There are some 100,000 such tanks in the state, and 35 percent of them may be leaking, the division estimates.

Both legislators and environmentalists have been concerned about these storage tanks. In 1985, the legislature gave the Environmental Management Commission the authority to govern the location, construction, installation, monitoring, leak detection, repair, and operations of underground tanks

used for the storage of oil and hazardous substances.²³ But the bill did *not* include funding to clean up existing leaks.

The 1985 action prompted a Legislative Study Committee on Underground Storage Tanks. It reported to the 1987 General Assembly, recommending a \$1 million appropriation to the EMC to begin investigating and cleaning up leaking underground storage tanks. But the legislature did not act on this recommendation. Meanwhile, oil distribution companies were realizing that aging storage tanks could begin to leak, which would cause them problems with liability insurance. A bill addressing the insurance problem (HB 1304) passed the House and could be taken up in the N.C. Senate in the "short" 1988 session. The 1987 legislature also authorized another study committee on the issue.

The liability issue, viewed together with existing statutes regarding oil leaks, has complicated the legislative discussions over HB 1304. Rep. Hackney believes the EMC already has the authority to force oil companies to clean up any leaks. "We have strict liability for petroleum spills," says Hackney. Dan Oakley, special deputy attorney general, supports this view. "The Oil Pollution and Hazardous

**Table 1. NPDES Permits, 1977-1988 (Selected Years)
Number and Type of Permit, As Percent of Total Issued**

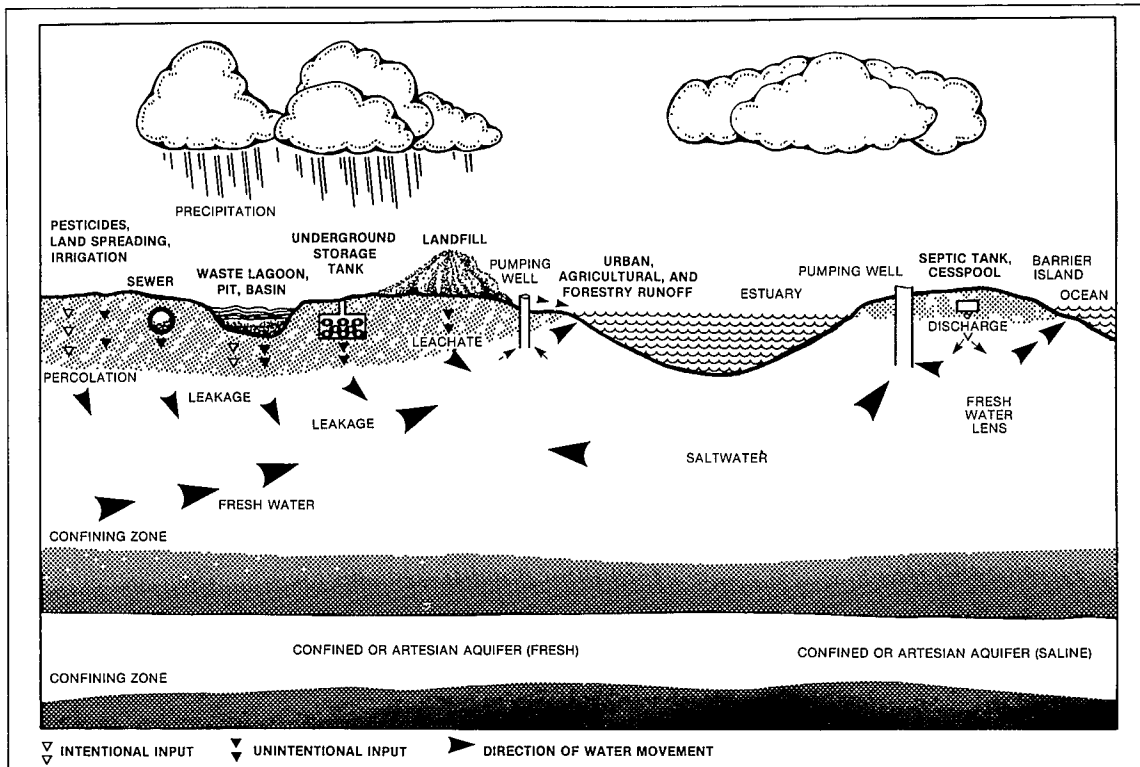
Type of Wastewater Discharger	1977		1980		1983		1986		Cumulative Total of Permits in Effect ² (Jan. 1988)	
	#	% of Total	#	% of Total	#	% of Total	#	% of Total	#	% of Total
Municipalities	157	26%	59	30%	31	7%	49	5%	308	9%
Non-Municipal										
Major Industries	33	6%	21	11%	52	11%	18	2%	98	3%
Minor Industries ¹	404	68%	119	60%	375	82%	616	65%	2,612	74%
Package-Treatment Plants ¹	NA	NA	NA	NA	NA	NA	260	28%	500	14%
Total Issued	594	100%	199	100%	458	100%	943	100%	3,518	100%
Cumulative Total of Permits in Effect	700	100%	1,500	100%	2,489	100%	3,159	100%		

FOOTNOTES

¹Separate data on package-treatment plants were not kept during 1983 or previous years. In the above data for 1977, 1980, and 1983, NPDES permits for package-treatment plants are included in the "minor industries" category.

²These numbers are estimates because the data was not broken down into these categories for 1977, 1980, and 1983.

Source: Water Quality Section, N.C. Division of Environmental Management



Sources of Groundwater Contamination

Department of Natural Resources and Community Development

Substances Control Act is a strict liability statute," says Oakley.²⁴

The bill that passed the House in 1987 would weaken that liability. "The oil companies would put up the money for a clean-up fund if we do away with some of their liability," says Hackney. "The bill shifts the liability to the fund and away from the assets of each individual company—if the company chooses to use the fund. And consumers would be the source of the money for the fund. But the main point for those who supported [House Bill] 1304," he continues, "is that it's more important to get a pot of money to get the cleanups going in the near term than to rely on any separate state appropriation or executive action. The way to get action is to create some sort of fund where the money is readily available to clean them up. I support getting HB 1304 on through the legislature."

Sanitary landfills present another huge problem. Rainwater percolates down through a landfill and into the water table. This liquid filtering into the groundwater is called leachate; the chemicals in the leachate vary according to what's dumped in the landfill. The state recently began requiring liners to prevent leachate from getting into the groundwater.²⁵ Only one of the 150 sanitary landfills currently operating with a state permit uses a special liner, the

one in New Hanover County. (For more on liners, see article on solid wastes, page 40.)

Water Supply— Drought and Growth Ups the Ante

North Carolinians have generally enjoyed an adequate supply of water, thanks to a dispersed population and a generous amount of rain which feeds our rivers and aquifers. But as the state grows, water shortages are becoming more evident in several areas, particularly in areas of high growth where water supply is naturally limited. Greensboro and Hillsborough, for example, are in the upstream ends of river basins where streams are small. In the coastal plain, Kinston, Jacksonville, and New Bern have depended heavily on groundwater for decades. Now the pressure level in the aquifer is dropping, creating concerns about the long-range water supply. There's rapid growth on the Outer Banks, where the principal water supply is a shallow aquifer of limited capacity. And throughout the state, many reservoirs are now too small to handle emergency drought conditions.

The drought of 1986 highlighted the need for more comprehensive planning. About 50 public water supply systems activated water conservation

programs, including voluntary or mandatory water restrictions. But many had no plans for droughts, and others with plans never used them. Some faced serious threat of running out of water.

"The key to resolving water supply problems is timely, knowledgeable, and cooperative action by local governments, with appropriate assistance from state government," says John Morris. "The state's responsibility is to provide a framework of laws and policies within which water supply problems can be solved, to provide plans or studies of river basins or regions that can guide the more detailed local government plans, to offer technical and financial assistance, and to assure the protection of water quality and fish habitat."

Within this general mission, hard questions will emerge as future water shortages increase. In most cases, the questions inevitably focus on issues of local governments working together—e.g., one municipality buying water from another. Perhaps the most controversial water-supply issue though is transferring water from one river basin to another.

"Inter-basin transfer," as the process is known, has a long history in western states, where water supplies vary to a great extent. Because of the relative abundance of water throughout North Carolina, river-basin transfers have not yet been widely considered. Small scale transfers have been used in North Carolina, increasingly during droughts. But large-scale transfers have been a highly emotional issue. People living in a certain area feel they have a right to their own water.

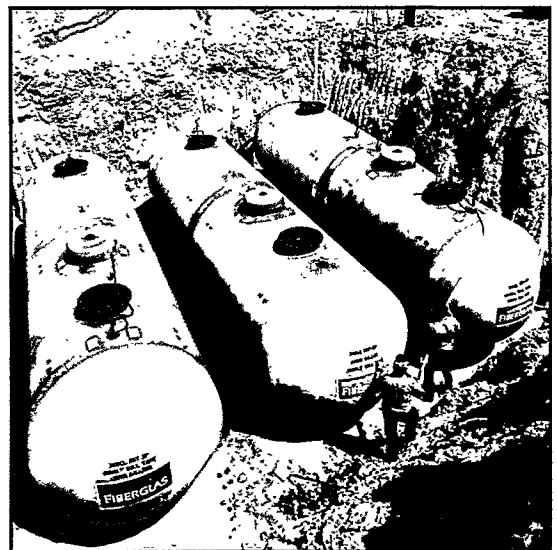
Virginia Beach, Va., in the Pasquotank River basin, wants to withdraw 60 million gallons of water a day from Lake Gaston, which straddles the state line in the Roanoke River basin. The Army Corps of Engineers issued a permit for the pipeline in 1984, but the state of North Carolina sued, claiming that the pipeline would violate various federal laws. If the federal courts rule in favor of an inter-basin transfer to Virginia, asks Moreau, how could North Carolina defend its position against such transfers? Within the state, pressure is building to transfer water from rural river basins to urban areas. Greensboro, for example, could solve its water-supply problem by transferring water from the Dan River (Roanoke River basin) to the Cape Fear basin.²⁶

In the late 1970s, Speaker of the House Carl Stewart (D-Gaston) found out how strong feelings can be on the inter-basin transfer issue. In speeches, he called for a study of whether the state should consider inter-basin transfers or establishing a state water authority. In the 1979 legislative session, he

pushed through a measure to establish a \$50,000 Legislative Study Commission on Alternatives for Water Management. But the commission ran into opposition from citizens against inter-basin transfers and from interagency turf considerations over who would conduct a statewide assessment of water supplies. The commission met only eight times, returned about \$45,000 of its appropriation unspent, and made its position crystal clear on the controversy. "This commission does not recommend inter-basin transfers of water as a means of solving the general water management problems of the state of North Carolina," it concluded.²⁷ The study commission thus buried any consideration in the early 1980s of the inter-basin transfer issue.

In 1980, Stewart ran for lieutenant governor and lost. "I don't think there's any doubt that my willingness to consider the possibility of inter-basin transfers in the context of future planning of water resources cost me votes in a number of counties," said Stewart in a recent interview. "I don't think we've made significant progress in water resource planning in the last decade. It's the kind of issue," concluded Stewart, "that will be a dominant issue as we approach the turn of the century simply because in reality some inter-basin incursion is almost inevitable."

Three of four reports of groundwater pollution stem from leaking underground storage tanks such as these.



Department of Natural Resources and Community Development

Managing a Threatened Resource

An overwhelming array of problems confront the 18 different state agencies and scores of local offices that have some responsibility for water management (see Table 1 on page 12 for more on these agencies). Many of the short-term problems mentioned above, such as the backlog in permit applications, are rapidly becoming so great that they may require new kinds of intergovernmental arrangements to manage the long-term solutions.

As the federal money—and the requirement for planning—phase out, the state management role becomes paramount. Any community of more than 5,000 to 10,000 people needs a water management plan that can be systematically updated, says Moreau. Such plans should be required as a condition for receiving a state grant for a sewage-treatment facility, he adds. In 1987, the legislature appropriated \$21.5 million for the 1987-89 biennium for wastewater and water-supply facilities. The money will be distributed primarily through low-interest loans from a revolving loan account, which will be coordinated by the Office of State Budget and Management. The state action did *not* require local water planning.²⁸

From 1973 to 1986, nearly \$700 million in federal grants went to N.C. municipalities for new or expanded wastewater-treatment facilities, plus \$412 million from state clean water bonds. But the state bonds are gone and the federal money is declining. Some communities will now have to pay as much as 60 percent of the cost of building or upgrading treatment plants, as opposed to the 12.5 percent maximum local contribution required during the height of the federal involvement. And after 1995, the percentage could go even higher.

About \$1 billion will be needed to make municipal sewage-treatment plants meet their permit standards. The 1987 reauthorization of the federal Clean Water Act in 1987 requires that all municipal treatment plants comply with state standards by July 1988.²⁹ Under the Clean Water Act, the Environmental Protection Agency has the power to monitor water-quality standards established at the state level, according to stream conditions. If a state does not run its NPDES system properly, the EPA can assume control of the permit process. This July, a municipality not in compliance with its permit faces tough penalties, unless it can convince a judge to grant an extension.

Between the pressures of drought and the demands of finding money to replace aging wastewa-

ter-treatment facilities, municipalities have a hard question to answer. N.C. municipalities currently cover only 76 percent of the cost of wastewater treatment through fees, according to the Water Resources Research Institute.³⁰ Can municipalities continue to keep the cost of water and sewer services at a price well below cost? Moreau and others believe the legislature should force municipalities to raise water and sewer bills.

“As you put more and more pressure on a constant resource base, it takes more and more intensive management to maintain that quality,” says Moreau. “There’s ample money out there to pay for reasonable rates for water and sewer service. Local elected officials have no incentive to raise the rates. It’s not a popular thing to do.” Without such a legislative requirement, explains Moreau, the legislature will remain under pressure by local governments to help pay for the cost of new wastewater-treatment facilities.

Some recent efforts have been made to link water quality and water supply regulations. For example, the Department of Natural Resources and Community Development has begun a watershed protection program tied to the best-use classification system. A local government might want the state to assign a higher best-use classification to a watershed area; such action would require more stringent requirements on point-source polluters. To get NRCD to assign a higher best-use classification, the local government must have a watershed protection plan that controls nonpoint sources. Such a plan often involves density regulations. “Already 40 communities have requested an upgrade in classification and thus have shown a willingness to enact watershed protection measures,” says NRCD Assistant Secretary Pugh.

How can the agencies responsible for water supply and quality manage both day-to-day challenges and plan for the future? The task is fraught with technical, interagency, financial, and practical issues. The logical agencies to address such questions are the Environmental Management Commission and the Divisions of Environmental Management and Water Resources. The most urgent issues for consideration, as discussed above, are:

- how—and how fast—communities can develop water management plans;
- how the state can adequately manage a backlog of NPDES permit system;
- whether a new state law is needed to protect groundwater;

—continued on page 68

How Much Can the Rivers Take?

Twenty-nine plants dump their waste along a small section of Jackson Creek outside of Cherokee in western North Carolina. In rural Henderson County, 175 facilities discharge into rivers and streams. "At what point do we start having to turn down permits because there are too many on a reach of stream which can't take it anymore?" asks George T. Everett, deputy director of the Division of Environmental Management. "It's just coming up now. It's going to be a big issue that we face, and somebody's going to have to make a big policy decision."

Everett is talking about "*assimilative capacity*," a cumbersome name for what soon may be a river's biggest and most valued asset. To put it simply, assimilative capacity refers to the amount of waste a stretch of water can absorb. Remember that rivers and streams move waste. It is different from the kind that garbage trucks haul

away. Most of it is treated trash. As more and more plants discharge their wastes into the state's waters, those waters become less and less able to absorb, or assimilate, any more. What capacity they have left becomes very valuable.

"We rarely think of assimilative capacity of rivers as a resource, but it's a significant resource," says R. Paul Wilms, head of the Division of Environmental Management. "We are seeing the complete exhaustion of rivers' ability to assimilate additional waste. It's gone. That's a relatively new problem that we're facing."

The problem is peaking in the lower portion of the Cape Fear River basin. Four large companies, the city of Wilmington, and numerous small dischargers use the river for their waste. Everett and Wilms doubt the Cape Fear can take much more. Everett estimates that the river could probably handle a small company that would



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discharge a few thousand gallons of wastewater a day. A large company, with multi-million gallon discharges, would be another matter, he says. What happens, then, when Interstate 40 is completed to Wilmington and large companies want to come to town?

Computers, using elaborate models, figure how much waste a section of water can hold before an NPDES permit is issued, and the state engineers use the results when assigning pollutant limits. Under the theory that everyone is entitled to equal slices of the pie, *the elaborate analysis is done every time a new permit is issued*. That takes the state time, contributing to a severe backlog of permit requests (see main article, page 57, for more). The result is tougher pollutant limits on everyone to make up for the additional waste load. That means more money because all the facilities have to upgrade their treatment of their water discharged when their permit expires. The lower Cape Fear is so close to the threshold, however, that accommodating the wastes of another large company may result in pollutant limits too strict and too expensive for the existing permit holders.

"The continual re-allocation of available assimilative capacity equally among all users manifests itself in ever more stringent permit levels," says Wilms. "Is that really an equitable and effective way to protect water quality? The facilities are never in compliance with final limits. And it's always more expensive."

A better way of assigning waste loads, says Wilms, might be to assign waste capacity on a first-come, first-serve basis in certain overtaxed river basins. Then let capitalism take over. As an example, say the computers figure that the lower Cape Fear can absorb 100 pounds of waste. The state could assign it all to the city of Wilmington for its sewage-treatment plant. If one of the large companies wants 10 pounds of capacity for its waste, it would have to strike a deal with the city.

Either the city's plant could treat the company's waste or the city could sell 10 pounds to the company and use the money to recoup the costs of meeting the tighter permit limits that would follow.

Under this system, the waste loads would have a dollar value. Hence, planners would have an economic basis for making decisions on the water's use. Is it, for instance, worth more as a place to move waste or as a drinking supply?

"We would let the market drive those values," says Wilms. "The market does that very well. It would provide decision-makers with a better basis to make decisions than what they have right now, which is essentially nothing in terms of economic value. You can then assess the value of a potential water supply, like B. Everett Jordan Lake."

In 1983, 100 million gallons of water in Jordan Lake were set aside for future drinking water needs. Wilms wonders, though, if that water isn't worth more downstream. It could be used to increase the flow of the Cape Fear River so that the river could absorb more waste and thus accommodate more growth—maybe that big company that wants to move to Wilmington when I-40 gets there.

"Right now, those decisions are made by default," says Wilms. "We built the Jordan Lake impoundment, and part of its capacity is for drinking supplies. We assume that's its highest value. That may be true today, but that may not be its highest value 50 years from now."

Such a policy, he thinks, also would cut the time it takes to process permits and cut into the backlog because there would usually be no need for the time-consuming analysis for neighboring facilities each time a permit is issued.

"I'm hoping that we get to that point," says Wilms. "I'm going to propose that we do that in many watersheds to reduce backlog."

—Frank Tursi

Stream Watch

If you want to see how a broad-based volunteer program can help government work more efficiently, look no further than "Stream Watch." More than 110 local stream watch groups have "adopted" a segment of stream or river, like a person might do with a troubled teenager. Groups do everything from technical monitoring of pollutants in the stream to keeping the creekside cleared of trash. Some stream watch groups are affiliated with environmental organizations, such as the 22 groups joined with the Haw River Assembly. Others are as small as a single person who sends water samples to the state laboratory for regular checks. The Z. Smith Reynolds Foundation has made small grants available to stream watch programs.

Both citizen groups and government officials have high praise for the program. As the 1987 NRC report on the "State of the Environment" said: "The Stream Watch Program is becoming an important way for citizens to play an active role in managing and protecting the state's valuable water resources." Thousands of miles of streams could still use protector advocates. For more information, contact Jim Mead, director of N.C. Stream Watch, Division of Water Resources, P.O. Box 27687, Raleigh, N.C. 27611-7687, (919) 733-4064.

■ whether the new stormwater regulations will protect shellfish waters effectively or have an impact on land-use patterns, and whether they should be extended statewide;

■ whether current N.C. law is adequate to resolve competition among public water supply systems, including questions of inter-basin transfers, and competition among industrial and agricultural users;

■ whether the state should set minimum water and sewer rates; and

■ what action should be taken in areas where rapid growth or increases in water use are threatening to outstrip available groundwater supplies.

On each of these issues, more research and a broader consensus among policymakers, environmentalists, municipal officials, and developers are

needed. Only state-level leadership can build a consensus broad enough to support meaningful actions regarding such issues. Is it too late to save the state's water?

"I hope it's not too late, and I have to believe it's not," says Wilms. "But it soon will be. We will have lost our ability to overcome what we've done to the land. We'll just have to wait and see. You and I won't see it. But our grandchildren will. I'd like them to look back and say, 'They at least tried.' I hope they don't look back and say, 'Why didn't those people do something?'" □ □ □

FOOTNOTES

¹A detailed account of the river's problems appeared in the *Winston-Salem Journal*, April 5-9, 1987, pp. 1A ff.

²"Up the Polluted River," *Greensboro News & Record*, Feb. 19, 1984, p. 12A.

³While the Division of Environmental Management plays the central staffing function for the EMC, the Division of Water Resources and the Division of Land Resources provide staff assistance to the EMC on water supply and water management and on dam safety issues, respectively.

⁴15 NCAC 2B .0214 and 2B .0216, respectively.

⁵33 U.S.C. 1251 et seq. For historical background on the state's water-pollution control program and the components of the Clean Water Act, see David Moreau, "Water Management: A Tenuous State/Local Partnership," *North Carolina Insight*, June 1984, pp. 66ff.

⁶Construction grants for water and sewer facilities ranked fifth among the largest cuts in federal aid to North Carolina in the sweeping budget cuts made after President Reagan came to office. For more, see, Jim Bryan et al., *Federal Budget Cuts in North Carolina*, N.C. Center for Public Policy Research, April 1982, p. ii.

⁷Raymond J. Burby, David H. Moreau, and Edward J. Kaiser, "Financing Water and Sewer Extension in Urban Growth Areas—Current Practices and Policy Alternatives," Water Resources Research Institute, September 1987, p. 25.

⁸"Education, Environment, and Culture: The Quality of Life in the South, 1986 Commission on the Future of North Carolina," Southern Growth Policies Board, Cross-Cutting Issue No. 5, 1987, p. 12.

⁹*North Carolina—State of the Environment Report, 1987*, N.C. Department of Natural Resources and Community Development, April 1987, pp. 5-6, and data from the Division of Environmental Management.

¹⁰*State of the Environment Report*, p. 6.

¹¹Chapter 767 of the 1987 Session Laws, sections 1-3. When the House Judiciary III Committee was considering the fee increase during the 1987 legislative session, George Everett said that the state needs \$5 million for the permit granting and inspection process, rather than its \$3.9 budget.

¹²*State of the Environment Report*, p. 5.

¹³"Surface Water Quality Concerns in the Tar-Pamlico River Basin," Water Quality Section, N.C. Division of Environmental Management, final draft, April 1987. The report is an excellent technical overview of the problems plaguing the Pamlico River.

¹⁴*Ibid.*

¹⁵Chapter 111 and Chapter 817 of the 1987 Session Laws, now codified as G.S. 143-214.4.

¹⁶ 16 U.S.C. 3801, *et seq.*

¹⁷ Bill Finger, "Making the Transition to a Mixed Economy," *North Carolina Insight*, April 1986; see especially pp. 14-16.

¹⁸ 15 NCAC 2B .0217; 15 NCAC 2H .0408 and .0409.

¹⁹ Letter from Chief Deputy Attorney General Andrew A. Vanore Jr. to EMC member Anthony R. Combs, dated Oct. 15, 1987.

²⁰ 15 NCAC 2H .1001 to .1004.

²¹ *State of the Environment Report*, pp. 10-13.

²² G.S. 143-214.1.

²³ Chapter 551 of the 1985 Session Laws (SB 831), codified within G.S. 143B-282(2) and 143-215.3(a).

²⁴ G.S. 143-215.75 *et seq.*

²⁵ In February 1987, says Assistant Attorney General Nancy Scott, "A policy decision was made to protect groundwater to the drinking water standard," which was "another way to interpret existing rules. It is a difference in how the [groundwater] standard is accomplished." That policy decision requires either liners or impermeable clay liners in sanitary landfills. Officials at the Department of Human Resources and at the Attorney General's Office agree that the policy is an unwritten one, but it may be incorporated into the N.C. Administrative Code in 1988. To avoid a possible violation of the N.C. Administrative Procedure Act, the Center recommends including the policy in the Code.

²⁶ For more on the legal issues involved, see G.S. 153A-285 and 162A-7, which require that "counties and cities acting jointly

or through joint agencies" and water and sewer authorities get permission from the Environmental Management Commission before diverting water from one stream or river to another. The commission is directed to consider seven criteria in evaluating whether to approve a proposed diversion.

²⁷ "Alternatives for Water Management, Report of the Legislative Study Commission to the North Carolina General Assembly," Feb. 28, 1980, p. 12.

²⁸ Chapter 796 (SB 110) of the 1987 Session Laws, now codified as G.S. Chapter 159G, "North Carolina Clean Water Development Loan and Grant Act of 1987."

²⁹ 33 U.S.C. 1311(i). The new amendments to the act force additional emphasis on a "water-quality based" approach to regulating sources of pollution, in contrast to the old "technology-based" approach. Currently, categories of dischargers (e.g., paper mills, textile mills, petroleum refineries) are required to meet specified national standards of performance in removing pollutants from their wastewater; the standards are based on the best treatment technology. The new water-quality approach, instead, examines the receiving waters to determine the types and amounts of pollution which can be assimilated without impairing the designated uses of the waters.

³⁰ David H. Moreau and Dale Whittington, "Financing Water Supplies and Wastewater Services in North Carolina in the 1980s," Water Resources Research Institute, Report No. 212, February 1984, p. 14.



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Beside the grand history of the glaciers and their brown, the mountain streams sing the history of every avalanche or earthquake or snow, all easily recognized by the human ear, and every word evoked by the falling leaf and drinking deer, beside a thousand other facts so small and spoken by the stream in so low a voice the human ear cannot hear them. Thus every event is written and spoken. The wing scars the sky, making a path inevitably as the deer in the snow, and the winds all tell it though we hear it not.

—John Muir from "Trails of Wonder"