United States
Environmental Protection
Agency

Communications, Education,
And Public Affairs

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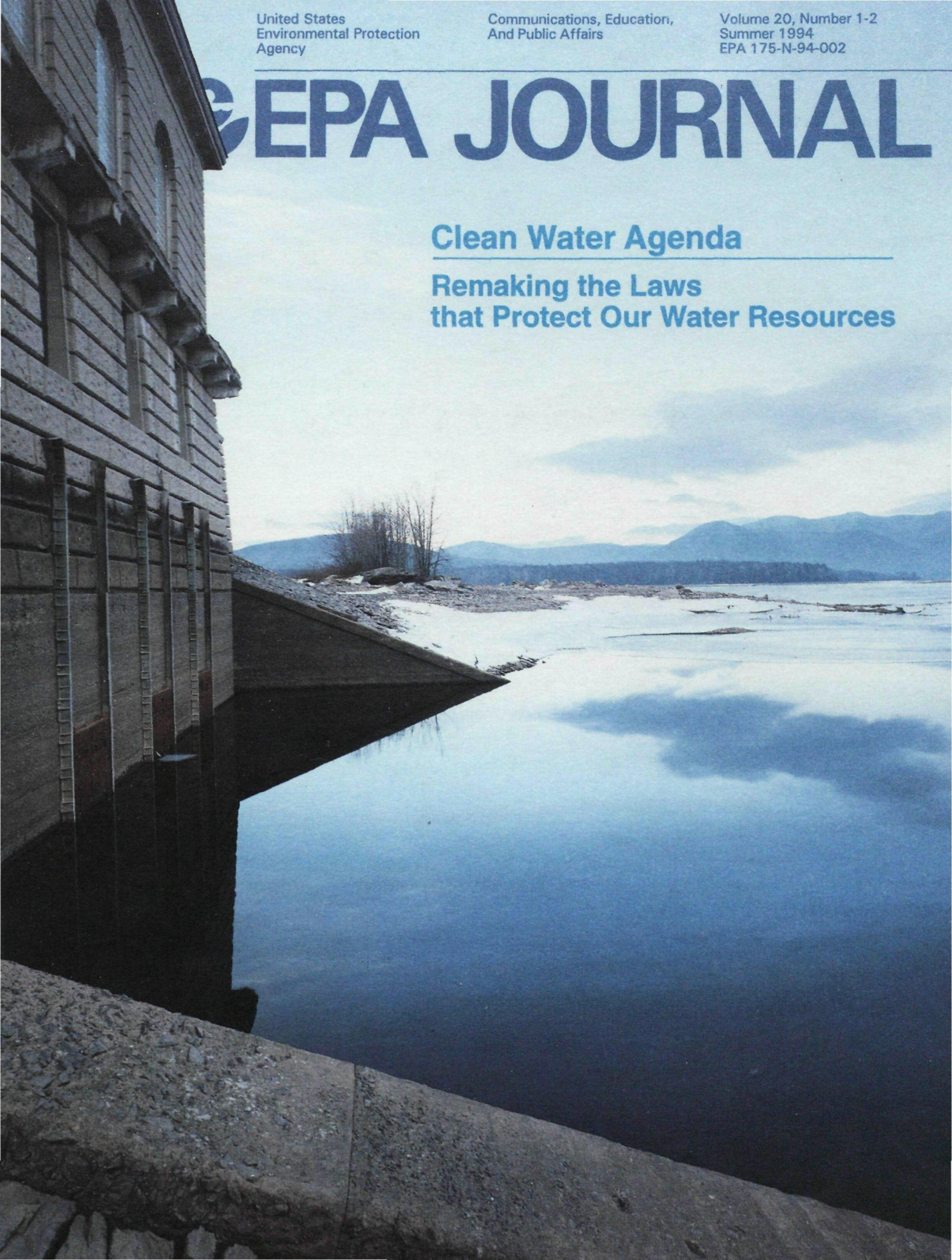
# EPA JOURNAL

## Clean Water Agenda

## Remaking the Laws that Protect Our Water Resources



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Correction: Due to an editorial error, October 1995 was incorrectly cited as the Congressionally mandated issue date for EPA regulations that will require realtors and landlords to provide home buyers and renters with information on lead hazards before they move into a home (Oct.-Dec. 1993 issue of EPA Journal: article by Representative *Henry A. Waxman, p. 39). The Congressionally* mandated issue date is October 1994 for regulations intended to take effect October 1995.

**A Magazine on National and Global Environmental Perspectives**

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## From the Editors

Twenty-two years ago, against the backdrop of a Cuyahoga River so polluted that it caught fire and inflamed public concern, Congress passed the first Clean Water Act. Targeting mainly so-called "point sources," such as municipal and industrial outfalls, the 1972 law set a "fishable and swimmable" goal for all U.S. waters, a goal thought to be achievable within a decade. The 1974 Safe Drinking Water Act, enacted on the heels of the Clean Water Act, mandated national standards for contaminants in drinking water and established monitoring requirements.

Despite progress made over the last two decades, particularly in curbing point-source pollution, serious problems remain. These lingering problems are more difficult to deal with than the kinds of gross pollution caused by discharges of raw sewage and industrial wastes. Today's problems are primarily due to polluted runoff from farms and cities (diffuse "nonpoint-source" pollution that does not lend itself to traditional regulation), which is not adequately controlled under current law. According to the most recent data provided to EPA by the states, roughly 40 percent of assessed rivers and lakes and more than 30 percent of assessed estuaries are presently *not* suitable for fishing, swimming, or other uses.

What's more, recent episodes involving waterborne disease in Milwaukee and elsewhere have raised alarms about the safety of U.S. drinking water systems. As many state and local officials attest, funding is also a problem, in many states and municipalities, there is a shortage of funds at hand to deal with water pollution and other environmental problems. States and localities are also concerned about a lack of flexibility in federal standards.

Both the Clean Water Act and the Safe Drinking Water Act are currently up for renewal, affording an opportunity to strengthen the legislative framework for protecting U.S. water resources. This issue of *EPA Journal* is keyed to the reauthorization debate on both laws. □

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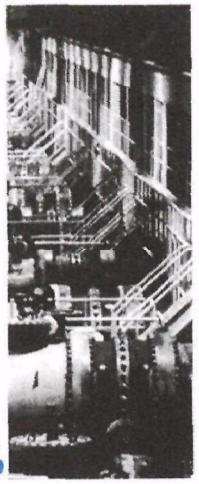

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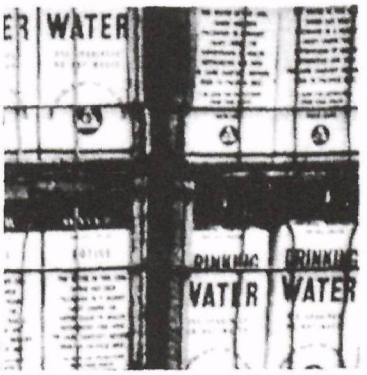


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The U.S. Environmental Protection Agency is charged by Congress to protect the nation's land, air, and water systems. Under a mandate of national environmental laws, the Agency strives to formulate and implement actions which lead to a compatible balance between human activities and the ability of natural systems to support and nurture life.

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Contributions and inquiries are welcome and should be addressed to: **Editor, EPA Journal (1704), Waterside Mall, 401 M Street, SW, Washington, DC 20460.**

## New Superfund Law Proposed

*John Gilbert photo. EPA, Edison, NJ.*

*The Clinton Administration has proposed a new Superfund law that will directly affect those 73 million Americans who live near hazardous waste sites. The new law would make Superfund cleanups faster, fairer, and more efficient. EPA Administrator Carol Browner said: "America needs Superfund, but it needs a Superfund that works. The Administration is committed to ensuring that the funds go to cleanups, not lawyers. We remain firm that polluters must pay--but we will limit the liability of small businesses and individuals. And our proposal will put people first by ensuring that communities are fully involved in clean-up decisions in their towns and cities."*

**The Washington Post** commented: ". . . Hastily enacted by Congress in 1980 following the public outcry over the discovery of the Love Canal dump in upstate New York, Superfund mushroomed into a massive and complex federal program. In recent years, it has been beset by long delays in cleanups, hobbled by drawn-out lawsuits and burdened by enormous costs. It has come under attack by industry, environmental groups, insurers, and state and local governments. The administration's proposal retains the original law's fundamental principle that polluters must shoulder the burden of cleaning up the thousands of hazardous waste sites identified by the government. But it seeks to funnel more money into cleanups and less into legal and administrative costs by: limiting the liability of small polluters; providing incentives for polluters to agree to mediation rather than to litigate; and using new taxes on insurance companies to settle old claims against them by their policyholders. Under the current law's liability provisions, even a relatively minor polluter of a hazardous waste site can be held liable for the entire cleanup if other site polluters are out of business or cannot be found. In addition, polluters can be held responsible for dumping of wastes even if such actions were legal at the time. The law has thus encouraged companies to sue one another or their insurance companies in an attempt to shift some of the blame--and the financial liability--elsewhere. Under the new plan, polluters that agree to a process of apportioning responsibility by a 'neutral professional' would be protected from further liability in the future. Another far-reaching change contained in the proposal would permit different approved levels of restoration for hazardous waste sites based on their probable future use. For example, a site in an industrial area would no longer be required to be cleaned sufficiently to make it safe for a day care center or residential housing. . . ."

**The Philadelphia Inquirer** reported: ". . . The administration is seeking to tie cleanup standards to local land use decisions and allow for a mix of public and private funds to finance the work. Depending on the future use of the dump site, the land would be subjected to more--or less--rigorous cleanup, according to Carol Browner, head of the U.S. Environmental Protection Agency. 'One community may decide to asphalt over contaminated soil and make it a parking lot. For another, it may mean hauling away the soil and building a playground. But both communities will have equal protection,' she said. Browner predicted that the new approach would both cut the cost of the Superfund program by 20 percent and speed the cleanups. The program currently has an estimated price tag of $300 billion. . . . Under the administration's revamped Superfund program:

- A community group, composed of citizens and local government officials, would be created to evaluate the site and decide on its future use.

- The site, once its use was determined, would be subject to specific cleanup standards set by the EPA. These standards would be national.

- The EPA would also provide a cleanup 'recipe' that private industry could follow for each standard. This recipe would remove some of the uncertainty for businesses.

- The cleanup costs would be distributed among the responsible parties according to their share of the responsibility. But the federal government would pay for small-property owners and any additional costs. . . ."

A subsequent article in **The Washington Post** reported: ". . . A panel of environmentalists and corporate executives yesterday [May 3, 1994] pledged to support a Clinton administration proposal for cleaning up the nation's hazardous waste sites, and key lawmakers said they will push for early passage. . . . Environmental Protection Agency Administrator Carol M. Browner presented the plan to a White House meeting attended by the heads of Dow Chemical Co., E.I. du Pont de Nemours & Co. and other chemical companies, insurance and small business interests and groups such as Friends of the Earth. . . . Both environmental and corporate organizations have criticized current Superfund legislation for different reasons. Administration sources said the new version was crafted to meet the interests of both. In response to environmentalists' concerns, for example, the plan calls for community leaders to participate directly in decision-making about cleanup procedures and in the oversight of enforcement. Under the plan, if community leaders are not consulted about cleanup, they have the right to sue. . . .Environmentalists had pushed for a provision saying that Superfund sites close to residential areas should be made suitable for residential use. Corporate leaders opposed that provision, which was not included. . . ."

## Expansion Proposed for Toxics Release Inventory

EPA has proposed 313 additional chemicals whose releases or transfers industry would have to report annually to the Toxics Release Inventory (TRI). The new chemicals, 170 of which are active ingredients in pesticides, would nearly double the list to a total of 633. In a further expansion of the inventory later this year, the Agency will propose that additional facilities be required to make the reports. Currently, the requirement applies only to manufacturing facilities; EPA is looking at other activities responsible for substantial releases, such as mining and wholesale distribution. The Agency is also considering adjustments that would reduce to a minimum unnecessary data collection and reporting, especially by small sources.

EPA began publication of TRI in 1989 under the Emergency Planning and Community Right to Know Act. Companies report the amounts of toxic chemicals they have released to the environment during manufacturing or the amounts they have transferred to other facilities, including amounts transferred for disposal. EPA publishes the data as is. Numerous groups have used the data to lobby for more stringent controls on toxic chemicals or to pressure local industries to cut down on releases. In addition, many companies, upon reviewing their own release reports, have voluntarily adopted pollution prevention measures to reduce releases. Beginning with the 1991 reporting year, companies had to document progress made in preventing pollution.

## *WasteWi$e* Off to a Good Start

In a January letter to the CEOs of the "Fortune 1000" companies, EPA Administrator Carol Browner called on the nation's major corporations to voluntarily reduce the amount of waste they generate. Participants in the program, called *WasteWi$e*, set their own waste-reduction goals and schedules. To date, more than 240 major companies have joined *WasteWi$e*, including AT&T, Warner-Lambert, Texas Instruments, American Airlines, McDonald's, Bell Atlantic, and Federal Express. Companies that signed on before May 20, 1994, became charter members, which gives them special recognition and makes them candidates for case studies to be published by EPA.

The *WasteWi$e* program asks participating businesses to reduce waste by preventing waste, recycling, and buying/manufacturing products with recycled content. Examples include setting up systems to reuse shipping packaging, conserving paper through two-sided copying and electronic mailings, reducing customers' waste through more efficient packaging or mailings, and using recycled products wherever possible.

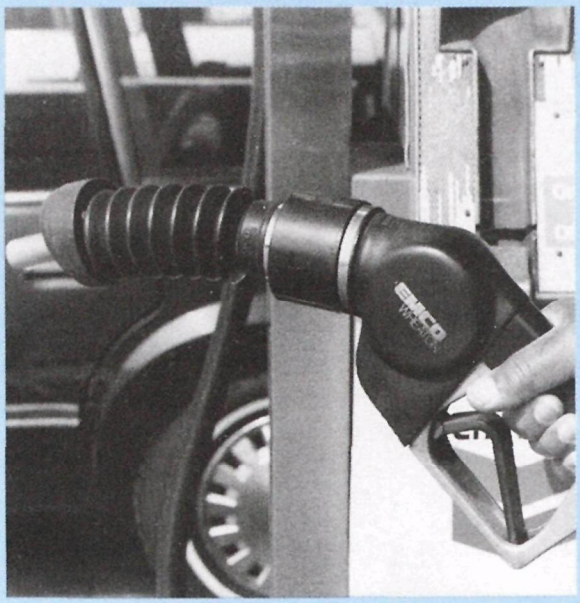
The American commercial sector accounts for 40 percent of the municipal waste stream. Beyond the benefits to the community, companies' solid-waste-reduction efforts can be an internal economic boon. State Farm Mutual Automobile Insurance Company has reportedly saved approximately $300,000 annually using waste-reduction measures. Interested businesses and other members of the public can call EPA's *WasteWi$e* hotline at 1-800-EPAWISE (372-9473).

## Utilities Receive Bonus Allowances for Acid Rain

Five electric utilities have been awarded a total of 532 acid-rain bonus allowances by EPA for their efforts to use energy more efficiently or to use renewable energy resources. Each allowance equals one ton of sulfur dioxide ($SO_2$), the main ingredient in the formation of acid rain. Under the 1990 Clean Air Act amendments, all electric utilities must hold enough allowances to cover their annual emissions of $SO_2$. They can meet the requirement by either reducing emissions or by purchasing allowances from other utilities. Congress set up a reserve of 300,000 bonus allowances under the act to reward utilities that voluntarily reduced emissions before the deadlines. Utilities can use the bonus allowances to meet their own immediate requirements, they can bank them for future use, or they can sell them. EPA began accepting applications to the reserve last July and makes awards on a first come, first serve basis. The five utilities are: ESI Energy Incorporated, Florida; Portland General Electric, Portland, Oregon; Puget Washington Power, Washington; the New England Electric System (Massachusetts Electric, Massachusetts, and Granite State Electric, New Hampshire); and the City of Austin, Texas.

## Canisters on Cars to Cut Pollution from Refueling

*Commencing with the 1998 model year, EPA will require manufacturers to install new automobile canisters that will capture gasoline vapors during refueling. The requirement will apply to light trucks, mini-vans, and other utility vehicles commencing with the 2001 model year. When the new canisters are completely phased in on new vehicles, states will be able to eliminate the requirement for vapor recovery nozzles at service stations. Administrator Carol Browner said: "Today's rule breaks years of gridlock over whether or not to require cars and trucks to capture smog-producing emissions during fill ups. Now, for the first time, we are taking an action that is both cost-effective for consumers and will offer important environmental benefits that are protective of human health."*



*Steve Delaney photo. EPA.*

**The Detroit Free Press** reported: ". . . Automakers have long argued the devices were expensive, dangerous, and unnecessary. But environmentalists and regulators saw them as the best way to stop gas fumes from escaping into the air. Those fumes can aggravate smog in some cities as well as hurt crops and make it difficult for people to breathe, especially young children and the elderly. . . . The regulation won't require a completely new device. Most cars already have canisters in the engine compartment to capture polluting fuel evaporation. Federal regulations call for those canisters to be improved beginning in 1996. Monday's announcement means refueling vapors will have to be captured and diverted to those enlarged, improved canisters. The American Automobile Manufacturers Association called the rule tough, but said `the graduated nature of the phase-in enables us to gain valuable experience on passenger cars which we can then transfer to our truck designs. . . .'"

**The Washington Post** said: ". . . The EPA estimated the canisters will add $20 to the price of a vehicle. But automakers have said costs could be closer to $50 a car. . . . The action, taken under court order, ends a seven-year battle with the auto industry, which had strongly opposed the canisters. Automakers contended it would be cheaper to equip gasoline pumps with pollution-control devices. Major oil companies fought that idea. During his reelection campaign in 1992, President George Bush directed service stations in areas with the worst air pollution to install pollution-control nozzles on pumps. Bush said he did not want to burden the struggling auto industry with yet another environmental regulation. But 10 months later, responding to a lawsuit filed by environmentalists, a federal court said Bush's order had violated the 1990 Clean Air Act. The appeals court said the EPA must require the on-board vapor-recovery system. The Clinton administration agreed to comply with the court order without an appeal. Browner went a step further yesterday by requiring the increasingly popular vans, utility vehicles and small trucks--not directly mentioned by the clean air law--to begin phasing in the canisters in 2001. . . ."

# Ongoing Enforcement

## Arctic Fisheries to Pay $725,000 Penalty

Arctic Fisheries Incorporated has agreed to pay a penalty of $725,000 to settle charges that it violated its Clean Water Act (CWA) permit by repeatedly discharging fish processing waste into Alaskan waters. The penalty is the largest ever collected in Alaska on the Pacific Northwest for CWA permit violations. The Justice Department lodged a consent decree on behalf of EPA in U.S. District Court in Seattle, Washington. The complaint included the charge that waste found floating in the waters of Lost Harbor off Adun Island had been discharged by an Arctic Fisheries seafood processing plant. In addition to paying the penalty, Arctic Fisheries agreed to conduct sampling and to make visual inspections not previously required by their permit, as well as to stop discharging fish processing waste into Lost Harbor.

## Sara Lee Volunteers Its Violations, Pays Penalty

Sara Lee Corporation, headquartered in Chicago, Illinois, has voluntarily disclosed to EPA that three of its facilities failed to meet the reporting requirements of either the Emergency Planning and Community Right-to-Know Act (EPCRA) or the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). A facility in Forest, Mississippi, failed to report the release of more than 2,000 pounds of ammonia to the environment and failed to

file Toxic Release Inventory (TRI) reports for three separate years. Facilities in Fort Worth, Texas, and in New London, Wisconsin, failed to file TRI reports on releases of sulfuric acid, hydrochloric acid, and ammonia for the years 1987 through 1990. As a result of Sara Lee's voluntarily disclosing the violations, EPA chose to issue a civil complaint simultaneously with the signing of a consent agreement settling the case. Sara Lee will pay a penalty of $118,830 and will audit its more than 140 facilities for compliance with EPCRA and CERCLA.

## Asbestos Removal Violation Brings Record Penalty

Violations of work-practice standards at an asbestos removal project have resulted in a court ordered $1.675 million civil penalty against B&W Investment Properties, Inc., a Chicago, Illinois, property management firm, and Louis Wolfe, owner of the three buildings in Cicero where the project was being carried out. The penalty is the highest ever awarded under the Clean Air Act's NESHAP (National Emission Standard for Hazardous Air Pollutants) for asbestos. The court held that the defendants violated the NESHAP by failing to notify EPA of their intent to renovate or demolish the buildings and by failing to wet friable asbestos and insure that it stayed wet until collected for disposal. The property is located adjacent to a Chicago Transit Authority "El" station and has been used occasionally by transients for shelter.□

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# The Administration's Proposals

## We must embrace a watershed approach

by Carol M. Browner

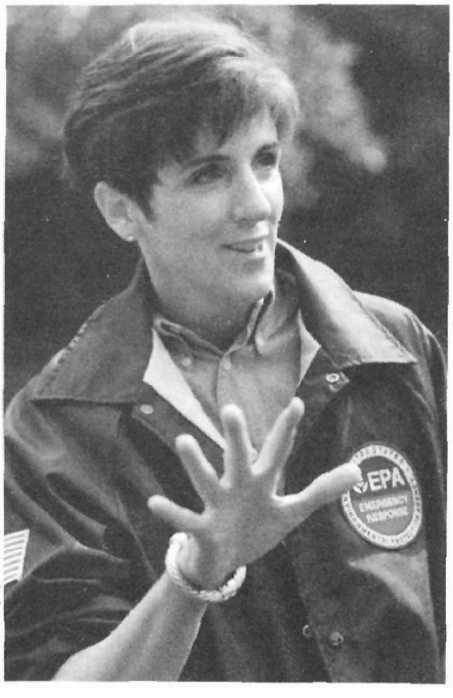
On Earth Day in April this year, I spent a morning with elementary school students on a boat on the Anacostia River here in Washington, DC. We caught some fish and carried out simple tests to assess the overall condition of the river. More than two decades after Congress first passed the Clean Water Act, we did not like what we saw. One of the fish had a tumor. Old tires, broken bottles, and trash studded the banks. We couldn't steer into a once-thriving marina because it is now abandoned, choked with mud and weeds. Everywhere we saw evidence that America's water laws are not working as they should.

The same day, I released the latest National Water Quality Inventory, a biennial report on the state of our nation's rivers, lakes, and estuaries. The report, based on data collected in 1991-92, shows that America's waters are indeed in trouble. Approximately 40 percent of the waters assessed by the states are *not* suitable for simple activities such as fishing or swimming.

Our drinking water is also at risk. In the past year, residents of Milwaukee, New York, and Washington, DC, were ordered to boil the water that came out of their tap because of contamination of the drinking water supply. In Milwaukee, thousands of people fell ill. Some died.

Millions of Americans make their living from the nation's waters, fish and swim for recreation, or choose to locate their homes or businesses near waterways. And Americans expect their drinking water to be the cleanest in the world. We depend on water to cook with, water to wash our children, water to nourish our farmlands, water to sustain the birds and fish and plants with which we share our world.

> More than two decades after Congress first passed the Clean Water Act, we did not like what we saw.




Steve Delaney photo, EPA

*Thanks to a team effort by local and federal governments, Washington, DC's Kenilworth Marsh--once badly contaminated-- has been restored to health. Carol Browner visited the site during National Parks Week.*

To protect this vital resource, the Clinton administration has proposed to change the two major laws that safeguard our nation's waters: the Clean Water Act, which has jurisdiction over our rivers, lakes, estuaries, and wetlands, and the Safe Drinking Water Act, which regulates tap water quality. Both are up for reauthorization.

America's water-quality laws have accomplished a great deal. The flow of untreated sewage and industrial wastewater into our surface waters has been sharply reduced. We no longer have rivers catching on fire, but new legislation is necessary to solve the problems that remain, such as polluted runoff and persistent toxic pollutants in water bodies, and to maintain the progress we have made.

The single greatest remaining threat to America's rivers, lakes, and estuaries is polluted runoff, sometimes called nonpoint-source pollution. Silt, pesticides, fertilizer, and other pollutants are carried off farms, suburban lawns, industrial plants, and city streets into water bodies whenever it rains.

Controlling runoff from hundreds of thousands of fields and streets is far more difficult than controlling the pollution emitted from the end of a pipe. To solve this problem, we must change the Clean Water Act to embrace a comprehensive "watershed" approach to water quality. A watershed is all the land forming a drainage basin that surrounds a body of

*(Browner is Administrator of EPA.)*

*EPA Administrator Browner surveys the Anacostia River at the nation's capital.*
*Denis Paquin photo, Wide World.*

water. To protect our water, we must control the pollution that drains off our land.

For years, Americans have taken the purity of their drinking water for granted. But any community--like Milwaukee--that experiences a contamination crisis comes away with a sobering sense of urgency. Our system for providing safe drinking water is broken. Many communities cannot afford to comply with federal monitoring requirements. Many cannot afford to upgrade their

## President Clinton's Clean Water Initiative

Federal water-pollution legislation dates back to 1948. The original Clean Water Act was passed in 1972 and has been amended several times since. Following are key elements of President Clinton's Clean Water Initiative, which was sent to Congress for consideration as they took up reauthorization of the Act.

### • Controlling Polluted Runoff

EPA would specify measures for controlling polluted runoff; states would choose which measures to apply in priority waters. After an initial five-year implementation period, states would determine whether water-quality standards were being met. For those that were not, another five years would be allowed for application of additional controls. Enforcement would be authorized to ensure that proper action is taken.

### • Stormwater Control in Urban Areas

The administration would give local governments more flexibility in assessing and selecting control options so that they could target the highest priority problems. Overall costs for these programs could be reduced by four-fold compared to the extremely broad current program.

### • Watershed Management

Incentives would encourage states to adopt a watershed approach to managing water quality. For example, states would be given greater flexibility to tailor nonpoint-source programs to fit site-specific conditions in watersheds. To reduce administrative burdens, federal reporting requirements and grants would be consolidated.

### • Financial Assistance

Continued federal assistance for the *state revolving loan fund* would be provided through the year 2004 to better ensure the fund's long-term viability. Also, a fee program would help states recover the costs associated with managing Clean Water Act programs such as pretreatment, the National Pollutant Discharge Elimination System, and sludge.

### • Greater Authority to Restrict Discharge of Toxics

Establishing limits on industry and setting numeric criteria for water quality are the two mechanisms by which toxics currently are controlled. Both can be costly and time-consuming. When scientific evidence demonstrates that a serious threat exists, EPA needs the authority to take more immediate action.

### • Strengthening Enforcement

Enforcement provisions would be streamlined and strengthened to equal those found in comparable environmental laws. Also, a stronger role would be given to citizens to pursue enforcement action.

infrastructure to meet federal treatment standards. The current law limits the Agency's ability to focus on those contaminants that pose the greatest risk to public health by requiring that we regulate 25 contaminants every three years, regardless of public health risks. Likewise, the law fails to provide communities with the flexibility and the funding they need to target their resources to the most urgent problems.

Most important, the current system focuses on monitoring and treating drinking water. It does little to protect the sources of drinking water from contamination. Clearly, treatment costs could be greatly reduced if communities prevented contaminants from entering the drinking-water supply in the first place.

> To protect our water, we must control the pollution that drains off our land.

The Clinton Administration's proposal addresses all these flaws. Our new Safe Drinking Water Act will improve public health protection *and* reduce costs for water suppliers.

Source-water protection measures will prevent pollution from entering drinking water in the first place--thus reducing treatment costs and reducing the likelihood of dangerous contamination. The administration's package will provide billions of new federal dollars to upgrade systems that treat drinking water and assure that water suppliers meet basic safety standards. At the same time, our recommendations for a new Clean Water Act emphasizing watershed management and the control of polluted runoff will reinforce Safe Drinking Water Act objectives.

As our population grows, the demand for clean, safe water will also grow. New, sensible water-quality

laws can reduce red tape and give state and local governments the funding they need to solve problems facing their communities.

We have an historic opportunity to protect public health and restore our rivers, lakes, and estuaries. On some future Earth Day, when those elementary school students go down to the Anacostia River with their own kids, I want them to find safe, clean water. □

Volunteers clean up the banks of a stream near Lititz, Pennsylvania. *Grant Heilman photo.*

## Safe Drinking Water Act Reform

The Safe Drinking Water Act was passed in 1974; major amendments were made in 1986. Following are key elements of reforms recommended by President Cinton as the act comes up for reauthorization in the Congress.

### • Regulating Contaminants

The current requirement that calls for EPA to regulate an additional 25 contaminants every three years would be replaced with new authority under which EPA would consider any number of contaminants and decide upon the most appropriate response for each--regulation or further study.

### • Financing Infrastructure

Similar to the fund established under the Clean Water Act, a *state revolving loan fund* would be established to help communities and water suppliers finance needed infrastructure. The fund would be authorized at $599 million for 1994, $700 million for 1995, and $1 billion a year from 1996 to 1998.

### • User Fees

To ensure that states have sufficient resources to implement Safe Drinking Water Act requirements, authority would be provided to states, or to EPA in those states where EPA administers the act, to establish a user fee program.

### • Special Assistance for Small Systems

States would establish small-system viability programs that would evaluate existing systems to determine whether they have the means to comply with the law. They would also prevent new, nonviable systems from being established and would provide authority to order consolidation of existing noncompliant, nonviable systems, where needed. Further, a less expensive treatment technology would be established specifically for small systems. To ensure that public health is protected, systems adopting this technology would be required to take added precautions, such as implementing source-water protection programs and assuring certification of system operators.

### • Encouraging Source-Water Protection

To reduce monitoring and treatment costs and prevent contamination from occurring in the first place, states would be required to develop *source-water protection programs.* These would delineate drinking-water protection areas and assess contamination threats to the sources in these areas. To further reduce costs and provide greater management options at the local level, states could approve alternative monitoring and treatment processes if the community implemented an "enhanced" source-water protection program. The definition of enhanced would be determined by EPA via the regulatory process.

### • Strengthened Enforcement

Enforcement authority would be strengthened to make the Safe Drinking Water Act consistent with other environmental statutes. Improvements would include consolidating and addressing inconsistencies among multiple enforcement provisions and clarifying that federal facilities must be in compliance.

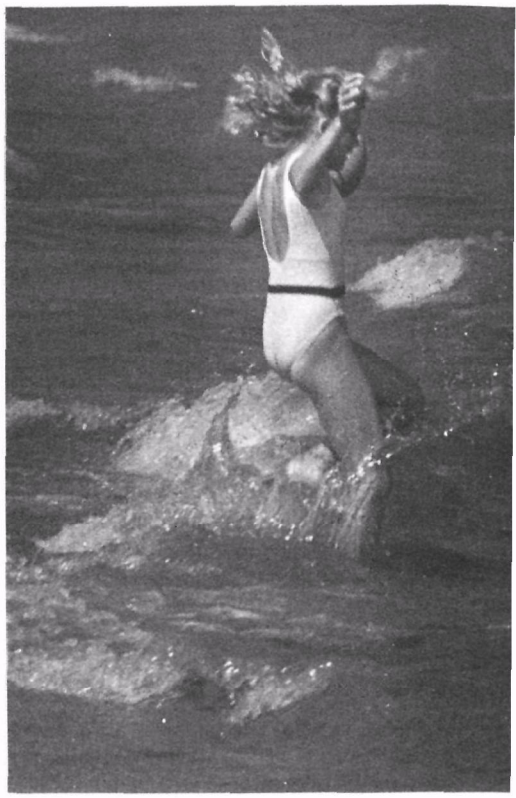
### • Training and Certifying Operators

States would be required to set up programs for training and certifying all drinking water system operators. Systems that cannot afford to train staff or hire certified operators could contract for part-time services or share services with other local systems.

# The Clean Water Act: Has It Worked?

by Robert Adler

## We have a long way to go



More than two decades after the Clean Water Act was passed, little clear information is available on basic questions about the health of our water bodies: How much cleaner are our rivers than they were 20 years ago? Are our beaches safe for swimming? Do our lakes support more fish, and are the fish safer to eat? What is happening to species that rely on aquatic habitat?

Numerous government reports are available on virtually all aspects of Clean Water Act program administration. Government computers store extensive technical data related to the quality of our waters and the health of our aquatic ecosystems. These data are riddled with inconsistencies, however, making it almost impossible to determine whether, on a national basis, we have made significant progress in the war against water pollution.

*(Adler is Senior Attorney at the National Resources Defense Council in Washington, DC. This article was excerpted from Chapter 2 of* The Clean Water Act: 20 Years Later *[Island Press 1993].)*

The following analysis begins with traditional means of evaluating water-quality progress. Because this evaluation is of only limited value in responding to our basic questions, it is followed by a review of "real-world" information on the safety of our waters for swimming, fishing, and drinking; on the health of our aquatic ecosystems and availability of important aquatic habitat; and on the status of fish and other species that rely on our rivers, lakes, and wetlands.

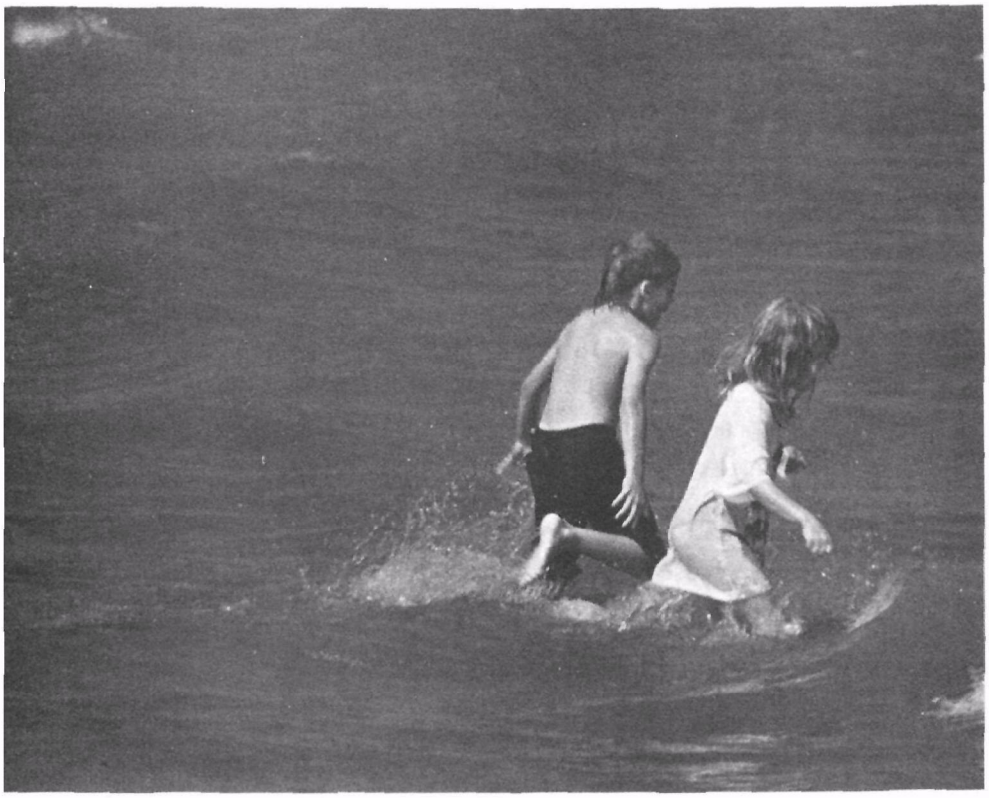
This search gives some cause for hope that we have succeeded in reducing some forms of serious water pollution, especially from traditional sources such as factories and sewage treatment plants--so-called point sources of pollution. But the best available data show that we still have a long way to go. Primarily because of massive pollution running off of farms, city streets, and other intensive land uses (nonpoint-source pollution, also known as polluted runoff) as well as large-scale destruction of wetlands, floodplains, stream channels, coastlines and other important aquatic habitat, we are actually going backwards in our efforts to restore the health of our aquatic ecosystems.

### Traditional Measures

Traditionally, the way to evaluate success in water-pollution control is to count the numbers of new treatment systems installed and the pounds of pollutants removed by those systems. By this measure, the United States has made significant progress since passage of the 1972 Clean Water Act.

The federal government invested $56 billion in municipal sewage treatment from 1972 to 1989, with total federal, state, and local expenditures of more than $128 billion. The percentage of the U.S. population served by wastewater-treatment plants jumped from 42 percent in 1970 to 67 percent in 1975, to 70 percent by 1980, and up to 74 percent by 1985. As of 1988, plants providing enhanced, secondary treatment or better served 58 percent of the U.S. population. This improved treatment, according to EPA, has reduced annual releases of organic waste by 46 percent, despite a large increase in the amount of waste treated.

The same measure viewed from the opposite direction, however, shows a glass only half full. By 1988, public sewer systems serving 26.5 million people in the United States provided less than secondary treatment, and 1.5 million people had no treatment at all,



*Kids escape heat in Lake Michigan. Many U.S. water bodies are still not "swimmable."*
*Mike Brisson photo.*

with raw sewage discharged into public waters. About 70 million people were not served by public sewers. While many of these had properly designed and maintained septic systems, others had in-ground systems that leaked pollutants into surface or ground water.

Similar gains are evident in the industrial sector. In 1973, industry spent about $1.8 billion on water pollution controls. By 1986, this had jumped to almost $5.9 billion.

Again, these investments have reaped large dividends in total pollution reductions. According to EPA, pollution controls implemented in 22 industries since 1972--under a Consent Decree between EPA and the National Resources Defense Council (NRDC)--have reduced releases of selected "priority" toxic organic pollutants by 99 percent, or by almost 660,000 pounds per day. Reductions in toxic metals are estimated at almost 98 percent, or more than 1.6 million pounds per day. Even higher amounts of conventional pollutants, like organic waste and solids, have been controlled with this new technology.

As with sewage pollution, however, industrial water pollution is far from contained. In 1990, for example, U.S. industries reported the release of almost 200 million pounds of toxics into surface waters, and another 450 million pounds into public sewers.

Despite these reductions in pollutants from point sources, on a national basis gains in ambient water quality are hard to measure. Thousands of water-quality monitoring stations exist around the country, but relatively little of the information collected at these stations is suitable to determine long-term water quality trends.

The Clean Water Act requires states to submit reports every two years to EPA, which must evaluate, among other things, the extent to which state waters meet the basic goals of the act. In turn, EPA is required to analyze these reports and submit a comprehensive analysis to Congress every two years. These reports are known as the *National Water Quality Inventory*. The first inventory was released in 1974; the most recent, released in April 1994, covers the years 1990-91. The most recent inventory demonstrates that even the interim goals of the 1972 Clean Water Act have not been met: Roughly 40 percent of our assessed rivers and lakes and roughly a third of our assessed estuaries are not meeting or fully supporting designated uses (e.g., fishing, boating, swimming, drinking water supply). Other reports, to be discussed later, suggest that these numbers are seriously understated. Clearly we have not yet met the 1983 "fishable and swimmable" goal of the law. And despite incomplete monitoring, states report that toxic pollutants affect a large percentage of waters. Thus, we have not eliminated the release of "toxic pollutants in toxic amounts" either.

## Human Health Still Threatened

### Swimming Hazards and Beach Closures

Among the first questions the average person would ask about whether the Clean Water Act has succeeded is whether it is safe to go to the beach.

Until the most recent inventory (1992), not published until spring 1994, EPA did report how many waters the states believed were "swimmable." In the 1990 inventory, for example, EPA reported that the Clean Water Act's swimmable goal was met in about three-quarters of our rivers and estuaries, more than 82 percent of our lakes, and almost 90 percent of our ocean waters. Even these optimistic numbers lead us to conclude that, almost a decade after the 1983 goal for swimmable waters, a large number of water bodies (one out of ten ocean miles and one of five lake acres) are not safe for swimming. But a closer analysis indicates that many more waters are not safe for swimming. Even based on inadequate and inconsistent monitoring, there were over 2,600 reported coastal beach closures or advisories in 1992, and over 7,700 reported closures or advisories between 1988-1992.

### Pollution of Drinking Water

The Safe Drinking Water Act, passed in 1974, regulates the quality of water as it leaves your tap, while the Clean Water Act is designed to eliminate water pollution in the rivers and lakes from which half of the country (by

population) gets its drinking water. But while the general public does not care about this fine legal distinction, progress under the Clean Water Act is critical to the average citizen's drinking water for two reasons. First, ultimately, cleaner water supplies will produce cleaner water to drink. Second, the public faces increasing costs for treating drinking water to eliminate contaminants that should not be there in the first place. For a status report on the Safe Drinking Water Act, see boxed article on page 15.

*Fish kills still occur with alarming frequency.* Grant Heilman photo.

### Fish and Shellfish Contamination

In late 1992, EPA released the results of a five-year effort to evaluate the presence of toxic chemicals that may be bioaccumulating in fish. This effort tested for the presence of 60 pollutants in 119 species of fish collected from 314 water bodies.

The results are sobering. Biphenyl, mercury, PCBs, and DDE were found at more than 90 percent of the test sites. And every pollutant in the study was found in at least one location. Concentrations of pollutants varied widely among individual samples. Nevertheless, EPA calculated that the levels of pollutants measured in fish around the country posed significant risks of cancer and other health effects to average fish consumers and even higher risks to subsistence and recreational anglers (who consume more fish from contaminated waters).

The overall level of contamination of coastal waters by sewage and other sources of pathogens appears to be getting worse, although this probably reflects better monitoring and reporting as well as ongoing pollution.

The National Shellfish Register, for example, shows that the amount of estuarine waters in which shellfishing was banned increased by 6 percent from 1985 to 1990. By 1990, in fact, less than two-thirds of our shellfish waters were unconditionally approved for shellfish harvest. On a regional basis, the situation was even worse. Between 1985 and 1990, the percentage of waters in which shellfishing was banned jumped by 10 percent in the Gulf of Mexico; it nearly tripled (from 10 to 29) in the North Atlantic. While shellfish waters were degrading on the East and Gulf coasts, they appear to have been improving along the Pacific.

Drawing by Bruce Eric Kaplan. Copyright 1993, The New Yorker Magazine, Inc.

*"This isn't tap water, is it?"*

### Sediment Contamination

Toxic pollutants in sediment contaminate small aquatic organisms that live or feed in the sediment. These small animals are consumed by bottom-feeding fish, which in turn are eaten by larger fish. In fact, because levels of toxic pollutants bioaccumulate or biomagnify in higher levels of the food chain, sediment contamination levels can actually understate concentrations of the same pollutants in fish and shellfish.

In 1992, the Coast Alliance prepared a comprehensive survey of available information on sediment contamination. Based on studies and compilations by EPA, the National Oceanic and Atmospheric Administration, and the National Research Council (NRC), this review noted hundreds of problem sites throughout the Atlantic, Gulf, and Pacific coasts, and the Great Lakes. The nation's waters have become so polluted that, according to EPA, only the most remote water bodies can be expected to have pristine sediments.

## Aquatic Species and Ecosystems in Jeopardy

### Trends in Aquatic Biodiversity

In 1979, the American Fisheries Society (AFS) compiled a list of 251 North American fish designated as endangered, threatened, or of special concern. When AFS revisited its catalog a decade later, the situation had deteriorated severely. The 1989 list added 139 new types and removed 26, producing a total of 364 fish that warrant protection due to rarity.

The AFS experts concluded that the factors that threaten most fish had changed little since the 1979 classification: "Habitats continue to be degraded through human activities associated with agriculture, mining, industry and urban development, while harmful, exotic species continue to be introduced and native fishes are transplanted beyond their natural ranges."

But fishes are not the only category of aquatic and aquatic-dependent species in jeopardy. The current Fish and Wildlife Service list of threatened and endangered species includes, in addition to 90 fish, 13 snails, 42 clams and mussels, and 10 aquatic crustaceans. Many other species on the list rely heavily on aquatic ecosystems. Mammals include the Florida manatee, stellar sea lion, and southern sea otter; wetlands or beach-dwelling species such as beach mice, voles, and shrews; and the Florida panther, whose habitat in the Everglades is facing increasing pressure from development. Currently listed bird species include waterfowl and other species that use wetlands and other waters for food, nesting, staging, and other critical habitats. Most experts agree, moreover, that currently listed species reflect only the tip of the iceberg.

### Trends in Aquatic and Other Water-Dependent Populations

America's coasts and some inland waters continue to provide a tremendous bounty of fish and shellfish, with vital economic and nutritional value to the nation. Indeed, many seafood populations--including the American lobster--are on the rise. But other indicators are more ominous. For example, between 1970 and 1989, harvest of oysters dropped by 44 percent and landings of spiny lobster declined by 34 percent. Commercial landings of striped bass have declined continuously since 1973, with a fall of 92 percent since 1982. Between 1983 and 1989, landings of bay scallops fell by 88 percent.

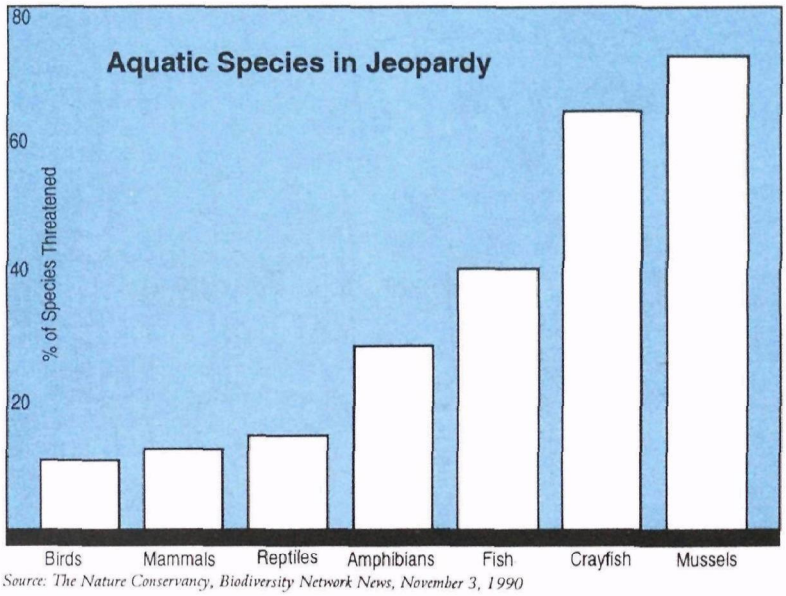
### Fish Kills

At first blush, the number of fish kills appears to have declined over time. Until 1981, states generally reported between 700 and 850 fish kills per year; this level dropped to 500 or fewer for much of the 1980s. But these numbers are skewed by extreme variations in the numbers of states reporting fish kills during certain years. Reporting dropped from all states in the early 1970s to an average of 36 states from 1977 to 1985, with a low of 24 in 1986 and with 43 reporting in 1992. Adjusted to reflect these variations in the number of states reporting, the trends show an increase between 700 and 750 incidents per year in the early 1970s to between 800 and 1,000 incidents per year in the late 1970s and 1980s. In 1992, 43 states reported a total of 1620 fish kills, of which 930 were attributed to pollution.

### Aquatic Toxicity

Much of the growing body of evidence about the effects of toxics on fish and wildlife comes from the Great Lakes and has been presented in useful summaries. For example, a 1991 report by the National Wildlife Federation and the Canadian Institute for Environmental Law and Policy summarized the effects of toxic contaminants on wildlife in the Great Lakes area.

- Fifteen kinds of birds, animals, and fish in the Great Lakes region have had reproductive problems and/or population declines since the 1950s.
- Missing brains, missing eyes, internal organs located outside the body, and deformed feet and wings are among the abnormalities found in Great Lakes wildlife. Birth defects occurred in almost 50 percent of the species studied.
- Six species of wildlife have shown serious documented behavioral changes.
- Sexual changes are thought to be caused by the similarity in structure of PCBs, DDE, and other pesticides to female hormones.
- Beluga whales, terns, and herring gulls have suffered a suppression of their immune systems.



*Source: The Nature Conservancy, Biodiversity Network News, November 3, 1990*

### Lost and Damaged Aquatic Habitats

To help fill the gap in knowledge of the overall biological health of rivers and lakes, in 1982, EPA and FWS conducted the National Fisheries Survey.

The conclusions were striking: 81 percent of the nation's waters, including 53.3 percent of all perennial waters, had fish communities adversely affected by a variety of factors. (Perennial waters run continuously, as opposed to intermittent streams, which run only during wet periods of the year or only after sufficient precipitation.) All told, even for perennial streams, more than one out of four provided *minimal support at best for healthy* fish populations. Less than 4 percent of waters were rated as completely healthy.

### Wetlands

When the Clean Water Act began to regulate wetlands in the mid-1970s, an estimated 105.9 million acres of wetlands remained. By the mid-1980s, only 103.3 million acres remained, with a total loss of 2.6 million acres, or an average of 260,000 acres per year. Estuarine wetlands have declined by about 1 percent--mostly in Gulf Coast states--in most cases due to conversion to open salt water. Inland vegetated wetlands have decreased by nearly 2.5 million acres, with the largest losses in forested wetlands, primarily in the South.

At the same time, the situation is at least somewhat promising from the perspective of recent trends. The rate of wetlands loss has slowed by about half since the wetlands protection provisions of the act have been in place. If this trend continues and wetlands protection efforts are expanded and strengthened, perhaps *we can reverse the tide and begin to* restore rather than degrade the nation's wetlands resources.

### Floodplains and Riparian Habitat

Estimates of loss of floodplain and riparian (riverbank) habitat vary. But while they differ in detail, all lead to the conclusion that a large percentage of the original riparian habitat in the United States has been lost, and a large percentage continues to be lost. A detailed 1992 assessment of floodplain management in the United States provides useful perspectives:

- By the late 1970s, an estimated 3.5 million to 5.5 million acres of floodplain had been developed for urban use, including more than 6,000 communities with populations of 2,500 or more.

- Out of 75 million to 100 million acres of indigenous, woody riparian habitat, less than half (about 35 million acres) remain in nearly natural condition. The rest have been inundated, channelized, dammed, riprapped, farmed, overgrazed, or altered by other land uses.

- The Army Corps of Engineers estimates that there are 574,500 miles of stream bank with erosion problems in the United States, 142,100 of which are characterized as "serious."

*"Somehow, it's not the same as when we were here on our honeymoon."*

## Conclusion

We have good reason to applaud the success of the Clean Water Act over the past two decades. Pollution from point sources has been reduced dramatically, and some human health and environmental threats have declined accordingly. It is equally clear from the above, however, that we still have a long way to go in meeting the basic goals of the Clean Water Act.

Three basic messages predominate from this evaluation. First, although point-source pollution has declined, we continue to release large amounts of toxic and other pollutants into our water, causing continuing contamination of water, sediment, and fish and wildlife. Second, although we have paid much attention to pollution from point sources, relatively little has been done to stem the tide of polluted runoff from farms, lawns, and city streets. Third, while some progress has been made in restoring the chemical integrity of our waters, the biological health of these same waters is moving in the wrong direction.

A revised and revitalized Clean Water Act could address these major flaws in the current law, and in current programs.□

## The Safe Drinking Water Act in Retrospect

Twenty years following the passage of the Safe Drinking Water Act in 1974, the Natural Resources Defense Council has recently completed an analysis of the protection and treatment techniques currently used by the nation's largest drinking-water systems. The results of this analysis were published in a March 1994 report entitled *Victorian Water Treatment Enters the 21st Century* (authors: Brian A. Cohen and Erik D. Olson).

As the title of this report indicates, NRDC finds that most large water suppliers in the United States are traveling on a technological "dirt road" at the same time that most Americans are preparing to enter the "information superhighway." Following are some highlights from the report:

Mike Brisson photo.

- *The vast majority of large water suppliers do little or nothing to prevent contamination of the watershed or ground water that they rely upon for source water.* The most effective way for drinking-water utilities to protect public health and reduce the risks from chemical contamination is to provide *multiple barriers of protection*. The first and most effective technique is protecting water supplies from deterioration by preventing their pollution. However, about two-thirds of large surface water systems have failed to adopt even minimal watershed protection techniques such as watershed land ownership and stream or reservoir buffers to prevent runoff or discharges of chemically or microbiologically polluted water into their source water. About 8 of 10 ground-water-supplied systems have failed to adopt wellhead protection programs to prevent contamination of their wells.

- *More than 90 percent of major water utilities have failed to install modern, post-World War I chemical-contaminant removal technology, despite widespread chemical contamination.* Fewer than 10 percent of large community water systems are using modern water treatment technologies (such as granular activated carbon or ozone, both widely used by European drinking water systems) to reduce risks of chemical contamination by pesticides, arsenic, and other contaminants as well as disinfection byproducts. Moreover, only 26 percent of all large utilities are using the centuries-old and simple technique of aeration for removing volatile contaminants. While a relative handful of U.S. water systems have pristine watersheds and produce low levels of disinfection byproducts, most do not and should therefore consider a shift to higher quality treatment.

- *Scores of major systems with inadequately protected source waters have dragged their feet and have not installed basic 19th-Century filtration and particle removal technology needed to protect water from dangerous microbes.* As of February 1994, more than 80 large surface-water systems (serving over 10,000 people each), which provide water to over 4.5 million people, have inadequately protected their watersheds and have not installed filtration, in violation of EPA's Surface Water Treatment Rule, according to EPA data. This does not include cities with watershed protection programs tentatively approved by EPA as adequate to avoid filtration, such as the Delaware-Catskill watershed of New York (see article on page 24). Approximately 140 large surface-water-supplied utilities (approximately 10 percent) also are not using coagulation and flocculation--basic steps in the pretreatment process needed to remove particles prior to filtration of all but the most pure source waters.

Moreover, as of 1989, nearly 50 large ground-water systems provided no water treatment whatsoever--not even basic disinfection. Many experts argue that ground water adequately protected from surface contamination does not need extensive treatment because passage of the water through the aquifer is enough to remove many particles and contaminants. However, many of the ground-water systems are under the influence of surface water and are subject to contamination from surface sources.

- *Aged, crumbling distribution systems are neglected and are often the cause of waterborne disease outbreaks.* The final step in the provision of safe drinking water is water distribution: the network of pipes that carries the water from the treatment plant to the customer. The distribution system is fraught with concerns. Millions of pipes are made with lead, and as a result, millions of Americans are exposed to unsafe levels of lead in their drinking water (see boxed item on page 19).

In addition, there are less obvious concerns. In many cases, the pipes that bring us our water are 100 or more years old and are cracking or crumbling. These aged pipes often harbor microbial growth and are subject to catastrophic breakage. Broken or "cross connected" pipes that allow contaminated water to seep into the water system have often been linked by the Centers for Disease Control and Prevention to waterborne disease outbreaks, yet the average water pipe will be over a century old before it is replaced.

These findings underscore the need to strengthen both the Safe Drinking Water Act, which sets standards for the quality of water coming from your tap, and the Clean Water Act, which sets standards for discharges and runoff into surface waters, in order to protect our drinking water supplies. In NRDC's view, necessary legislative changes should include strengthened provisions for watershed and ground-water protection, tougher drinking-water standards for contaminants, increased funding to help systems pay for improvements, and beefed-up enforcement authority for EPA and citizens to ensure that standards are met.

# Disaster in Milwaukee

by Velma Smith

## Complacency was the root cause

*Milwaukee residents stand in line to fill water jugs.*

*Milwaukee Sentinel photo.*

More than a year has passed since Milwaukee's drinking water crisis. The April 1993 outbreak of cryptosporidiosis remains an unpleasant memory for most of the nearly 400,000 people who were stricken with the waterborne disease.

For some, exposure to the contaminated water was disastrous. A woman in a weakened state from chemotherapy lost her life to *cryptosporidium*. Another, stricken with a rare blood disorder thought to have been brought on by cryptosporidiosis, lost her spleen. An HIV-infected child, who lived without the ravages of that disease until the outbreak, has now spent a year in bed--a three-year-old living with the pain and frustration of chronic diarrhea and frequent vomiting.

All in all, Milwaukee's *cryptosporidium* experience had a stiff price, much human suffering as well as an estimated $37 million in lost wages and productivity.

Discovering how it happened might not help the people who suffered most from the nation's worst drinking water disaster. But finding answers is crucial to preventing further cases of contamination--in Milwaukee or in any community served by the nation's 200,000 public water systems.

One theory holds that the Milwaukee plant was old and the design flawed, which resulted in the return of dirty backwash water to the reservoir. Another suggests that plant personnel failed to act quickly when turbidity levels rose. Some charge that more than human error was involved, and that critical monitoring equipment was broken at the time turbidity levels peaked. Still another theory focuses on the fact that the water intake point was vulnerable to contamination. Upstream feedlots and an alleged illegal discharge from a slaughterhouse are considered culprits, as is a sewage treatment plant sited upriver less than two miles from where Milwaukee draws its water.

Critics of the Safe Drinking Water Act counter that regulation, rather than its absence, was to blame for the episode. Milwaukee's operators, these

*(Smith is Director of Domestic Policy at Friends of the Earth. She also directs FOE's Groundwater Project.)*

critics claim, most likely missed the *cryptosporidium* not because EPA had held off regulating it, but because they were side tracked by lower priority problems on which the law mandated they focus. In this case, the so-called lower priority problem was lead. In an effort to reduce the acidity of the water supply, and thereby reduce the amount of lead leached from pipes, Milwaukee plant operators were experimenting with changes to their chemical treatment regime when the warning signs of cryptosporidium contamination appeared, and they missed them.

Unfortunately, in most of these difficulties—from poor plant design and aging equipment to inadequate operator training, from gaps in the protection of water sources to difficulties in coping with a host of contaminants all at once--Milwaukee is not unique. It may be the norm. When all is said and done, there may be one critical threat to safe water, a threat that has allowed these problems to go unnoticed in the day-to-day operations of water protection and treatment across the country. Complacency about the quality of U.S. water supplies could be the greatest threat to the safety of those supplies.

"It was an issue of complacency, false complacency," said the city's health commissioner, Paul Nannis, of the Milwaukee episode. "I think the feeling was—'Hey, the water's always been fine.'"

It was also complacency that let federal regulators deliberate over, rather than decide on, standard-setting for dozens of contaminants during the Reagan years. Complacency lets state drinking-water budgets be the first on the chopping block in tight budget years, and it allows water-intake points to be located down river from farm runoff or poorly regulated wastewater discharges.

Drinking water complacency means that in some states the training requirements for hairdressers are tougher than those for water-system operators. It means that drinking-water wells pull from ground-water sources in the vicinity of chemical plants, oil storage tanks, and landfills, and that fewer than a quarter of systems using ground water have wellhead protection programs to safeguard against contamination.

## Finding answers is absolutely crucial to preventing further cases of contamination.

Though EPA and its Science Advisory Board have ranked drinking water in the top four environmental health risks facing the nation, drinking-water safeguards have not fared well in terms of federal, state, or local resources. Indeed, the entire fiscal year 1995 budget request for EPA's Office of Drinking Water is less than $150 million. That amount must fund research; development of standards, criteria, and guidelines; oversight of state-administered programs; and grants to state agencies as well as regulation of underground injection of waste and general EPA efforts on ground-water protection. The total adds up to less than a third of the cost of a single C-17 airlift aircraft.

Clearly, when it comes to drinking-water protection, the nation's management philosophy has been penny-wise and pound-foolish. In 1984, for example, the Congressional Joint Economic Committee studying public infrastructure policies found deterioration of drinking-water distribution systems, inadequate sources of water supply, overdrafting of aquifers, contamination, and inadequate treatment. According to the committee's report, the price tag for addressing those problems, calculated in 1982 dollars, was over $5 billion. Those problems have not disappeared in the decade since the committee's report.

A 1994 report by the Natural Resources Defense Council charges that the nation's drinking-water systems are moving into the 21st century "on a technological dirt road," using "Victorian-age" treatment processes. (See article on page 15.)

According to EPA's own data, some 80 large systems serving a total of more than a million people have failed to meet regulatory deadlines for installing the fundamental protection of filtration.

While many large water systems are deficient in treatment or protection in certain respects, the condition of small systems is clearly worse. EPA's data for 1991 indicate that nearly 15,000 small systems serving populations of 3,300 or fewer were in violation of basic drinking-water-quality limits or Maximum Contaminant Levels (MCLs). These small systems, which in fact comprise the vast majority of the nation's water systems and exist within metropolitan areas as well as rural areas, present an administrative challenge at best and a clear threat to public health in too many cases.

Small systems are numerous and needy. They account for a disproportionate share of Safe Drinking Water Act violations and are plagued by financial instability and lack of access to capital, poor management and accounting, substandard water quality, and limited technical understanding and capability.

The problems of small systems, much like the broader problems of underinvestment in drinking water, have been with us for a long time. Over 20 years ago, the Assistant Surgeon General warned of an "immediate need in many localities for upgrading present water treatment and distribution practices," and in 1980, EPA concluded that many small systems could not meet then-existing water standards because of "serious

*Milwaukee restaurants like Miss Katie's Diner had to boil water for drinking.*
*Milwaukee Journal photo.*

financing and/or operating problems." In 1987, the National Council on Public Works Improvement warned that "many small water systems, as currently managed and operated, constitute a significant threat to public health."

Still, there are those who would discount the historical context in which today's drinking water problems must be viewed and addressed. Increasing rates of noncompliance among systems, the rising cost of water, and strains on state budgets all had their genesis, they argue, in the halls of Congress.

Many state regulators and drinking water purveyors believe that the 1986 reauthorization of the Safe Drinking Water Act precipitated a water crisis. They believe this crisis will be cured by substantially weakening the Act and putting EPA in the back seat when it comes to judging and securing the safety of drinking water from one community to the next.

Friends of the Earth and others in the environmental and public-health community do not share this view. We understand that new regulations adopted since the passage of the 1986 Amendments have highlighted the seriousness of these long-standing problems. We do not believe, however, that the law or its regulations are the root cause of these problems.

On the contrary, the amendments to the federal drinking-water law which pressed for a 20th century definition of "potable" may help to address significant weaknesses in the nation's approach to domestic water supply. According to the National Regulatory Research Institute, the long-term effect of the Act may be "positive," stimulating technological innovation and forcing much needed restructuring of the water-supply industry, an industry dominated by small, undercapitalized systems unable to cope with the challenges of providing safe water in the 21st century.

> While many large water systems are deficient, the condition of small systems is clearly worse.

In our view, the 1986 Amendments, as controversial as they have become, have provided an important public service for they have brought issues of drinking-water supply to the forefront of public debate. Though this debate on drinking water has been heated at times, some good things have already happened because of it.

Most notably, the Clinton administration has sold the notion of investment in drinking water not only to federal lawmakers but also to federal appropriators. Already $599 million dollars has been budgeted for a state revolving loan fund for drinking water. As soon as Congress reauthorizes the drinking water law, federal monies can be spent improving the safety of water supplies in many locales and employing workers in the business of providing safe water.

In addition, the Congress, prompted in large part by the administration, is beginning to recognize that safe drinking water requires two critical steps: protection as well as treatment. More of the public and policy makers are awakening to the need to improve and integrate pollution-prevention programs with approaches to assuring tap water safety.

And finally, complacency about drinking-water safety, though it may yet survive to threaten more communities, has been shaken somewhat. However today's debate is resolved, we hope that commitment to safe water will win out over complacency before another community suffers the public and personal losses that befell Milwaukee.□

# Monitoring Lead in Drinking Water —David Urbinato

According to the latest round of monitoring completed at the end of 1992, more than 10 percent of all large and medium-sized public water systems in the United States provide drinking water that contains lead levels exceeding the "action level" of 15 parts per billion established by EPA under the Safe Drinking Water Act. Those systems that exceed the action level must take corrosion-control measures to reduce lead levels, perform additional monitoring, and inform the public.

Overall, 100 large systems and 719 medium-sized systems exceeded the action level. By definition, large systems serve more than 50,000 people, and medium-sized systems serve 3,301 to 50,000 people. Altogether the 819 systems provide drinking water to 30 million people. The five large public water systems with the highest reported (90th percentile) lead levels were: Charleston and Columbia, South Carolina; Utica, New York; and Newton and Medford, Massachusetts. The five medium-sized drinking water systems with the highest report levels were: U.S. Marine Corps Camp Lejeune-Hadnot Point, North Carolina; Grosse Point Park, Michigan; Goose Creek, South Carolina; Honesdale, Pennsylvania; and Mangum, Oklahoma.

The law requires systems to test the tap water in residences likely to have high lead levels; consequently, monitoring results do *not* represent average levels of lead in drinking water for the entire system. Normally, areas served by lead service lines or residences containing lead interior piping or copper piping with lead solder installed after 1982 are considered high risk. Studies have shown that lead solder installed before 1982 is no longer leaching lead into water, thus those water lines are excluded from testing. Since 1986, it has been illegal to use lead solder that contains more than 0.2 percent lead. A water system is found to exceed the action level if more than 10 percent of its high-risk residences contain lead levels above 15 parts per billion.

In April 1994, EPA advised homeowners with submersible brass pumps installed within the last year to switch to bottled water until they could test their tap water for lead. Laboratory research done by the Natural Resources Defense Council and the Environmental Defense Fund showed that the brass parts of newer pumps release large amounts of lead during their first months of use. EPA is conducting studies to assess how the laboratory findings relate to lead concentrations in water as it comes out of the tap. Concerned homeowners can call EPA's Drinking Water Hotline at 1-800-426-4791 with questions on the pump problem.

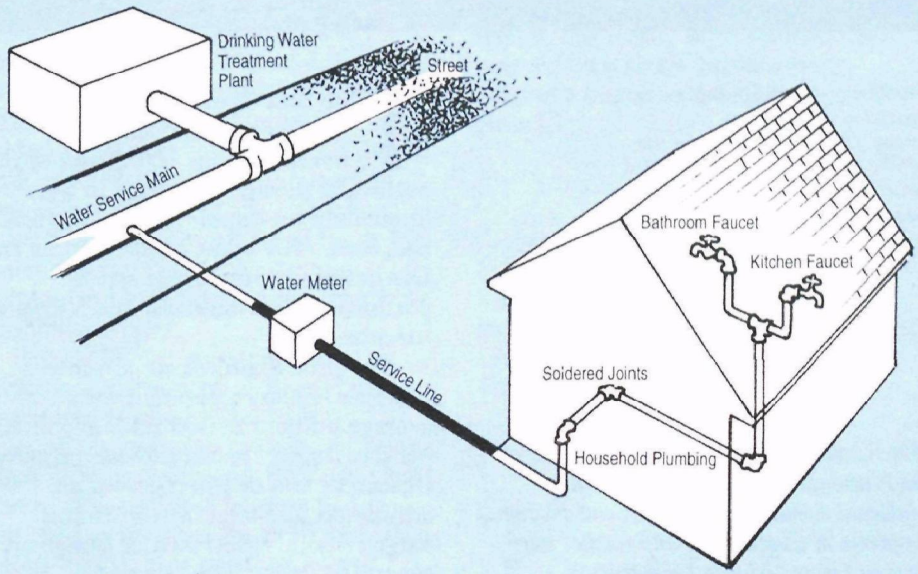
Lead is rarely found in either surface water, such as lakes and rivers, or ground water, which are the sources of drinking water for many Americans. Lead usually enters the water supply after it leaves the treatment plant. In some systems, the water is corrosive enough to leach lead from household plumbing pipes and lead service lines through which it passes. Treatment techniques sometimes include putting additives such as lime, calcium carbonate, or phosphate and silicate-based corrosion inhibitors into the water. These additives make the water less corrosive and leave a protective coating of minerals on pipes, so that less lead can be absorbed by drinking water.

Lead is especially threatening to children and infants. In large quantities it can delay physical and mental development in babies and impair mental abilities in children. On average, about 10 to 20 percent of a child's exposure to lead comes from drinking water. Combined with the other major sources of lead exposure, contaminated soil and lead-based paint, however, the levels could be high enough to cause adverse health affects.

Individual households located in communities where the lead level has exceeded the action level do not necessarily have high lead levels. EPA suggests that homeowners in these communities have their water tested to determine the lead levels for their households. Homeowners can call their community water supplier for help in locating EPA-certified laboratories that test for lead, or, once again, they can call EPA's Safe Drinking Water Hotline at 1-800-426-4791. A single test ranges between $15 and $40, depending on the laboratory.

Following are some preventive measures consumers may take to reduce high lead levels in their drinking water:

- Run the tap for several minutes before using water. This water can be used for cleaning and watering plants.
- Use cold water for cooking as lead leaches more readily into warm water.
- Avoid the use of hot water in preparing baby formula.
- Consider installing "point-of-entry" or "point-of-use" devices if testing indicates highlead levels.
- Consider using bottled water of known quality.



# Blue Plains: Saga of a Treatment Plant

by Myron F. Uman

## Investments in technology have paid off

*Blue Plains, located in the District of Columbia on the Potomac River, is now one of the world's largest and most advanced wastewater-treatment plants.*
*Hedrich-Blessing photo.*

*(Dr. Uman is assistant executive officer of the National Research Council of the National Academy of Sciences and National Academy of Engineering and teaches part-time at George Mason University.)*

The Blue Plains wastewater-treatment plant currently handles about 70 percent of the municipal sewage generated in the immediate metropolitan Washington, DC, area. The plant is operated by the District of Columbia and serves portions of the Maryland and Virginia suburbs.

The Blue Plains plant currently provides tertiary treatment for an average influent of 309 million gallons per day (mgd). It can provide primary treatment and disinfection for an additional 289 mgd of stormwater surge. About 1,800 tons of sludge are generated daily. The removal efficiency for biochemical oxygen demand (the amount of oxygen that would be consumed by natural organisms in the process of breaking down waste in polluted water) is 98 percent, and for suspended solids, 95 percent.

Over the years, the plant's operators have been faced with a constant challenge to enhance the plant's performance and to catch up with expanding demand that resulted from population growth that consistently exceeded projections.

In the Washington area, the practice of using water to remove waste via storm sewers dates from about

1840. Between that time and 1938, raw waste was dumped directly into the Potomac River. As the population grew, the Potomac became an open sewer. President Lincoln was known to leave the White House frequently because of the stench emanating from the river. After the Civil War, the city's population continued to grow and the sewage problem worsened. In 1889, a board appointed to consider the problem recommended moving the sewer outfalls downstream, which, the board concluded, would allow the city to double its population to 500,000 without recreating the nuisance in the city proper. Imagine trying to solve a pollution problem today merely by moving the outfall downstream!

The population reached that figure in the early 1930s, by which time bacterial pollution had closed the river from the city to a distance 10 miles south. In 1934, the federal government provided $4 million to build a treatment plant at Blue Plains, at the southern end of the District. The plant, which at the time incorporated only primary treatment, started operation in 1938 with a capacity of 130 mgd in order to treat municipal wastewaters of a population of 650,000 people. By 1940, the plant's service area had a population of 850,000, the plant was overloaded, and untreated sewage was being dumped into the river again. Due to the war effort, the population had jumped to 1.5 million by 1943, and about one-third more pollution was being dumped in the river than before Blue Plains was built.

In 1949, the capacity of the Blue Plains plant was expanded to 175 mgd, which would have been sufficient for a population about one-fifth the size of the service area. Fish kills and blooms of algae were commonplace. In the early 1950s, water from anywhere in the Potomac was unsuitable for drinking without treatment. Below the District, the river was unsuitable for swimming and fishing. Between 1932 and 1956, the nutrient loading of discharges to the river was doubled.

President Lincoln was known to leave the White House frequently because of the stench emanating from the river.

The capacity of the plant was further expanded to 240 mgd by 1959, and full secondary treatment processes had been installed. Chlorination was added in 1968 to disinfect the effluent. Still, by 1970, the pollution loading was higher than it was in 1932, and mats of algae extended for as far as 50 miles downstream in the summer. Fishing and swimming in the river were prohibited.

In the 1970s, investments in treatment technology at Blue Plains amounted to about $1.6 billion. The river finally began to recover. Although algae blooms continued, they were less severe. Recreational boating had returned to the river by 1976 and, after a long hiatus, bass returned as well.

Advanced treatment, aimed in part at reducing nutrient inputs to the Chesapeake Bay, began in 1980, when the plant's capacity was expanded to 309 mgd. The tertiary treatment facility cost $500 million to build and costs $50 million per year to operate. The additional capacity also allowed for storage and treatment of part of the region's stormwater surge.

In the early 1980s, bottom vegetation returned to the Potomac and fish populations noticeably increased. In 1988, the plant began removing excess chlorine from its discharge waters to protect fish larvae. Capacity will be expanded to 370 mgd by the end of 1995. Currently, 78 species of fish are found in the river at the District of Columbia.

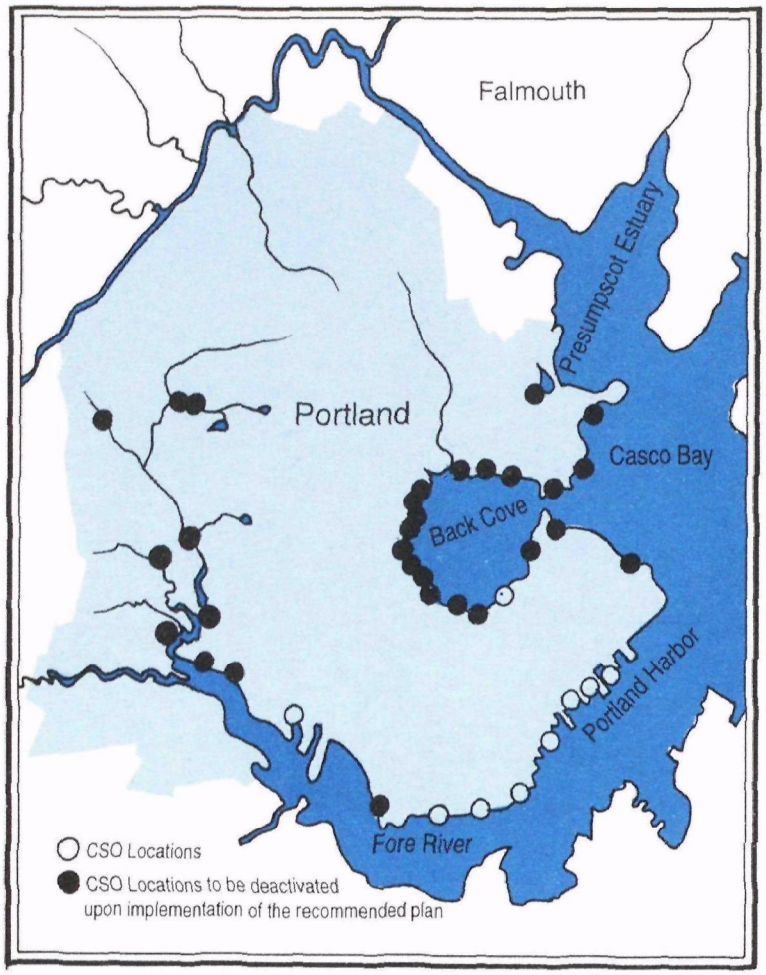
The history of Blue Plains is one of many failures and a few successes as the demands for its services grew faster than it could expand or incorporate more efficient technology. With massive investments in the 1970s and 1980s, however, it appears as if Blue Plains, with other wastewater-treatment facilities in the metropolitan region, has finally achieved success marked by a clean, healthy river despite a population that continues to grow.□

*Copyright Myron F. Uman 1994. Source: Interstate Commission on the Potomac River Basin and the District of Columbia Department of Public Works. This article is an excerpt from* What Makes Cities Tick? *a manuscript in preparation.*

# Portland, Maine: Case of a Combined Sewer System

## When it rains, the system overflows

by David Urbinato




As anyone who has ever had problems with a clogged toilet knows, sewer systems are an important but easily taken for granted asset. As far back as the mid-19th century, Americans were building systems to get waste, both human and animal, out of town. Since animals were the main source of transportation towns had to devise a way to get their waste off the streets. So they combined their street, or storm, sewers with their residential sewers to avoid the cost of building separate systems. There are 1,100 of these combined sewer systems (CSSs) still in use today, most of them in the Northeast and Midwest. Together they serve 43 million people.

There is a problem with CSSs: When it rains, they often overflow, because they carry more wastewater than either treatment facilities or their piping systems can handle. Portland, Maine, is one of the communities struggling with "combined sewer overflows" (CSOs). About 720 million gallons pour into the coastal waters around Portland every year. That amount of flow would cover most of downtown Portland, about three square miles, with a puddle more than a foot deep. The city's efforts to come up with a plan to deal with CSOs show how difficult and expensive a problem they have become.

CSOs are responsible for closing Portland's East End Beach several times during the summer, and they contribute to the closing of the city's shellfish beds. Back Cove, which is in the center of the city--and is for Portland the kind of recreational focal point that the Tidal Basin is to Washington, DC--is unsuitable for recreation for several days after storms. Though the outfall from Portland's wastewater-treatment facility is partly responsible for these problems, there is no question that CSOs are a substantial threat to human and aquatic life in the waters around the city.

Portland's problems come from the city's collection system. During rainy periods, the pipes and mains in certain parts of the system can't get combined sewage flow to the treatment plant. Whatever can't be accommodated by the conveyance system gets piped straight into the receiving water. In Portland, there are 39 locations where this happens.

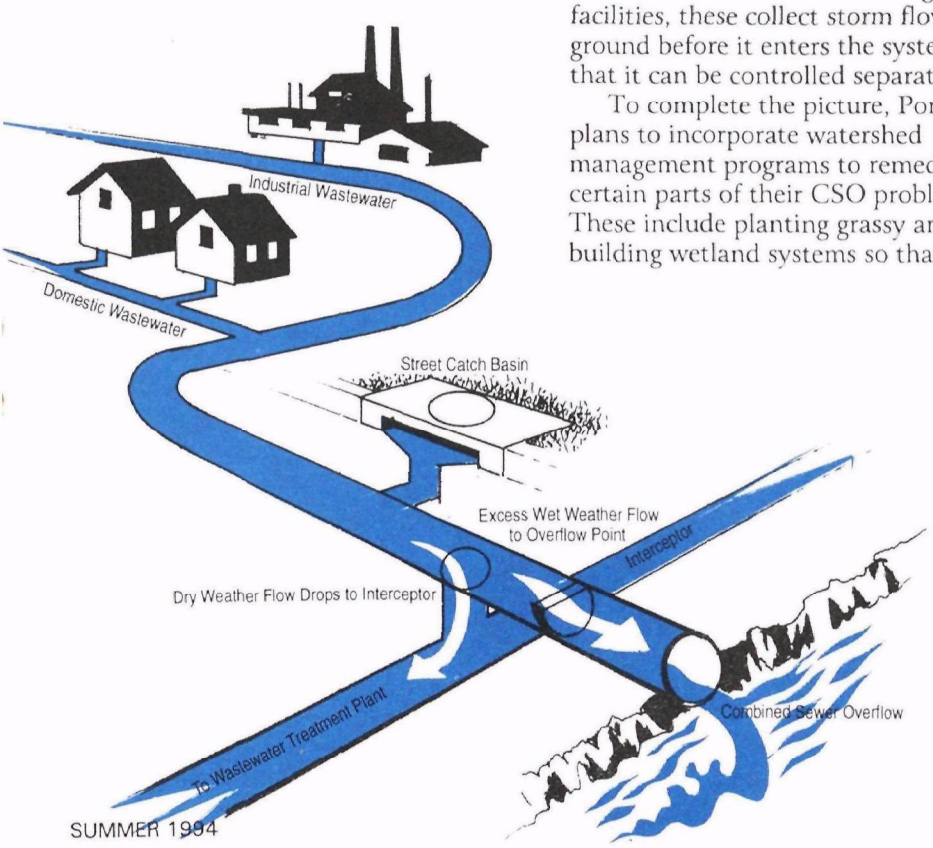
In 1991, the city of Portland and the Portland Water District were required by a consent agreement with the Maine Board of Environmental Protection to develop a CSO abatement plan. In response to the consent agreement, the city formed a task force consisting of state, regional, and local officials and local environmental groups to study the problem. Over a three-year period the task force came up with a plan that, when fully implemented, will allow greater use of Portland's public beaches

*(Urbinato wrote this article while at EPA as part of the University of Missouri's Washington, DC, program for graduate students in journalism. He graduated in May with an M.A. in journalism.)*

throughout the summer and will control 99 percent of all wastewater flows generated during wet weather. Overall CSO volume will be reduced by 88 percent, and the number of CSO events will be reduced by 85 percent.

Portland aims to control CSOs with a variety of methods: reduce pollutants at their source, improve the system's ability to store wastewater and convey it more slowly to the treatment plant, increase the capacity of key pumping stations, control the storm flow into the sewer system, and use watershed management to help control runoff.

Presently, Portland is already reducing pollutants at their source and plans to expand the practice under their CSO plan. The city will continue to aggressively implement an industrial pretreatment program that requires companies to remove their toxic and other nonconventional wastes from their wastewater before discharging it to the sewers. Portland also sweeps its streets twice a year, removing 17,000 cubic yards of material that would otherwise end up in the treatment plant or be piped into the city's waterways. The city will expand its efforts to clean the sewers to prevent waste from accumulating and thus impeding the flow of water to the treatment facility.




The city also plans to improve its system's ability to move waste after it gets into the sewer system. Many sewer systems rely on gravity to get waste to the treatment plant. Pumping stations are used when gravity can't do the job. The Portland plan calls for optimizing the capacity of two pumping stations, which are now overwhelmed during storms. The city also plans to build a storage facility near one of the stations to detain storm flow, which can then be pumped to the treatment plant in dry periods. Storage facilities are among the more expensive elements of the plan, accounting for just under one-fourth of the total CSO plan costs.

Controlling flow before it gets into the sewer system is another major element of Portland's CSO plan. One technique applies "brakes" at certain points in the system. These devices, known as vortex valves, reduce storm flow entering certain street sewers and force it to travel over ground on streets. The storm flow then enters the combined sewer at a point where there is capacity, enters a separate storm sewer, or ponds in an area where flooding is not a problem. Vortex valves, which are already being used in Portland, will continue to be installed throughout the combined sewer system. Stormwater detention facilities will also be built. Unlike storage facilities, these collect storm flow above ground before it enters the system so that it can be controlled separately.

To complete the picture, Portland plans to incorporate watershed management programs to remedy certain parts of their CSO problem. These include planting grassy areas and building wetland systems so that nature can detain and soak up rain and slowly release it into the city's sewers and waterways, cleaning it along the way. Also, some combined sewers will be separated.

Portland officials say the plan will cost $52 million. If it is implemented over a 15-year period, as is planned, the annual sewer costs to Portland's households will rise from the current rate of $200 a year to $250 during the average year of the plan and $325 during the peak year of the plan. The peak year cost represents approximately 1.22 percent of income for a household with median income.

Portland's plan reflects in several of its key elements a national policy on CSOs recently adopted by EPA. The plan, like the policy, was formulated with input from the principal stakeholders, not merely released to them for comment after the fact. As allowed in the policy, Portland's plan spreads the costs out over 15 years, scheduling the larger, capital-intensive projects for the latter part of the period. That way, if the cheaper, earlier control efforts are successful in reducing the CSO load, the later projects can be scaled down to save the ratepayers money. As mentioned earlier, Portland's plan will reduce overall CSO volume by 88 percent; EPA's policy calls for a reduction, in most cases, of at least 85 percent. Current law, which many municipalities complain is unrealistic, can be interpreted to require 100-percent control.

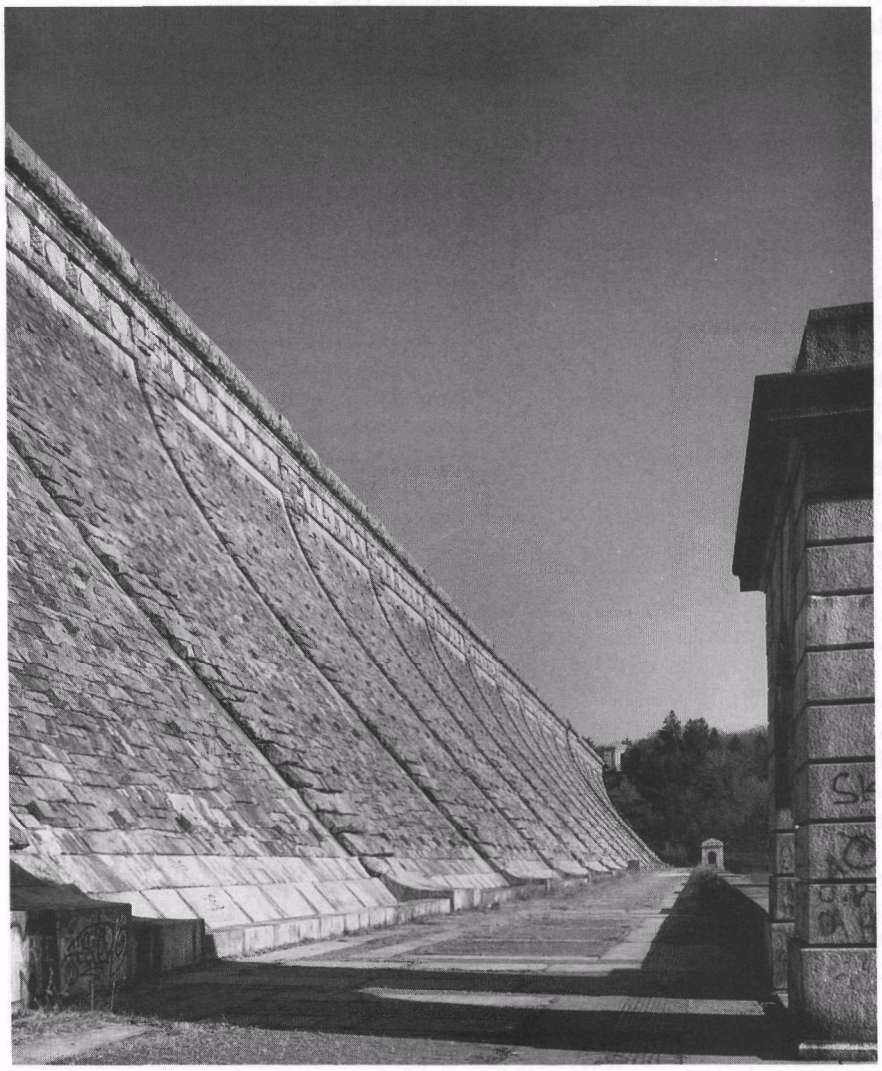
Nevertheless, several issues need to be resolved before Portland's plan can be approved by EPA. For example, Portland officials intend to bypass a significant portion of their storm flow around secondary treatment at the wastewater-treatment facility; this storm flow would receive primary treatment only. This practice would require a special NPDES permit provision from EPA to avoid being a direct violation of the Clean Water Act. To be granted the NPDES bypass provision, the officials would have to show, for one thing, that the bypass would not cause or contribute to violations of water-quality standards in Casco Bay.

Portland and EPA currently are negotiating to reach consensus on the city's plan.□

# New York City: Case of a Threatened Watershed

by Keith S. Porter

## Pollution prevention could save huge filter costs



*Kensico Reservoir near New York City. Kensico serves as a distribution reservoir from which water is conveyed to the city through a gravity-fed system of tunnels.*
*Nathan Farb photo.*

New York State law authorizes New York City to regulate the two upstate watersheds--the Croton and the Catskill-Delaware--that provide the city with drinking water. These two watersheds cover an area nearly the size of Delaware. They contain within their boundaries parts of eight counties, 60 towns, one city, and 11 villages, and more than 500 agricultural and horticultural units. They provide drinking water for nine million consumers--roughly half the population of the state. Eight million of these reside or work in New York City itself; the remaining one million reside upstate in the watersheds.

The two watersheds, together, produce 1.2 billion gallons of water daily. This water traditionally has been of such high quality that it often won contests. The city found no need to filter it before supplying it to consumers.

The natural beauty of the watersheds, however, and their proximity to the metropolitan area have encouraged land development. Close to the city, development has been aggressive. For example, since the second world war, suburban encroachment in Westchester and Putnam counties has caused serious degradation of the Croton reservoirs. Consequently, filters to treat the water produced in the Croton system are now required. Expected construction and annual operating costs are $600 million and $45 million, respectively.

The Croton system produces only about 10 percent of the water consumed by New York City. If similar degradation were to occur in the more remote Catskill-Delaware system, and filters became necessary, the costs would be enormous. Construction could exceed $5.0 billion; annual operating costs would approximate $300 million.

Some scientists believe filters should be constructed to protect against already existing risks. Such a position has been taken by an expert panel formed by EPA's New York regional office. The panel also stated that comprehensive watershed management is required regardless of whether the filters are installed.

Last December, EPA agreed to postpone the decision on filtering the Catskill-Delaware supply for three years while the city attempts to demonstrate that it can maintain the

*(Porter is Director of the New York State Water Resources Institute, Cornell University.)*

quality of the water through watershed control. As a backup measure, the city must complete the preliminary design of the filters during the period.

For the nine million consumers in New York City and Westchester County, failure of watershed control programs upstate will mean they have to bear the brunt of paying for filters. To pay greatly more for water of equal or lesser quality will seem economic perversity. On the other hand, the watershed residents believe that economic perversity is already upon them. Under the watershed control programs, they are being asked to incur unknown economic and social costs to protect water that is consumed primarily by people outside the watersheds. And so the conflict is joined.

Over the past three years, representatives of watershed interests and New York City have negotiated over watershed management. The negotiations are intensive and often acrimonious. New York City is determined to fully protect its water supply. Communities in the watersheds are equally determined to protect their way of life. The forced acquisition of land and subsequent destruction of many communities during the original construction of the New York City reservoirs has left bitter memories. Nevertheless, progress has been achieved, especially with respect to farming in the watersheds. Negotiations between the city and farmers have proceeded separately from those dealing with communities and non-farm open spaces. The New York State Department of Agriculture and Markets has facilitated discussions through an inter-agency/farmer *ad hoc* task force.

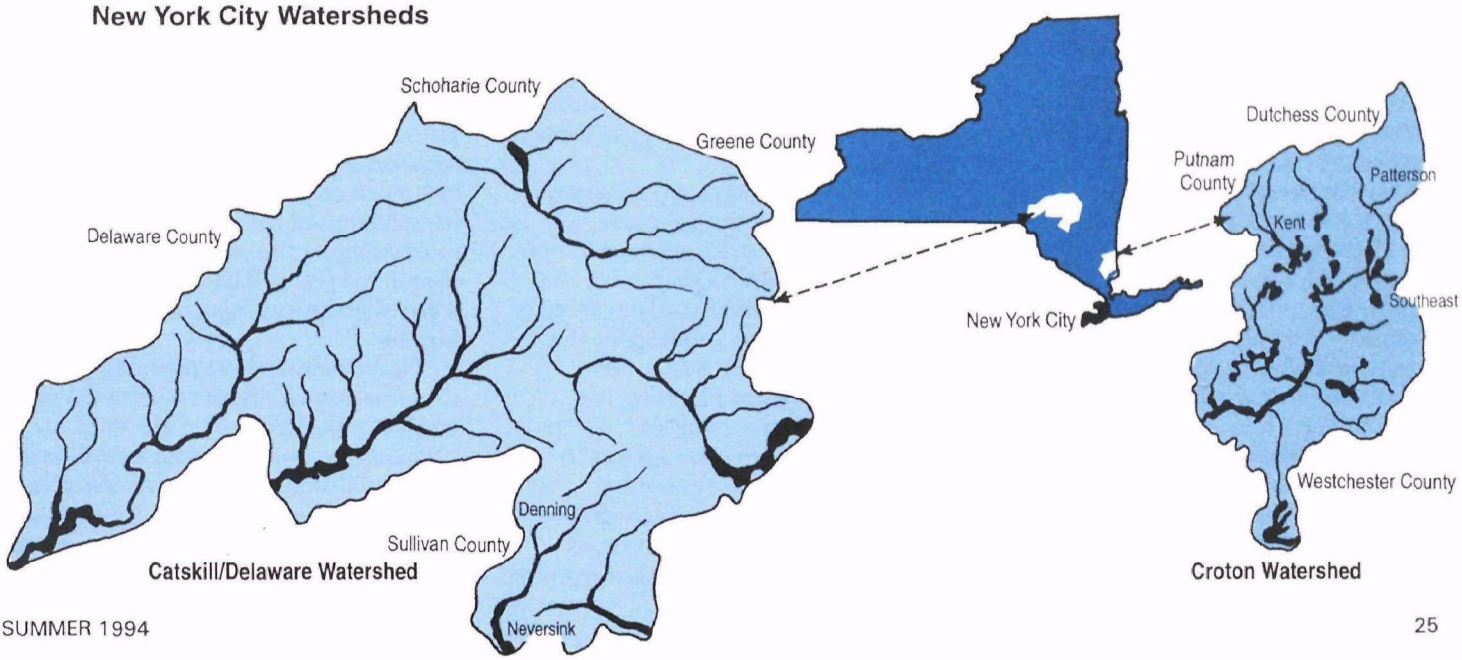
More than two years ago, a comprehensive farm management program was established under the title, "Whole Farm Planning Program." The program is endorsed by New York State agencies, New York City, the farmers themselves, and EPA. The program assumes that, in a populated rural landscape, well-managed agriculture is the best protection for water quality. Further, compulsion is unlikely to succeed with fiercely independent farmers, and the program should be a voluntary one based on providing incentives to farmers to participate. Finally, farming practices adopted to protect water quality should be based upon sound scientific principles. The farmers seek best scientific options for farming purposes, and New York City seeks scientific assurance that those options will satisfy water-quality objectives. An inter-disciplinary group of Cornell scientists is working to meet both these needs.

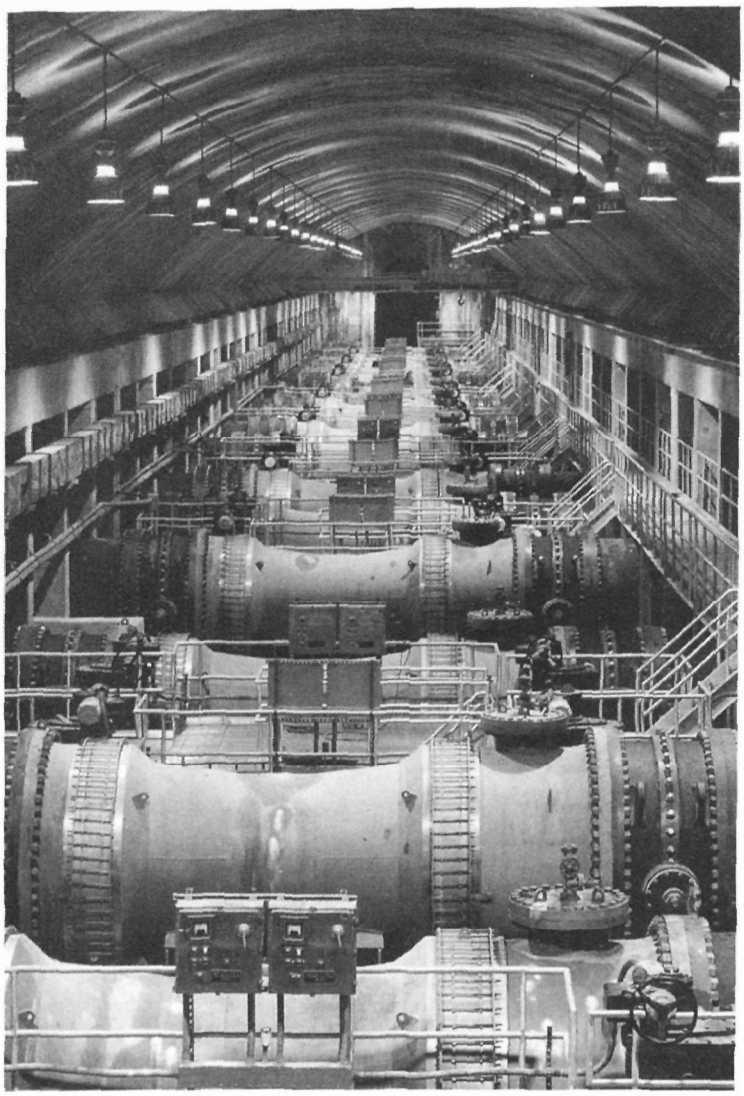
New York City provided $4.0 million for the first two years of the program, during which the objective was to develop plans on 10 demonstration farms. Of the roughly 500 farms in the watersheds, the majority are dairy farms, and the 10 selected for demonstration were all dairy. Another important reason for selecting dairy farms is that dairy animals are a known source of *giardia* and *cryptosporidium*.

Plans for the farms are now developed. Each farmer worked with County Project Teams comprising staff from Cornell Cooperative Extension, Soil and Water Conservation Districts, and the U.S Soil Conservation Service. These teams received advice and training from scientists at Cornell University. Administrative coordination was provided by the New York City Soil and Water Conservation Committee. Leadership is now passing to a Watershed Agricultural Council comprising watershed farmers, watershed agribusiness, and the New York City Department of Environmental Protection (NYCDEP).

Preventing pollution from farms has a cost. For it to succeed, water quality needs must be reconciled with the economic constraints and interests of the farmer. There must be gain to balance pain. The solution relies upon an exhaustive examination of the farm as a whole. This strategy is called Whole Farm Planning, which seeks gains in efficiency by evaluating and integrating all aspects of management. This requires coordinated planning by agricultural scientists. Farm economists, agricultural engineers, soil scientists, animal scientists, crop specialists, veterinarians, microbiologists, pest management specialists, and hydrologists must combine their expertise. This integration of multiple scientific

**New York City Watersheds**





*Gargantuan in scale, New York City's third water tunnel system, now under construction, will bolster the city's water distribution system. Shown is the new Van Cortlandt Valve Chamber, built 250 feet deep under the Bronx, due to go on line next summer.* Nathan Farb photo.

disciplines is difficult but necessary.

Whole Farm Planning starts out by evaluating three stages at which pollution can be stopped. The first is the source of pollution, such as barnyard areas, silage systems, stored manure, and sheds containing chemicals. If a source is managed so as to eliminate or reduce releases of contaminants, then risks to water quality are diminished. The second stage is the farm field over which contaminants may be transported to a watercourse following precipitation and runoff. By releasing contaminants only when there is no runoff, by reducing the amount released, or by managing soil and crops to minimize effects of runoff, transport across the field is reduced. The third stage is the watercourse itself, along which buffer zones may be kept to prevent contaminants from reaching the water. This evaluation is a rational means to identify and rank risks posed by farming activities. Options for management can then be selected to minimize risks and costs.

The protozoan pathogens, *giardia* and *cryptosporidium*, are a problem. We require knowledge about animal sources of these protozoa and their environmental fate. Little is known about dairy farms as a cause of microbial pollution of water. An inter-agency pathogen group, including Cornell scientists, is studying the incidence of the parasites in dairy herds and their possible control. An associated group is evaluating methods to identify critical hydrological areas on the farms.

The farm management program is about to enter its second phase, in which we expect to implement Whole Farm Planning on 85 percent of the remaining farms over the next three to four years. Present funding for the program amounts to $35 million.

As Whole Farm Planning has progressed, inter-agency and community groups have sought to establish a Whole Community Planning Program. Local government is represented by the Coalition of Watershed Towns. Technical working groups and a policy dialogue group, involving about 300 individuals, have been created to seek technical and institutional agreements.

To demonstrate how community planning might protect water quality, six towns assumed a pilot role. The towns are Denning, Middletown, and Neversink in the Catskill-Delaware watershed, and Kent, Patterson, and Southeast in the Croton Watershed. (See map inset, page 25; not shown: Middletown, the southernmost pilot town in the Catskill-Delaware watershed.) Each town formed a Citizen Advisory Committee; the committees are supported by technical staff from County Health and Planning Departments, by Cornell Cooperative Extension, the New York State Water Resources Institute, and the NYCDEP. Each committee has identified and assessed priorities for their town. On-site wastewater disposal, stormwater and drainage, and land-use management are shared major priorities. The towns in the Catskill-Delaware watershed are also concerned with streambed and streambank management. Denning and Neversink have proposed a joint Watershed Council for the Neversink Reservoir whose catchment area lies within the two towns.

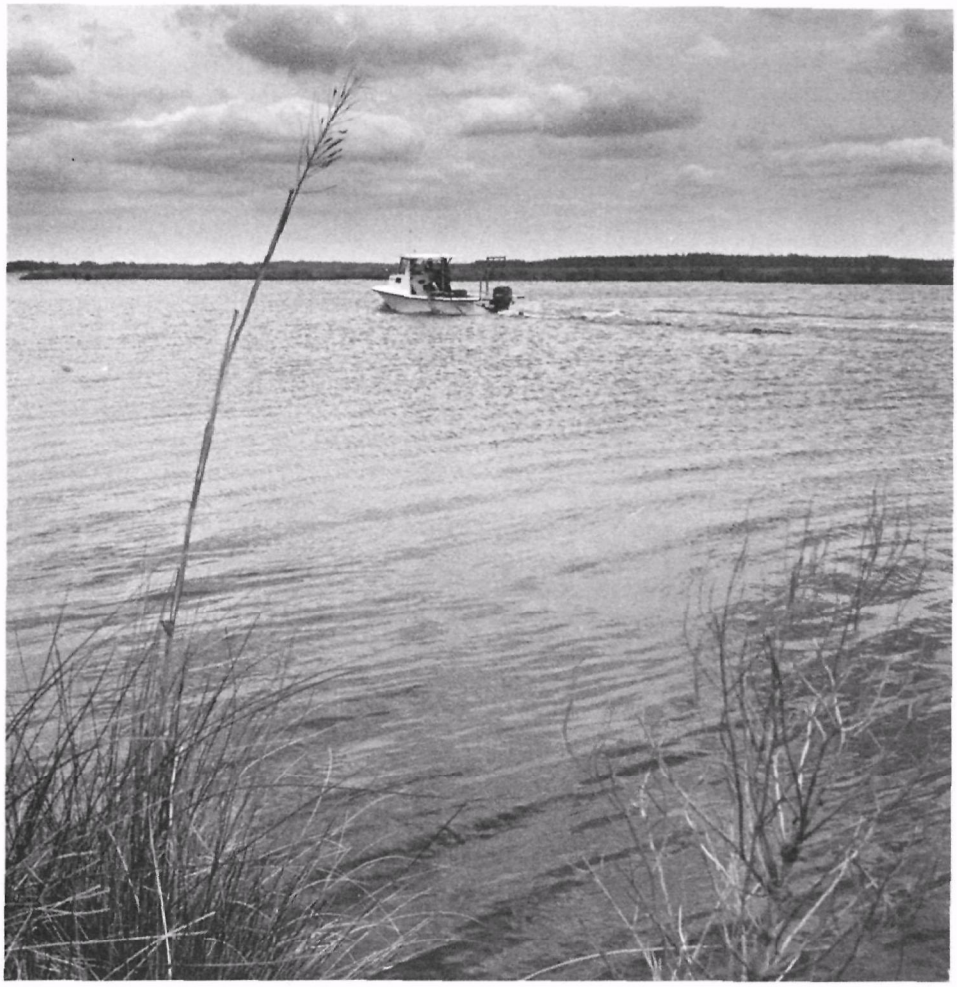
The declared intention of New York City to acquire additional land to protect its reservoirs has seriously jeopardized further negotiations between the city and watershed leaders. Currently about 350,000 acres, or roughly one quarter of the watersheds, is owned either by New York State or by the city. The city now proposes to purchase an additional 80,000 acres, for which it has committed $201 million. Unfortunately, the city has not yet explained why it needs 80,000 acres, nor has it developed an acquisition strategy. As shown by the history of acquiring land for the construction of the reservoirs, land purchasing by the city is a heatedly contended issue. The towns are also worried about consequences for their tax base.

Nevertheless, there is shared hope that this critical dispute can be resolved. In the absence of local cooperation, nonpoint sources will not be controlled sufficiently to make pollution prevention work. The outcome bears watching as a case study in watershed management.□

# Albemarle-Pamlico: Case Study in Pollutant Trading

by John Hall
and Ciannat Howett

## Most of the nutrients came from nonpoint sources



*Albemarle-Pamlico sound.*
*Copyright Scott Taylor photo.*
*Duke University Marine Laboratory.*

The Albemarle-Pamlico estuary of North Carolina is the second largest and one of the most productive estuarine systems in the country. Over the past two decades, excess nutrients entering the estuary from the Tar-Pamlico River have caused algal levels to increase. These increased levels can lead to fish kills, odors, and habitat loss and can generally diminish water quality. The system has also suffered significant losses in wetlands, submerged aquatic vegetation, and spawning areas due to real estate development.

To reverse the degradation of the estuary, in 1989 North Carolina's Department of Environmental Management decided to increase control of municipal and industrial point-source dischargers along the river. Under a proposed watershed plan, these dischargers would be forced to build advanced treatment facilities to reduce their nutrient loading to the river. Estimated capital cost for the facilities was approximately $50 million.

The problem with the state's strategy was that almost 80 percent of the nutrient pollution entering the Tar-Pamlico River was discharged *not* from point-sources, but from agricultural and urban runoff and other nonpoint-sources of pollution. (See pie chart on page 29.) The state's strategy provided for only minimal increased attention to reducing nonpoint-source pollution and did not earmark additional funding or staffing for such efforts. Technical analyses indicated that little, if any, actual improvement in water quality would occur from the point-source control measures.

In 1989, a group of municipalities and industries located along the Tar and Pamlico Rivers joined together to form the Tar-Pamlico Basin Association, Inc. Their purpose was to

*(Hall and Howett are environmental attorneys at Kilpatrick & Cody in Washington, DC. Hall is a partner and Howett, an associate. The authors provide legal and technical counsel to groups of industrial and municipal dischargers nationwide, including the Tar-Pamlico Basin Association.)*

develop an alternative strategy that addressed both point and nonpoint sources of pollution in the entire Tar-Pamlico watershed on a cost-effective basis.

The Association proposed to optimize reductions in point-source loadings through existing facilities and to promote nonpoint-source reductions through innovative financing arrangements. Both technical and regulatory assistance was offered to leverage state resources in reaching a better understanding of the nutrient dynamics of the estuary and in identifying the most cost-effective mix of point- and nonpoint-source controls. This concept of point sources contributing to nonpoint-source controls is known as point/nonpoint-source "trading."

In December 1989, the Association's alternative strategy was adopted, and an agreement was signed by the Tar Pamlico Basin Association, the State of North Carolina's Department of Environmental Management, the Environmental Defense Fund, and the Pamlico-Tar River Foundation. The strategy consisted of three primary components: group point-source controls, nutrient discharge trading that funded nonpoint-source controls, and nutrient modeling of the watershed that improved targeting and tracking of pollution sources.

## Point-Source Controls

Under the Tar-Pamlico agreement, the Association is given group nutrient-reduction goals, rather than individual nutrient limitations being placed in each member's discharge permit. The goals are set at increasingly stringent levels each year for the first five years of the project.

The agreement requires members of the Association to evaluate their facilities to identify operational or minor capital improvements that could reduce nutrient discharge levels. Once they have optimized existing facilities, they are given the choice of achieving the group limitations by making major improvements to their facilities, "trading" discharge levels between themselves, or by funding implementation of nonpoint-source pollution controls.

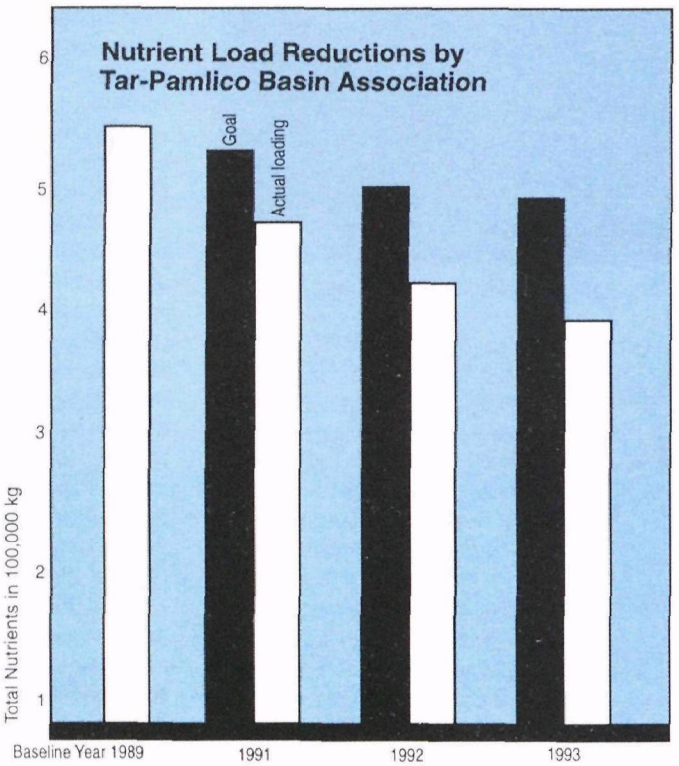
As a result of the initial evaluation, Association members were able to meet almost 80 percent of their group nutrient-reduction targets through operational changes alone. By working together as a group, they were able to finance a sophisticated engineering evaluation of their plants which as individuals--particularly the small towns that are members of the Association--they never could have afforded.

The bar chart shows the Association's success in reaching its nutrient-reduction goals during the first phase of the project. From 1989 to 1993, the new approach reduced overall nutrient loading to the watershed by 28 percent even though the average flow per month to the watershed increased by 18 percent. Effluent nitrogen concentrations, the primary pollutant of concern, decreased from 14.4 mg/l to 8.9 mg/l. This result far exceeded reductions that would have occurred under the original state proposal.

## Nonpoint-Source Controls and Nutrient Trading

If the Association members had not been able to reach their group nutrient reduction goals, the Tar-Pamlico strategy would have allowed them to pay into a fund to implement nonpoint-source controls. The arrangement was for them to pay $56 for each kilogram of nutrients they discharged over the target level. A 10-year credit was to be given for each kilogram funded by this approach. The flexibility of this arrangement is important because, once plant performance is optimized, preventing nutrient pollution through nonpoint-source controls, such as agricultural best management practices (BMPs), is far less costly than it is through advanced wastewater treatment. Further, it also promotes habitat restoration, wetlands preservation, soil-quality control, and those other benefits that come with agricultural BMPs.

Even though point/nonpoint-source trading has not been necessary yet, the Association has provided almost $1 million for demonstration projects in the watershed, primarily involving



*Egrets are native to Tar-Pamlico river marshes.*

*Copyright Scott Taylor photo. Duke University Marine Laboratory.*

implementation of agricultural BMPs. With the help of federal funds, the Association developed model BMP projects to ensure that the infrastructure is present when trading becomes necessary. In addition, the Association has spent $150,000 to finance additional personnel in the North Carolina Division of Soil and Water Conservation to assist in identifying nonpoint sources and implementing BMPs in the watershed.

## Nutrient Modeling

In addition to obtaining funding for BMP projects, the Association funded creation of a water quality model of the Pamlico estuary and obtained funding for development of a geographic information system (GIS) of the watershed. Through the use of these models, the state can target BMPs to those operations that are causing the greatest impact and can determine if additional point-source limitations would improve water quality. This capability allows the state's regulatory strategy to move beyond the scatter-shot approach of controlling all point or nonpoint sources to the maximum extent and brings to bear a more sophisticated cost/benefit analysis of pollution improvement impacts.

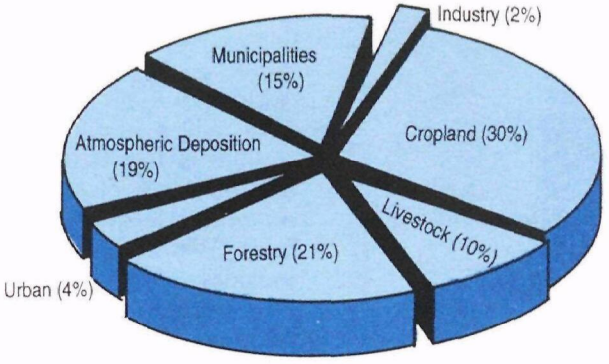
## Conclusion

At the end of 1995, the Tar Pamlico project will move into Phase II. Development of the project, in which the infrastructure and foundation for trading and nonpoint controls were established, will give way to implementation, in which the basic concepts will be retained and trading can occur as necessary. Negotiations on the specific provisions of Phase II are just beginning, but there is no question that the project is considered a success by all the parties involved: the Association members, the regulators at the state and federal levels, and the members of the environmental community.

The concepts of point/nonpoint-source trading and watershed-based management have also become increasingly popular since the Tar-Pamlico project first introduced these concepts. Despite some initial skepticism, EPA is now pointing to the project as a model for cost-effective and innovative water-quality control. Both the House and Senate versions of the Clean Water Act reauthorization contain provisions for a watershed approach to water-quality improvement; both versions would be improved if additional provisions are included to encourage cost-effective alternatives such as point/nonpoint-source trading.

As this concept grows in popularity and prominence, communities interested in implementing similar approaches should look to Tar-Pamlico as a case study experience. To aid communities in such an endeavor, Congress recently appropriated funds for creation of a guide to watershed planning and point/nonpoint-source trading as implemented in the Tar-Pamlico basin. This guide will be available in the fall of 1994 through the North Carolina Department of Environmental Management, 512 North Salsbury Street; Raleigh, North Carolina 27604. □

**1988 Tar-Pamlico Nitrogen Sources**

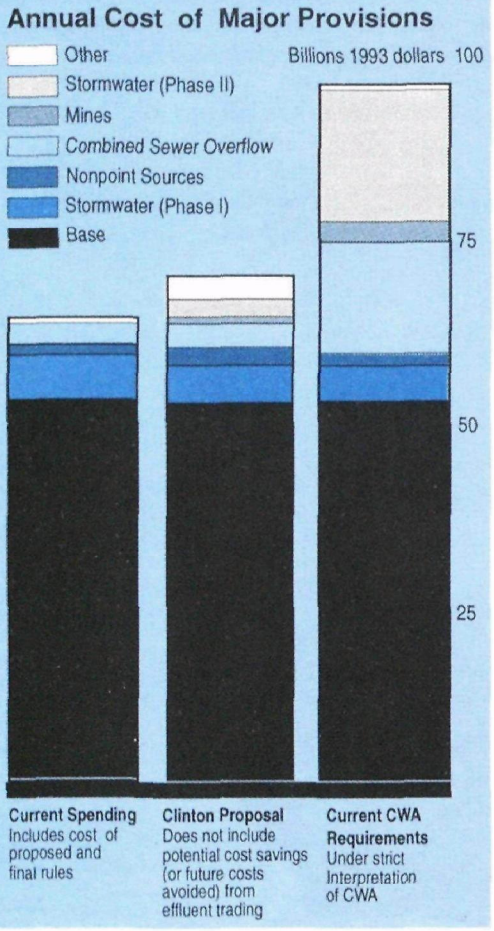



(Figures total greater than 100 percent due to rounding.)

# President Clinton's Clean Water Act Initiative: Costs and Benefits

## Costs avoided would outweigh costs incurred

by Mark Luttner




President Clinton's Initiative for reforming the Clean Water Act (CWA) will reduce red tape, streamline administrative procedures, and target expenditures--all for the purpose of realizing our water-quality goals more efficiently. Equally if not more important, the initiative focuses on those pollutant sources that have been controlled inadequately in the past: wet weather runoff from agriculture, combined sewer overflows (CSOs), and stormwater. Rather than imposing across-the-board, national mandates, the initiative calls for more targeted approaches based on risk. In other words, state and local governments would be given greater flexibility to focus on highest priority problems.

In developing recommendations to improve the Clean Water Act, the Administration estimated the costs and projected benefits for implementing each of its major provisions. Costs were estimated for private sources, municipalities, state governments, and the federal government. Estimates were made for what is currently being spent, what would be required under the President's Initiative, and what would be required under the existing law if nothing changed.

The annual incremental costs of the Initiative for all sectors range from $5.0 to $9.6 billion. However, the proposed recommendations would also result in cost savings or costs avoided for all sectors of $29.1 to $33.8 billion annually compared to current law, with the majority attributable to urban areas that have historically faced large stormwater and CSO costs.

### Watershed Approach

Currently, programs to control runoff from agricultural and urban areas cost between $1.0 and $1.3 billion annually. The Initiative would require an increase of between $1.0 and $1.7 billion. However, this does not include related savings to the agricultural community from reduced pesticide and fertilizer use, nor does it take into account savings to those areas that develop and implement plans for runoff management on a watershed basis. Watershed management, which provides an integrated approach to controlling pollution sources, results in resources being coordinated and leveraged more efficiently. The result is increased long-run savings, savings that are not reflected here.

### Stormwater

Under the existing CWA, the estimated annual cost for businesses and municipalities to control polluted runoff from yards, streets, and parking lots would be between $23.6 and $24.5 billion. The President's Initiative, however, calls for spending $7.0 to $10.1 billion annually. Thus, the Initiative would provide welcome financial relief to hundreds of communities as they struggle to address one of the most complex and expensive water-quality problems in the country.

### Combined Sewer Overflows

Combined sewer systems are a remnant of the country's earliest water infrastructure. They date back to the 19th century, when getting animal waste off the street was a municipal priority and towns frequently combined their street (storm) sewers with their residential sewers for economic reasons. Combined sewer overflows (CSOs) occur when heavy rains or snowmelt overload the system with more wastewater than their piping systems and treatment facilities can handle.

Replacing this infrastructure has a significant price tag, one that many cities have difficulty paying. For many years, CSO communities have regarded existing requirements as simply unachievable, and as a result many have done little or nothing. The President's Initiative is a consensus product negotiated by EPA and a diverse group of interests, including environmental groups and the cities themselves. It is a more workable solution that would provide communities with additional flexibility in developing CSO controls while still meeting water quality goals. The annual cost would be $3.5 billion, a $10.7 billion savings over existing requirements.

### Toxics Control

The Initiative proposes to limit the releases of the most persistent, bioaccumulative toxic pollutants and refocus the process for developing water-quality standards and criteria.

Toxic reductions would be achieved through multi-media strategies and by providing industry with flexibility in selecting the most cost-effective controls. For example, an industry might choose to change its production process rather than having to buy more expensive treatment technology.

### Ground-water Protection

The Initiative would protect ground water and drinking water by including provisions for regulating certain point-source discharges that are likely to contaminate ground water and related surface water. The cost to private sources for control measures, such as landfill liners and leachate-collection systems, are estimated to average between $150 and $600 million per year. Ultimately, the Initiative will reduce future ground-water contamination and save millions, if not billions, of dollars in cleanup costs.

### Pollution Prevention Planning

More and more, senior company managers are asking an obvious question: Why spend money on controlling pollution if it can be prevented from occurring in the first place? Many industries have adopted pollution-prevention planning voluntarily; however, for those that have not, the initiative would give EPA and the states the authority to require pollution-prevention plans from industries holding water-pollution permits. EPA estimates that the annual cost of preparing such plans for *about 6,000 industrial permittees* would range between $60 and $120 million.

Again, this estimate does not reflect the financial benefit (i.e., cost savings) that industry may realize by implementing pollution-prevention measures. For example, industries that capture and reuse solvents may lower production costs.

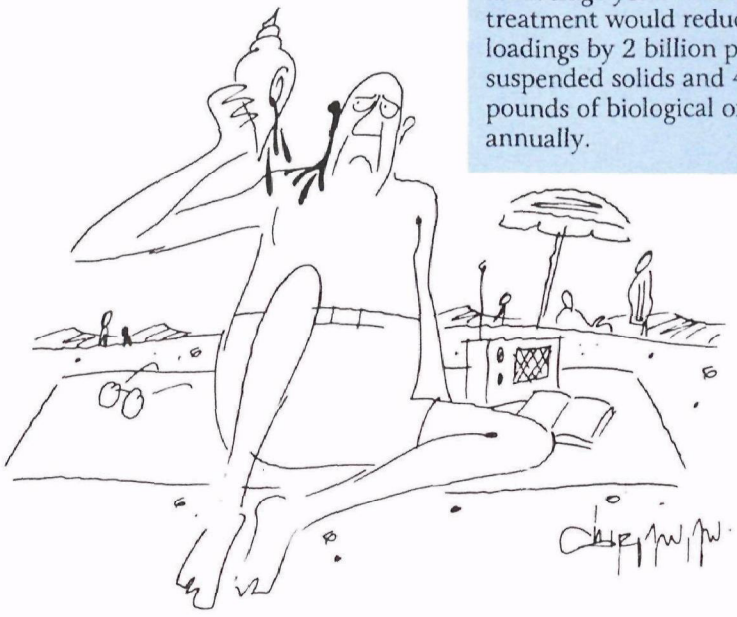
### Abandoned Mines

Approximately 500,000 abandoned mines can be found on federal lands around the country. Historically, only minimal effort has been made to address these sites despite some serious water quality problems. Rather than address all 500,000 sites, as is currently required under the CWA, the initiative would require controls only at those mines known to cause water quality problems. The result would be an annual cost of $0.3 to $1.1 billion, compared to $1.1 to $3.5 billion if all sites were addressed. The net annual savings to the federal government is estimated at $0.8 to $2.4 billion.

## Benefits

In addition to saving billions in costs, the President's Initiative would result in significant benefits in water quality:

- An enhanced program for controlling polluted runoff (nonpoint sources) would result in measurable water-quality improvements in 52 percent of impaired or threatened rivers and 63 percent of impaired or threatened lakes.
- Stormwater controls could reduce loadings of sediments, toxics, and nutrients in urban communities by 75 to 80 percent in developing areas and by 15 to 25 percent in areas already developed.
- The Combined Sewer Overflow policy will provide adequate treatment for over one billion gallons of raw sewage, urban runoff, and industrial wastewater that are currently discharged without treatment during an average year. The enhanced treatment would reduce pollutant loadings by 2 billion pounds of total suspended solids and 445 million pounds of biological oxygen demand annually.



### Discharge Fees

Every year, states spend approximately $394 million managing permit programs--National Pollutant Discharge Elimination System (NPDES), pretreatment, and sludge. To help recover these costs and to ensure the long-term viability of these programs, the Initiative would require states (and EPA in those states with programs administered by EPA) to assess a fee against permittees.

### Economic Incentives--Effluent Trading

Trading pollutant reductions between sources is a concept that was introduced in the Clean Air Amendments of 1990. The President's CWA Initiative would allow similar actions for water pollutants in select circumstances. For example, in a watershed heavily affected by farms, point sources might subsidize the cost of measures to reduce agricultural runoff. By thus helping to reduce overall pollutant loads on local waterbodies, point sources might avoid having to meet more stringent and significantly more expensive treatment requirements. (See article on point/nonpoint pollutant trading on page 27.) EPA's preliminary analyses show that trading (between point sources, between point and nonpoint sources, and between indirect dischargers in pretreatment programs) could achieve pollution reduction at significantly lower costs--between $0.7 to $7.5 billion less than the costs of current mandatory discharge requirements. ☐

*(Luttner is Director of the Office of Policy and Resources Management within EPA's Office of Water.)*

# Amending the Safe Drinking Water Act: View from Congress

## The outcome is not assured

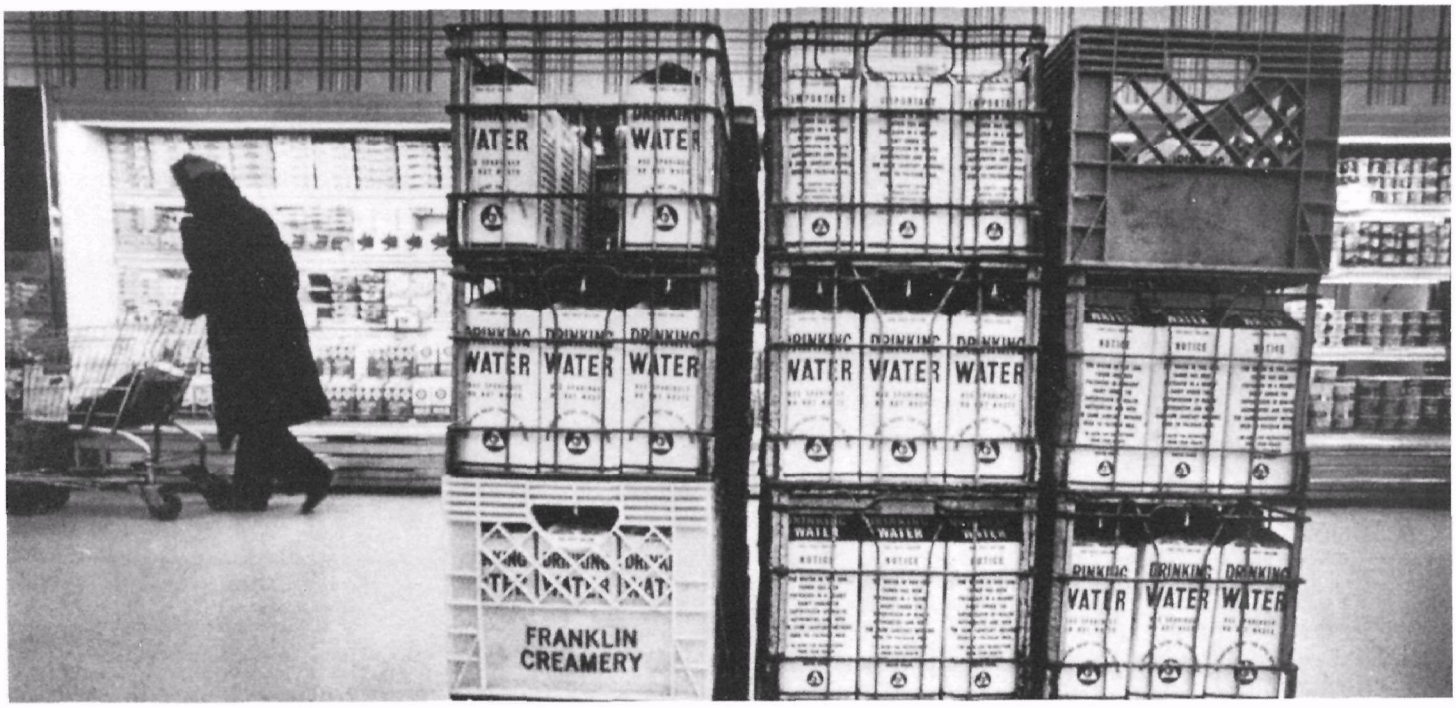
by Henry Waxman

In 1986, the last time Congress amended the Safe Drinking Water Act, the legislative process was a model of cooperative progress. But times have changed. The drinking-water debate in 1994 may be a legislative donnybrook. On one side are water companies seeking to relax regulations; on the other are millions of Americans concerned about contamination of the water they drink.

The American public became all too aware of the potential consequences of contamination last year, when problems in Milwaukee elevated the issue as never before. In March of 1993, that city's water supply was contaminated with an intestinal parasite that made more than 400,000 ill. For a week, more than 800,000 residents were without potable tap water. Drinking water became a precious commodity. In the end, more than 40 people died. Many remain seriously ill even today. Shortly after this tragedy, a senior EPA official conceded to *The New York Times* that, given the existing drinking-water protection system, "what happened in Milwaukee is likely to happen again, but I can't predict where."

There have, of course, been other incidents, including contamination problems that led to boil orders in the Washington, DC area, and parts of New York city. Also, although they have not received the same press attention as the problems in Milwaukee, New York, and Washington, many smaller towns have been affected by contamination incidents afflicting tens of thousands in Texas, Oregon, Missouri, and Georgia. In fact, a June 1991 study in the *American Journal of Public Health* estimated that "35 percent of the reported gastrointestinal illnesses among . . . tapwater drinkers were water-related and preventable." (See Vol. 81 at 703.)

Across our nation, the message is clear: Safe drinking water can no longer be taken for granted. Polls show that drinking water safety is a growing public concern, with one industry survey showing that more than 80 percent of consumers are willing to pay more for water meeting federal standards, while less than 2 percent agree with the industry position that federal standards are too strict *(Consumer Attitude Survey of Water Quality Issues,* American Water Works




*(Representative Waxman (D-California) chairs the House Subcommittee on Health and the Environment.)*

*Incidents of tapwater contamination are widespread. Shown here, a store in Duluth, Minnesota, supplied customers with free cartons of water.*
*Wide World photo.*

Assoc. Research Foundation, November 1993).

Probably the single most widespread and serious drinking water problem in the United States is not microbial contamination, but contamination from byproducts of the disinfection process, such as chloroform, that can cause cancer. Researchers at the Harvard School of Public Health, the Medical College of Wisconsin, and other institutions have associated these contaminants with more than 10,000 cancer cases each year, including nearly 20 percent of all rectal cancers and 10 percent of all bladder cancers.

Lead contamination is another major problem. Last year, EPA found that more than 800 cities exceeded the lead action level established under the SDWA. These high lead levels are a special danger to small children, whose developing nervous systems can be altered by lead, resulting in reduced intelligence and/or a variety of other serious problems.

Some insights into the nation's drinking-water problems can be gained from a recent report by the Natural Resources Defense Council (NRDC). Using industry data, NRDC found that 90 percent of the large public water systems in the United States continue to use technology developed before World War I to clean their water. (See boxed article on page 15.)

An additional shortcoming common to most systems is that treatment plants are operated by inadequately trained staffs with minimal oversight. A two-year General Accounting Office (GAO) study concluded last year that states, all but one of which have authority for assuring drinking-water safety under the SDWA, do not undertake even the routine inspections necessary to assure that systems are operating safely. In most cases, state supervision was found to be incomplete or superficial, and many states were found to rely on inadequately trained personnel to review water-system safety (GAO, *Drinking Water: Key Quality Assurance Program is Flawed and Underfunded*, April 1993).

Given these problems, it is perhaps understandable that many cities have problems with even the basic necessity to keep human and animal wastes out of drinking water. As mentioned earlier, the intestinal parasite that contaminated Milwaukee's water is believed to have come from animal or human feces entering Lake Michigan. Potential contamination from this same organism has prompted "boil orders" in a number of other localities, including two in Racine, Wisconsin. Even worse, water systems across the country have been coping with a variety of other contamination problems thought to be associated with sewage. In Washington, DC, fecal coliform has been found in tap water on more than one occasion. In New York City, another waste-related contaminant, the bacteria *e. coli*, showed up unexpectedly last summer. And last Christmas, the bacteria *salmonella* found its way into the water of the small Missouri town of Gideon, leaving half the residents ill with vomiting and diarrhea.

Many cities have problems with even the basic necessity to keep human and animal wastes out of drinking water.

The range of serious problems plaguing our nation's drinking-water systems must be addressed by Congress in the ongoing effort to amend the SDWA. President Clinton has proposed a broad new program to do just that. The Clinton Safe Drinking Water Initiative would provide for more financial and technical assistance to water suppliers, assure better training for system operators, streamline the law's requirements, provide special relief for small water systems, and guarantee more effective oversight. More than that, the Clinton administration has put its money where its mouth is and secured a 1994 budget that includes, for the first time ever, a major new funding program to help systems meet drinking-water standards.

Enactment of the Clinton proposal, however, is not assured. The President's initiative has been undermined by extremists in the drinking-water supply industry, with support from some state and local groups. Despite recent contamination problems, they stubbornly insist that the law's health standards are the problem and should be rolled back. Water suppliers, many of which are municipalities, argue that current requirements to provide safe water are "unfunded mandates" and should be weakened or eliminated. Their rhetoric on unfunded mandates may sound populist, but their ideological intransigence ignores public safety and will only lead to a legislative stalemate.

Legislation they support in the House and in the Senate would dramatically undermine health-protection efforts by rolling back standards, eliminating requirements for water systems to inform consumers when standards are violated, broadly weakening the existing requirements to reduce lead contamination, eliminating even the basic requirements for water systems to test for contamination levels, and authorizing broad variances from the act's requirements.

I take a different view. One of the most fundamental responsibilities of government is to provide safe drinking water to all Americans, even where the water supplier is a local government. Parents are concerned about their children's health, not about faddish political slogans like unfunded mandates.

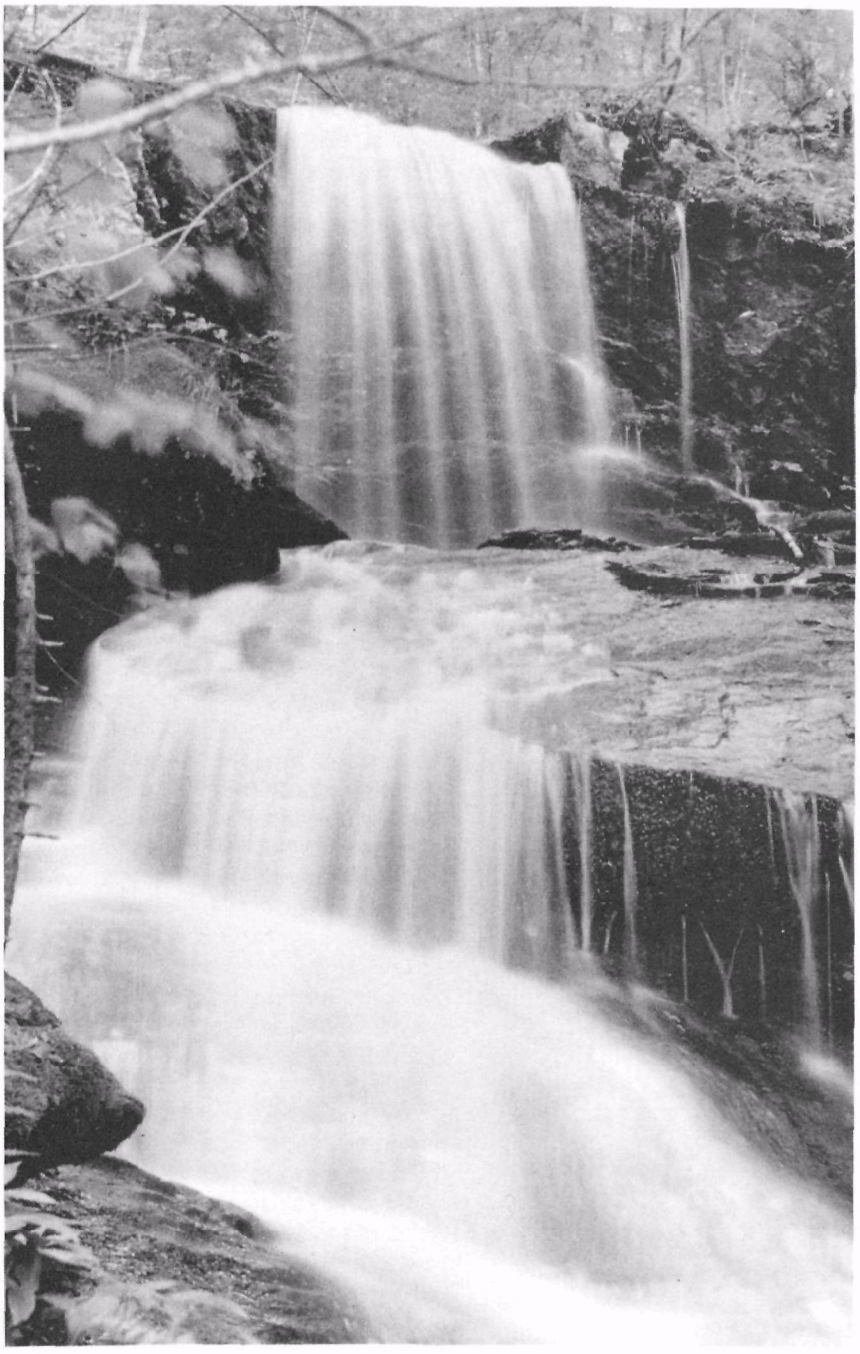
The unpleasant truth is that we are confronted with glaring shortcomings in the program for assuring that the nation's drinking water is free of contamination by dangerous substances. Congress shouldn't weaken vitally important health standards, but it should pass legislation that will strengthen health protection and provide for more financial and technical assistance to water suppliers.

The President has sought to respond to the nation's drinking-water problems with an approach that will reduce the burden on water suppliers and provide greater public-health protection. That is the path to restoring public confidence in our drinking water. □

# Amending the Clean Water Act: View from the States

by Howard Dean

## Heavy-handed control by Washington won't work



*Snow melt heads for Vermont's Lake Champlain.*
*George A. Robinson photo*

As the weight of financing and implementing many federal laws has shifted to the states over the past 15 years, governors have been pressing for greater participation in the legislative process.

When representatives of 25 states, the National Governors Association, and the Association of State and Interstate Water Pollution Control Administrators met in March of this year to discuss *their* needs in terms of a Clean Water Act reauthorization, two words were used repeatedly: *consensus* and *constructive*.

It is obvious that different states have different water resource problems; compare, say, Vermont to Arizona. Nevertheless, taking these differences into account, a clear state consensus on certain key points is important: We must agree on what is required by the people who will implement this law. Moreover, despite some charged rhetoric surrounding the Clean Water Act reauthorization, the message our group sent to EPA was clear: Our goals at the federal and state levels are not far apart.

We want to work constructively with the executive and legislative branches of the federal government. This implies an active role, not the marginalized role of naysayer. Thus, as strongly as I can, I am encouraging different groups to work together to help House and Senate committees write a thoughtful and effective Clean Water Act.

What do the states want? In a word: flexibility. Heavy-handed control by Washington is doomed to fail or, at best, be divisive. We need flexibility concerning our regulatory approach, federal oversight provisions, and use of federal program-support grants. We

*(Dean, an M.D., is Governor of Vermont.)*

agree with many points of the President's Clean Water Initiative, but we are strongly united in some desired changes. I've summarized some of them below.

● *Comprehensive watershed management.* This concept is terrific. Comprehensive watershed management envisions the states designating whole watersheds for planning and implementing the needed facilities or best management practices required to resolve all watershed pollution problems in a coordinated fashion. This approach is meant to resolve all problems, leaving none neglected. Functionally equivalent statewide or regional plans, which integrate both our point- and nonpoint-source control programs, should be accepted, and funds should be made available to accomplish the goals of comprehensive watershed management.

In Vermont, we have already identified our problem areas and necessary corrective actions through programs that integrate both point and nonpoint problems. For example, we have completed--and EPA has approved--our statewide Nonpoint-Source Assessment and Management Plans as well as our State Clean Water Strategy.

● *Nonpoint-source management.* Everyone acknowledges the need for aggressive nonpoint-source policies to reduce the amount of polluted runoff from farmland and urban areas. However, some proposals in Congress are much too heavy-handed. These include federally prescribed and mandated best management practices, enforceable within three years, which would undermine existing state voluntary and cooperative efforts that are being carried out in concert with Department of Agriculture (USDA) programs.

Requiring each landowner to develop site-specific management plans, as proposed in the Senate, would create a bureaucratic nightmare because it would be impossible for the states to review, approve, and monitor hundreds of such plans, many of which are already managed by USDA.

## What do the states want? In a word: flexibility.

States should be able to develop and implement voluntary and regulatory approaches in any mix that complements ongoing efforts. We must be held accountable, of course, for achieving water-quality standards in a timely fashion.

● *Water-quality standards.* Current proposals in Congress presume that EPA-developed criteria would become mandatory in the states after three years. This would occur without a public adoption process regardless of the site-specific characteristics of the state and waters or the applicability of the criteria to those waters. Very few criteria have such universal applicability, and this proposal would be disruptive to state standards setting. Reauthorization of this section should focus on better science, not command and control efforts that would, for example, require states to develop methodologies to translate water quality into a specific numerical limit for various pollutants.

Individual states must set standards to reflect the unique quality of their respective waters, after considering federally developed criteria for toxic or conventional pollutants. Federal procedures should prevail if states fail to act.

We strongly support amendments that clarify the scope of state water-quality-standards certifications for federally licensed projects.

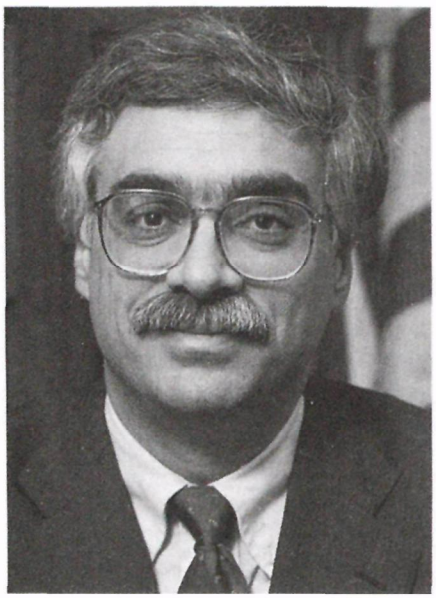
● *State Revolving Fund.* We need more money for infrastructure projects such as wastewater-treatment plants. The proposed $2.5 billion authorization should be doubled to meet identified state needs, and states should have more flexibility to provide for their disadvantaged communities. For example, states may need to provide zero-interest loans or construction grants to disadvantaged communities that cannot bear the normal cost-share of constructing needed wastewater- or stormwater-treatment facilities. Normal cost-sharing or repayment provisions may need to be waived.

The challenges are many. The rewards and benefits are great. As with any ambitious endeavor, this reauthorization will take time and effort.

The nation's governors look forward to working with Congress, EPA, and others affected by this law to ensure that our water supplies are the cleanest and safest possible.□

# Questions the Reader Might Ask

## An Interview with Robert Perciasepe



*EPA's Office of Water administers several environmental statutes including the Clean Water Act and the Safe Drinking Water Act, both of which are currently up for reauthorization by Congress. To get answers to wide-ranging questions that readers might ask in light of the ongoing reauthorization debates,* EPA Journal *interviewed Robert Perciasepe, the Agency's Assistant Administrator for Water.*

**Q Recent episodes involving the occurrence or threat of waterborne disease in Milwaukee, New York City, and our own Washington, DC, have triggered public concern about the safety of tap water. Is there reason to be worried about the quality of tap water in these and other cities?**

**A** We can't rest on our laurels. Things are changing, and we have to keep ahead of the changes. The population of the country has doubled in the past 25 to 30 years, and that puts stresses on the sources of our drinking water as well as on the treatment plants, most of which have been in place for many years. The approach that Administrator Browner and I recommend is one of pollution prevention. We look at source-water protection as a first line of defense rather than relying solely on treatment. I think that's where the United States has an advantage over many other places in the world, in that we have a strong Clean Water Act as well as a safe Drinking Water Act. Working together, they can produce the long-term security we need for drinking water.

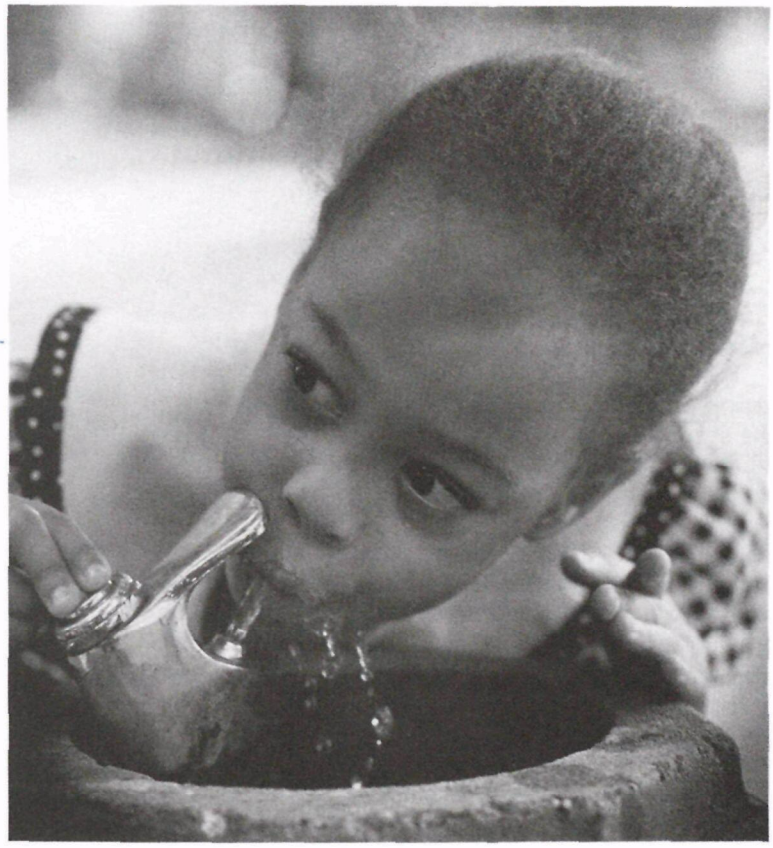
As far as these episodes are concerned, it's been my experience that treatment processes, like everything else humans design and operate, will occasionally fail. Whether the system is something as high tech as a computer or as low tech as a sand filter, mistakes can be made. Exactly what happened in the episodes you mention is a matter for further analysis. Again, I think the episodes underscore the need for protecting water sources as the first line of defense. We've made proposals for reforming the Safe Drinking Water Act that would strengthen source protection as well as provide for operator training and for the installation of new technologies. We've also proposed setting up a state revolving fund to help finance improvements to older systems.

**Q What about tap water safety in small communities: Do they have special problems?**

**A** As for the special problems of small communities, we have to keep in mind that the vast majority of people, 89 percent, are served by larger systems--those serving more than 3,300 people. Only 11 percent are on systems that serve fewer than 3,300 people. But on the flipside, there are 50,000 of these small systems (compared to 10,000 of the big ones), so the job of making sure the same quality of water is provided to that 11 percent is much different. There are more systems to evaluate, more systems to monitor, more systems that need trained operators, and so on.

To help small systems, we've proposed that the states set up small system viability programs that would look at existing systems to see which ones are going to work over the long term. If they're not, let's try to figure out another solution, like setting up a new management structure, drilling another well, or connecting some small systems with somebody else's system. If they're in a rural area and they're nonviable because of operation and maintenance, maybe we can have a circuit rider, who is also a trained operator, visit each system periodically. We're also proposing to establish a "small systems best available technology" that will allow these systems to adopt a less costly package plant approach.

Small communities do have some unique problems that must be addressed in the Safe Drinking Water Act reauthorization, and we've made some proposals to address them. The idea is to continue to improve the law, to keep it flexible, so that we can maintain the integrity we have.



*Most Americans have grown up taking the safety of drinking water for granted.*
*Steve Delaney photo. EPA.*

**Q In discussions about the Safe Drinking Water Act, the theme of "unfunded mandates" inevitably comes up in the context of state and local responsibilities. What is an unfunded mandate exactly?**

A To some extent, unfunded mandates are in the eye of the beholder. But they would generally be described as federal requirements for a state or local government to carry out a national imperative for which no funds are provided. Now that's pretty straightforward. But some people use this characterization unfairly. For instance, you might hear somebody say that their entire sewer and water budget was an unfunded federal mandate. The fact is 80 to 90 percent of the cost of running a utility system is basic operation and maintenance costs that every municipality has to face regardless of federal requirements. If you're a business, you're not going to locate in a city that has no water or sewer systems, right? These are basic necessities that have to be provided. The *real* debate is over the incremental cost that one can attribute to federal requirements for the good of the country as a whole. If we say we want everybody to have safe drinking water and water pollution control that they can count on, then we're talking about national standards that everybody has to meet. So the difference between what governments are willing to do for their local basic infrastructure versus what national standards are imposed over and above that basic infrastructure, I think can legitimately be called a national mandate.

Now, I have to say there are many who feel meeting national standards for the good of the country should not be construed as an unfunded mandate. They argue it is the government's responsibility to provide water that is safe to drink, and that we need minimum federal requirements. One community's drinking water standards might not be acceptable to another. So some argue these minimum requirements are not unfunded mandates at all, but rather necessities of modern society. When you consider that we provide substantial funding for water and sewer infrastructure through a variety of federal sources, a strong argument can be made that the national mandates on top of basic needs are well funded.

**Q During your tenure as a Maryland state official, did you experience problems with unfunded mandates?**

A There were instances when the general assembly passed laws that were for the good of the state, but county governments said, "Wait a minute, that's an unfunded mandate." For instance, equal education. The state provides a lot of money for education, but it's not enough. And some local governments provide more money than others, which means different opportunity levels were offered to different populations in the state. But just about everyone from the Supreme Court on down agrees that we should all have equal access and opportunity in public education. So are we talking about an unfunded mandate or a necessity of our society?

In my view, some national mandates are inevitable, and the federal government should provide what resources it can. Resource number one is money, and for both wastewater and drinking water we're proposing that our country's communities receive more money through the State Revolving Funds. We're also proposing that the law authorize the states to collect fees to run the programs. The second resource is time. And in both the Clean Water Act and the Safe Drinking Water Act we're proposing more time for compliance. The third type of resource is more flexibility for states and local governments in terms of how they achieve federal standards. These are the major elements we've built into our proposals to help bridge the gap between what would normally be provided under a basic infrastructure program and what might be perceived as an increase due to national standards.

**Q Under the Safe Drinking Water Act, EPA delegates "primacy" (responsiblilty for implementing drinking water programs) to the individual states, but primacy may revert to EPA under certain circumstances. Reportedly, some states--e.g., Maine, Washington, and Alaska--have come close to**

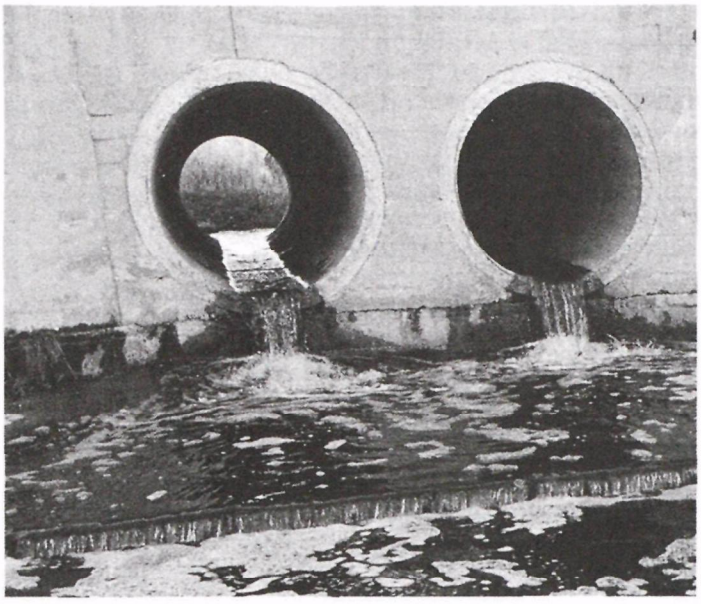
*Wetland protection needs to be considered at the beginning, not the end, of watershed planning.*
*Steve Delaney photo. EPA.*

**losing primacy. Can you tell us why the system is set up in this way, and what happens if primacy really does revert to EPA?**

**A** EPA wants the states to maintain primacy. We don't want it to revert to us. We believe drinking water programs are better run at the state level, where they can be more sensitive to the needs of the community. EPA is too far removed from day-to-day activity. Congress set the system up for primacy to revert to us as a failsafe measure. In other words, if all else fails, and no one is watching the quality of drinking water in a particular state, then at least there's a federal backstop. But we don't have the capabilities the states have in terms of technical assistance and working with communities. So it behooves us to make sure the states maintain primacy, and that's behind some of the recommendations we've made for reauthorizing the Safe Drinking Water Act. Again, we're talking about offering some of the resources I mentioned earlier.

**Q The President's Clean Water Initiative would encourage states to take a watershed approach to managing their remaining water pollution problems. What is a watershed, and how does the approach differ from the more traditional source-by-source regulation we are familiar with?**

**A** Another name for watershed is drainage basin. It's an area where all the runoff, and water from the ground water systems, the creeks, and streams eventually ends up in the same water body. So we could define the country in terms of watersheds separated by the continental divide. On one side of the divide, the water flows to the Pacific Ocean. On the other, it flows into the Mississippi. Those are watersheds on a macro scale.



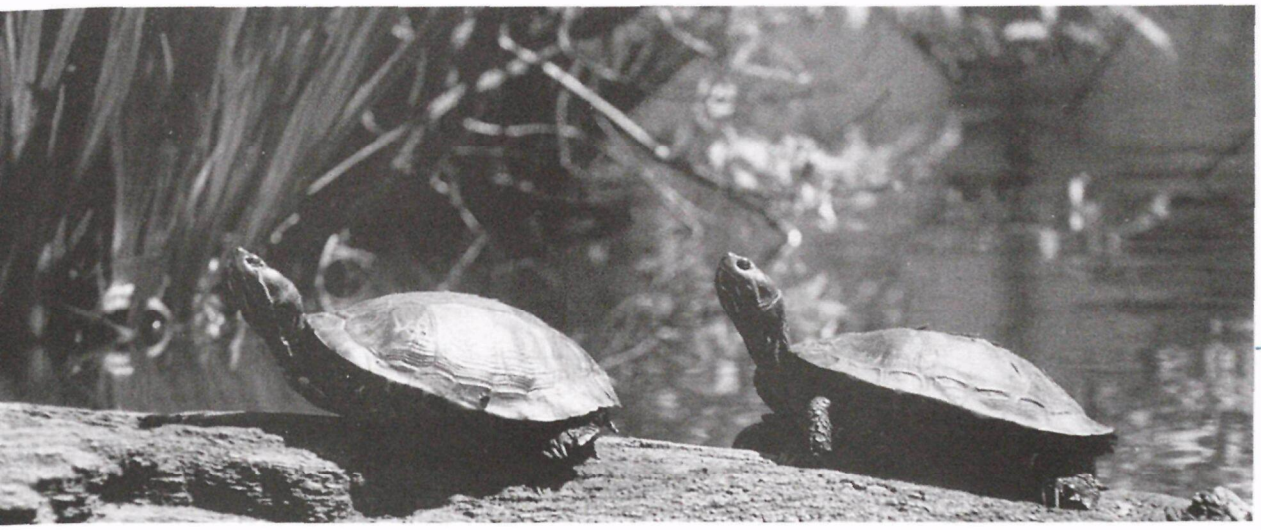
*Combined sewer overflows are a major source of polluted runoff.*
*Mike Brisson photo.*

On a small scale, you have Rock Creek and the Anacostia River watersheds here in Washington. They, too, have their own divides from which water flows into them on one side and away from them on the other. And there are watersheds within watersheds. Inside the Anacostia you could break the watershed down into smaller and smaller drainage units. We believe watersheds are an important unit for managing water quality because the sources of pollution within a watershed inevitably affect water quality.

Every watershed in the country is different. Some are more urbanized; some are more rural. Some are growing; some are not. Some have industry; some don't. Some have pollution problems; some don't. Instead of a one-size-fits-all solution, watershed management provides a flexible tool for states to identify important watersheds and take a comprehensive look at what's going on. Instead of just implementing each EPA program separately, they can tailor the programs to work together in each watershed to solve its particular set of problems. It's also important to involve the stakeholders in each watershed. Who lives there? What are their goals? Is it fishing? Is it recreation? How do the stakeholders see the problem? That way, you have their understanding of what's going on and their *buy-in* when the time comes for developing and implementing the solution.

We even see this as the proper framework for pollutant trading. You can't trade between watersheds, but you can within a watershed. Look at the possibilities. You can have trades between point sources and nonpoint sources, nonpoint to nonpoint source and so on--all to reach an overall goal of reduction that would be defined for the watershed. (See story on pollutant trading on page 27.)

Now, implicit in what I'm saying is that we will still maintain a basic federal program. We will still need to ensure that certain technology levels are maintained and, for nonpoint sources, we still have to initiate basic management practices. But you'll find when you focus on impaired watersheds that oftentimes these solutions are not enough. So how do you get further reductions in pollutant levels? The question is critical because the cost goes up the more you get



above basic technology levels. That's where flexibility comes in, making it possible for us to get the most for our buck.

I might add that watershed management planning goes beyond pollution control, allowing you to take into account other factors that might otherwise go unaddressed. For instance, what if the reason that you don't have a sustainable population of fish is because you have dams that prevent them from spawning? You can treat the water until it's pristine, but if your goal is a sustainable population of certain species of fish, wouldn't it make more sense to somehow bypass the dam or remove it? Watershed management planning gives you the opportunity to look at all the possibilities for achieving your goals.

**Q New York City's drinking water supply system is a particularly interesting case. As we understand it, EPA is allowing the city to defer committing to a multi-billion dollar filtration plant in favor of investing in a watershed protection approach to protect its source waters. Is this a unique case? Or will New York City's approach work for other cities?**

A The short answer is we're going to have to wait and see. EPA has issued what we call the surface-water treatment rule. Surface water can be exposed to contamination, so if surface water--a reservoir or river--is your drinking water source, then you must meet 10 objective criteria that we've laid down--or else you must put in filtration. These criteria are quantitative. You either meet them or you don't. Now, if your incoming raw water does meet these 10 tests, and you have a watershed program that will keep it that way, you can avoid filtration. The situation is complicated, because since we established the rule some states have passed more stringent laws saying that every surface water source has to have filtration, regardless of other considerations.

New York City currently meets the 10 criteria. But whether their watershed management program is going to keep it that way remains to be seen. (See story on page 24.) EPA has been willing to defer for three years the decision over the city's having to build filters. We've asked for a number of improvements to their program, and we've asked them to monitor water quality in a very stringent way. We've also asked them to begin the design of the filter systems so no time is lost in case their watershed management program fails to assure the long-term security of the water supply. In other words, we could rescind our deferral and the filter design would be ready.

Of course, we're talking about only part of the city's water supply, the part that comes out of the Catskill Mountains. The other part comes out of the Croton River Valley, which goes up through suburban Westchester, Putnam, and maybe part of Duchess County. That part of their water supply is going to require filters.

Can other cities avail themselves of the watershed approach? Some already do. Portland, Oregon, for instance, has a watershed that supplies water that doesn't require filtration. And there are others in the country. Many factors need to be considered, and simply being in a national or state park setting does not guarantee avoidance. For example, in the same state of New York there's a small town whose water comes from the side of one of the mountains in the Adirondacks. It's a small watershed and a small town. In that watershed, there is a visitors' center at the top of one of the mountains, and it uses a septic system to treat its wastewater. As a result, the town has a hard time meeting our 10 criteria, even though it is in a much more isolated location than New York City and its watershed. So while it may seem that we're giving an opportunity to New York that we're not giving to others, you have to look at each case individually.

**Q Ground water supplies half of the country's drinking water, yet protecting ground water is not a major focus of the existing Clean Water Act. Would that change under President Clinton's initiative? How does the initiative tie into the Safe Drinking Water Act?**

A We would like to see the Clean Water Act and the Safe Drinking Water Act work better together, and ground water is probably the best place for this to happen. We're proposing a watershed management program in the Clean Water Act and a stronger source-protection program under the Safe Drinking Water Act. But we don't want states to duplicate their efforts. So if they decide to take on watershed management under the Clean Water Act, and they include ground water under their goals for source protection, then we feel that should double as meeting the requirements of the Safe Drinking Water Act.

**Q Currently, the federal government shares in the costs of building sewage treatment plants around the country, but funding of**

**the federal share is scheduled to expire this year. What happens to this program under the President's initiative? What about smaller communities that will have a hard time coming up with their share of construction costs?**

A We propose that the authorization for the State Revolving Fund be extended to 2004. That would add another $12 to $13 billion over the next 10 years to the fund to help ensure its long-term viability. Together with the $9 to $10 billion that's already there and the repayments that will be coming in, the fund can continue revolving for the next 20 to 30 years at a rate of over $2 billion dollars a year, adjusted for inflation.

For small communities, we're also proposing that states be allowed to use a portion of the fund to provide up to a negative 2 percent interest rate on loans so that they can further subsidize these communities or stretch out their payment schedules. Again, one of the resources we can provide is time. Money is not the only means of assistance.

Q **Aside from sewage treatment plants, we understand that funding for other programs, like the permit program for regulating pollution discharges from industries and municipalities, will be reduced. How would the new initiative cover the costs of operating these other programs?**

A First of all, funding for existing programs would remain essentially constant. Second, for both the Safe Drinking Water Act and the Clean Water Act we are proposing a fee program, similar to what's in the Clean Air Act, whereby the states could charge for the permits they issue to help recover the costs of managing these programs. We estimate that the fee programs could raise an additional $300 million per year to help alleviate the financial shortfall they now face. Third, if the states choose watershed management, we will give them the flexibility to combine federal resources together rather than having to manage multiple grants. So, cumulatively these proposals would increase the amount of revenues available for states, and it would provide more flexibility in using existing funds.

Q **There have been statements in the press that the President's initiative would save the states about $30 billion a year. Other statements indicate that it would cost industry and government anywhere from $6 billion to $10 billion a year more than they are paying under the existing Clean Water Act. How do you reconcile the two?**

A Under the current law, the country is spending about $64 billion a year on water-pollution control. If we didn't change the law to make it more focused and efficient, that would grow to $97 billion a year. The proposals we're making would result in its growing to about $70 billion a year. So that's $6 billion more than we're currently spending, but $27 billion *less* than what we would spend if we didn't put these reforms in place. (See article on page 30.) Most of the growth in spending under our proposals goes toward polluted runoff, which is our biggest remaining water-quality problem and one that has not been adequately addressed, to date.

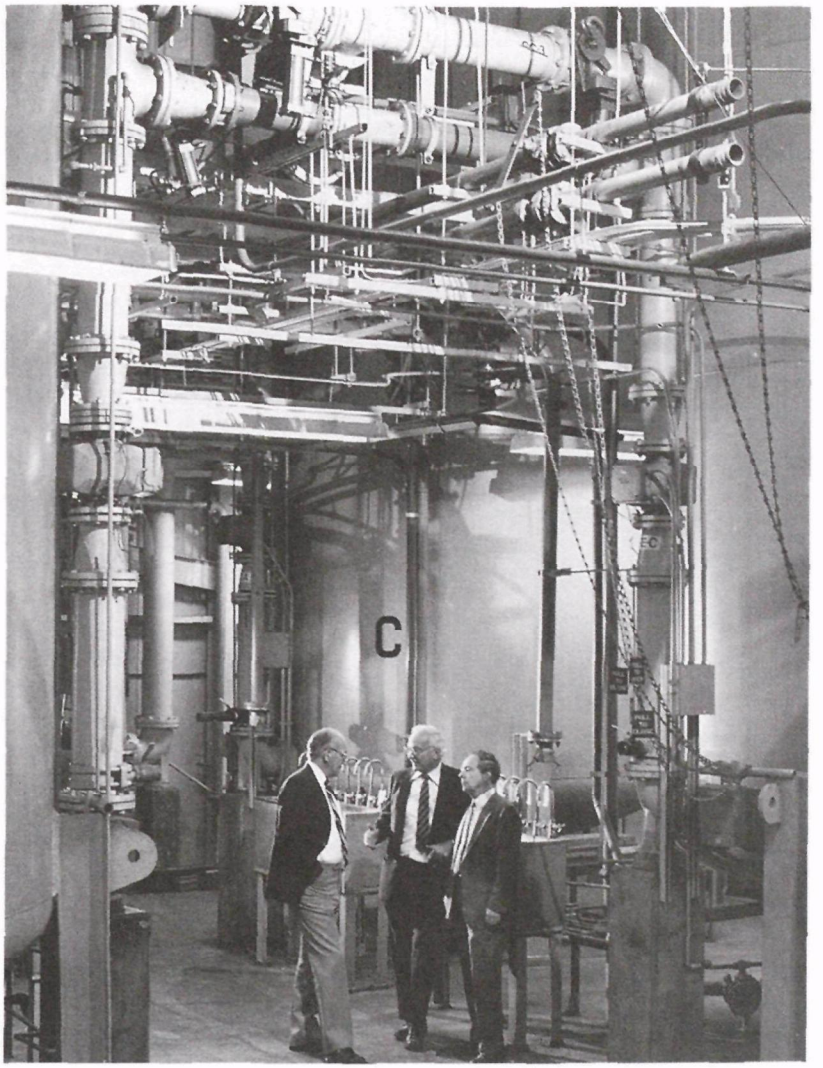
Q **The press has reported a controversy over provisions in the initiative that could lead to an eventual ban on the use of chlorine or chlorine compounds both in water-treatment facilities and in the chemical manufacturing industry. What's that all about?**

A Protecting the public and our environment from toxics is a very high priority for EPA, and thus, in our recommendations for improving the Clean Water Act, we're seeking newer authority to limit or prohibit discharges of the most highly toxic, bioaccumulative pollutants. We are particularly concerned about some chlorinated compounds because of increasing scientific questions that have been raised about potential threats to public health and the environment. So, in its recommendations, the administration calls for a study of the impacts and benefits of chlorine and chlorinated compounds. This study will involve all interested parties including scientists, industry representatives, environmentalists, and government regulators, among others. Based on the results, we would then develop a national strategy.

The initiative does *not* propose a ban or restrict the use of these chemicals, nor does it indicate whether regulatory action would take place upon completion of the study and strategy development. Unfortunately, that is the way it has been characterized by some in the media, and we've had a lot of concern and reaction to this mischaracterization. Our goal is to develop sensible, scientifically based recommendations that will best protect public health and the environment, and we'll have to wait and see what the study determines before we decide what those actions will be.

Q **Under the existing Clean Water Act, control of "nonpoint sources"--i.e., sources of polluted runoff--is left to the states, and the states, for the most part, have relied on voluntary programs. How would this approach change under the President's initiative?**

A Under the President's initiative, we propose major improvements for controlling three kinds of polluted runoff. The first is combined sewer overflows. Today in Washington, for example, it's raining. Somewhere a sewer carrying wastewater from our homes and industries will overflow



*Cincinnati invested $60 million in a granular activated carbon water treatment facility—one of the more advanced contaminant removal technologies used by U.S. drinking water systems.*
*Malcolm Pirnie photo.*

because runoff from the streets is filling it up and overloading its capacity. As a result, these sewers will overflow, discharging untreated waste into our rivers and streams. The second is stormwater. Some of this runoff is going to be carried by stormwater drains into the Potomac River. The third category is the more generic runoff pollution, which is runoff from farms, construction sites, and so on.

Now, in the past, we've attacked this problem inconsistently. Some states have strong programs, some none at all. We've never sat down as a nation and asked ourselves, watershed by watershed, what needs to be done in this particular watershed to solve the nonpoint-source pollution problems? We're proposing that states take two and a half years to identify their impaired waters or to carry out watershed management planning. Either way, in the process they would identify what needs to be done, and that would put people on notice to what they're responsible for. That's the first step, if you want to hold people accountable.

Number two is time. After the problem has been assessed and the solutions determined, we would then provide five years for necessary practices to be implemented. If more time is needed, another five years would be given. That's 12 and a half years for deciding what must be done and actually doing it. At the end of that time, we are proposing a state compliance assurance program of some kind, some enforcement of the management measures that haven't been carried out. We have no enforcement now, so this would put a little more strength in the nonpoint-source program.

**Q Wetlands have been described as the world's most efficient water-quality system. Although the rate of wetlands loss has been reduced, some 290,000 acres still disappear each year. Will wetlands be better protected under the President's initiative?**

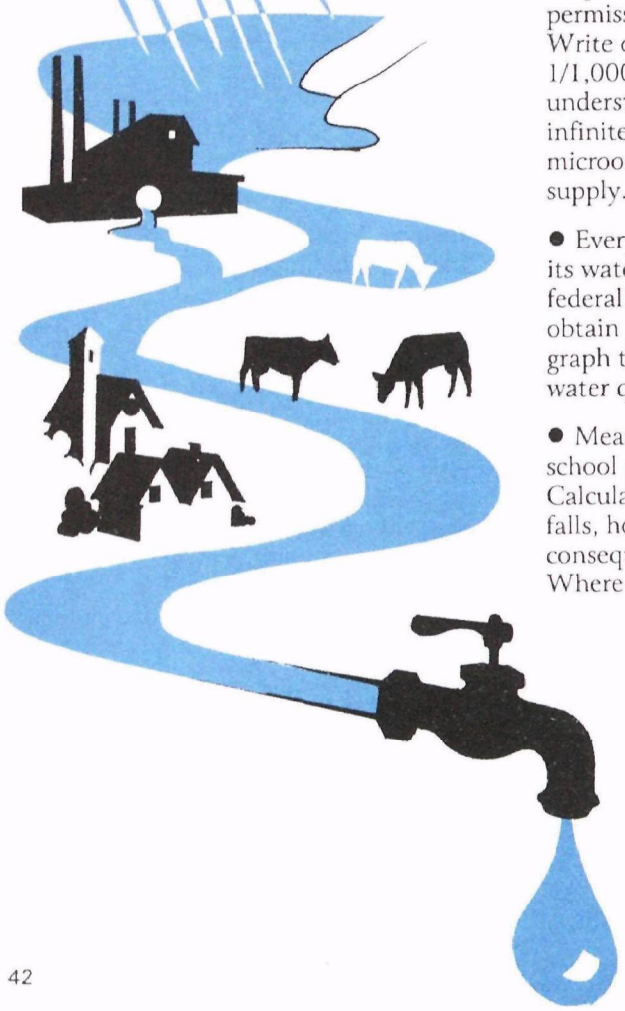
A Yes. In the President's Clean Water Initiative, we are proposing a number of improvements to the law that will allow us to do a better job than what's been done in the past to preserve wetlands. Obviously, everyone would like to see us achieve the goal of no net loss. This administration has a goal of no net loss and a long-term goal of increasing wetland resources. But there are problems with how we go about it. We would like to see the states get more involved with the decisions on wetlands. Proper federal oversight is essential, of course, but we need to push the decision making down as far as we can because it's at the lower levels of government where initial land-use judgements are made. We certainly don't want to get into local land-use control at the federal level. So the more wetlands are taken into account in land-use decisions that states are making, I think the better chance we have to avoid problems.

We're also proposing to look at wetlands on a watershed basis. If you draft a watershed plan, and right up front you set no net loss of wetlands as one of your goals, then you're going to be in a lot better position to achieve that goal than if you don't consider wetlands early on. Oftentimes, the way things work now, after all the decisions are made somebody says, wait a minute, you're affecting wetlands. This puts everybody at a disadvantage. As long as you have wetlands being considered at the end of the process, as opposed to up-front, you're going to have difficulty achieving the goal of no net loss.□

# EXPLORING WATER QUALITY

by Stephen Tchudi

*This topic is a natural for study at all levels of elementary and secondary school. We will focus on projects that help students make connections among national issues, the school disciplines, and their own communities. To prepare for the unit, collect some or all of the resources mentioned in the bibliography, and search your school or local library for materials on water quality.*



## Mathematics

- Students can collect and compute a dazzling array of statistics on water: its omnipresence, its use by people, animals, plants, and industry. See, in particular, "Water Trivia Facts" (available from National Drinking Water Week, listed below under "Resources") for statistics that range from how much of an elephant is water (7 percent) to the amount of the world's water that is actually suitable, with treatment, for drinking (1 percent).

- Review the federal "maximum contaminant levels" (MCLs) called for in the Safe Drinking Water Act. Prepare graphs and charts showing the permissible levels of contaminants. Write out the MCLs as fractions (e.g., 1/1,000,000) to help students understand that it takes only infinitesimal amounts of chemicals or microorganisms to pollute the water supply.

- Every local water supplier must test its water to ensure compliance with federal standards. Call your supplier; obtain your community's statistics; and graph the relationship of your drinking water quality to federal standards.

- Measure an asphalt parking lot (the school parking lot will probably do). Calculate its area. If 1/2 inch of rain falls, how many cubic feet of water consequently run off the asphalt. Where does that water eventually go?

## Sciences

- Study how the water cycle works in general, and in your geographical area, in particular. What is your average rainfall? Where does the water that evaporates from your region come down as precipitation?

- Learn about the watershed in which your community is located. How many square miles does it cover? What are its principal streams or lakes? How is water stored in your area (e.g., in reservoirs)? Create a map or model of your watershed. Is it part of a larger watershed?

- Create muddy, murky, or polluted water with a variety of ingredients: sand, scraps of paper, vegetable oil, gravel, salt, food coloring. Design a series of experiments with filters--sand, panty hose, cotton, coffee filters--to see how difficult it is to separate water from its pollutants.

- Investigate the differences between "point" and "nonpoint" sources of water pollution. Give some examples of each from the sources in your area. Why do you think nonpoint-source pollution, also known as polluted runoff, is more difficult to control?

- Make a set of flash cards on science facts and figures about water and the water supply. Use these as the starting point for a "Jeopardy" game on water facts. (See the "Blue Thumb Program" materials available from National Drinking Water Week.)

- From the "Earth Day Every Day" Teacher's Kit available from EPA's Water Resources Center, select from numerous classroom exercises such as those on the hydrologic cycle, conservation of water resources, chemical pollutants in water, etc.

## Social Studies

- Study the economics of your local drinking water. How much do people pay per gallon for their water? How much does it cost to treat water? What plans for expansion or innovation does your local water supplier have in mind? How much will that cost?

• Visit the wastewater treatment plant for your community. (Or invite a speaker to class.) How is wastewater treated? Where does the wastewater come from? What does it cost to clean up your water after it is used?

• How much of your watershed area (see mapping activity above) is under cultivation from agriculture? Mark this on your map. From your county agricultural agent, learn about the problem of nonpoint-source pollution due to agricultural use of chemicals. How large is the problem in your area?

## Humanities and Arts

• The National Geographic Society suggests having students make a list of all the words they can think of that have to do with water--mist, dew, rain, etc.--and water-based expressions--"drop in the bucket," "deep six," etc. What does the role of "water" in our language say about its role in our lives?

• Collect and analyze advertisements for water purification systems and bottled water. What tactics do advertisers use to persuade people to buy and use water other than that flowing from the tap?

•Encourage students to write science fiction or science fact scenarios about the future of water: e.g., the southwest runs out of water; global warming raises the world's sea levels; a villain figures out a way to contaminate the nation's drinking water supply; the Earth becomes a desert, and water is more precious than gold.

• Have students prepare a photographic display or videotape on the water-supply and wastewater systems of your community.

## Community Projects

• Adopt a stream or pond in your area, taking responsibility for eliminating visible trash and pollutants and even conducting scientific measurements of water quality. (See the Izaac Walton League's "Save Our Streams Adoption Kit" listed below under "Resources.")

• Sponsor a "Drinking Water Awareness Week" for the school or community to emphasize what people can do to protect their local water supply, conserve water, and dispose of chemicals properly. (See also the "Blue Thumb Program" materials available from National Drinking Water Week.)

• Sponsor a community forum where representatives of state, regional, or local water bureaus discuss programs presently in place and planned for the future to insure a safe and clean water supply. Use your own students as panelists, moderators, questioners, and reporters.

## Resources

American Water Works Association (sponsor of National Drinking Water Week). 6666 W. Quincy Avenue, Denver, CO 80235. Customer Service Dept (publications): 1 800 926-7337.

CONCERN, Inc., 1794 Columbia Rd., NW., Washington, DC 20009. *Drinking Water: A Community Action Guide* may be purchased for $4.00 plus $1.50 postage. Bulk rates for nonprofit organizations. Free information: 202 328-8160.

EPA Water Resource Center (mail code: RC-4100), Room G099, 401 M St., SW., Washington, DC 20460; you may call the Water Resource Center at 202/260-7786 to order publications by voice mail or EPA's Safe Drinking Water Hotline at 1 800 426-4791 for answers to questions about drinking water. The following items available from the Water Resource Center are especially useful:

• *Bottled Water: Helpful Facts & Information*

• *Developing Criteria to Protect Our Nation's Waters*

• *"Earth Day Every Day" Teacher's Kit (March 1993)*

• *Ground Water Protection: A Citizen's Action Checklist*

• *Home Water Testing*

• *Home Water Treatment Units: Filtering Fact from Fiction*

• *Is Your Drinking Water Safe?*

• *Lead in School Drinking Water*

• *Public Water Systems: Providing Our Nation's Drinking Water*

• *Safe Drinking Water Act (as last amended in 1986)*

• *21 Water Conservation Measures for Everybody*

• *Volatile Organic Chemicals: Are VOCs in your Drinking Water?*

International Bottled Water Association. 113 N. Henry Street, Alexandria, VA 22314. Free information: 1 800 WATER11.

Izaac Walton League of America. 1401 Wilson Boulevard, Arlington, VA 22209. "Save Our Streams Adoption Kit" ($1.00, teachers' guide: $8.00). Free information: 1 800 BUG-IWLA.

League of Women Voters. 1730 M St., NW., Washington, DC 20036. *Safety on Tap: A Citizen's Drinking Water Handbook* ($7.95 plus postage). Free catalog of publications: 202 429-1965.

National Geographic Society Educational Services (films, videos, film strips, books, maps, atlases, computer course ware). Free catalog. P.O. Box 98019, Washington, DC 20090. Phone orders: 1 800 368-2728.

National Sanitation Foundation. 3475 Plymouth Road, P.O. Box 1468, Ann Arbor, MI 48106. Call 313 769-8010 to inquire about free information and other publications.

Water Quality Association. Consumer Affairs Department, Box 606, Lisle IL 60532. Write for free information. □

*(Tchudi is a Professor of English at the University of Nevada, Reno, and co-director of an interdisciplinary summer institute for teachers that explores the lifeblood of northern Nevada: the Truckee River.)*

# London's Historic "Pea-Soupers"

by David Urbinato

British Tourist Authority photo.

Americans may think smog was invented in Los Angeles. Not so. In fact, a Londoner coined the term "smog" in 1905 to describe the city's insidious combination of natural fog and coal smoke. By then, the phenomenon was part of London history, and dirty, acrid smoke-filled "pea-soupers" were as familiar to Londoners as Big Ben and Westminster Abby. The smog even invaded the world of Shakespeare, whose witches in *MacBeth* chant, "Fair is foul, and foul is fair: Hover through the fog and filthy air."

Smog in London predates Shakespeare by four centuries. Until the 12th century, most Londoners burned wood for fuel. But as the city grew and the forests shrank, wood became scarce and increasingly expensive. Large deposits of "sea-coal" off the northeast coast provided a cheap alternative. Soon, Londoners were burning the soft, bituminous coal to heat their homes and fuel their factories. Sea-coal was plentiful, but it didn't burn efficiently. A lot of its energy was spent making smoke, not heat. Coal smoke drifting through thousands of London chimneys combined with clean natural fog to make smog. If the weather conditions were right, it would last for days.

Early on, no one had the scientific tools to correlate smog with adverse health effects, but complaints about the smoky air as an annoyance date back to at least 1272, when King Edward I, on the urging of important noblemen and clerics, banned the burning of sea-coal. Anyone caught burning or selling the stuff was to be tortured or executed. The first offender caught was summarily put to death. This deterred nobody. Of necessity, citizens continued to burn sea-coal in violation of the law, which required the burning of wood few could afford.

Following Edward, Richard III (1377-1399) and Henry V (1413-1422) also tried to curb the use of sea-coal, as did a number of non-royal crusaders. In 1661, John Evelyn, a noted diarist of the day, wrote his anti-coal treatise *FUMIFUGIUM: or the Inconvenience of the Aer and Smoake of London Dissipated*, in which he pleaded with the King and Parliament to do something about the burning of coal in London. "And what is all this, but that Hellish and dismall Cloud of SEA-COALE?" he wrote, "so universally mixed with the otherwise wholesome and excellent *Aer*, that her Inhabitants breathe nothing but an impure and thick Mist accompanied with a fuliginous and filthy vapour. . . ."

Laws and treatises failed to stop citizens from burning coal, however. Too many people burned it and there were no real alternatives. Anthracite coal was much cleaner but too expensive. By the 1800s, more than a million London residents were burning soft-coal, and winter "fogs" became more than a nuisance. An 1873 coal-smoke saturated fog, thicker and more persistent than natural fog, hovered over the city for days. As we now know from subsequent epidemiological findings, the fog caused 268 deaths from bronchitis. Another fog in 1879 lasted from November to March, four long months of sunshineless gloom.

When it wasn't fatal, the fog could at least disrupt daily life. A 1902, bi-weekly report from a fog monitor gives an indication. He wrote: "White and damp in the early morning, it became smoky later, the particles coated with soot being dry and pungent to inhale. There was a complete block of street traffic at some crossings. Omnibuses were abandoned, and several goods trains were taken off."

These conditions were not rare. "It was soon found that light fogs largely attributable to smoke were permanent," the same monitor wrote of the winter of 1901-02. "From the summit of St. Paul's Cathedral of Westminster Tower for instance, the average limit of visibility was only one-half mile."

At the turn of the century, cries to reduce the smoke faced a tough opponent. Coal was fueling the industrial revolution. To be against coal burning was to be against progress. "Progress" won out.

Not until the 1950s, when a four-day fog in 1952 killed roughly 4,000 Londoners was any real reform passed. Parliament enacted the Clean Air Act in 1956, effectively reducing the burning of coal. It was the beginning of serious air-pollution reform in England.□

**John P. DeVillars** is the new Regional Administrator for EPA's Region 1, headquartered in Boston. There he will direct federal environmental programs in Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont. He brings to the post knowledge of environmental regulation and of the link between a healthy environment and a strong economy.

From 1988 to 1991, Devillars was Massachusetts Secretary of Environmental Affairs and head of the Board of the Massachusetts Water Resources Authority, where he oversaw the cleanup of Boston Harbor and delivery of water and sewer services to Eastern Massachusetts--the largest public works project in New England's history.

More recently, DeVillars directed the environmental services group for Coopers & Lybrand in Boston (1992 until his EPA appointment) where he assisted corporations in achieving cost-effective environmental practices and analyzed regulatory impacts on businesses.

Among many environmental awards, he received the President's Award of the Nature Conservancy for national leadership on the environment. He holds a bachelor's degree from the University of Pennsylvania and a master's degree from the John F. Kennedy School of Government, Harvard University.

**Jeanne M. Fox** is the new Regional Administrator of EPA's Region 2, which includes New Jersey, New York, Puerto Rico, and the U.S Virgin Islands. She brings to the post a broad understanding of environmental issues from her varied positions with New Jersey agencies over the past 13 years.

Fox is an attorney with extensive experience in environmental problems. She served with the New Jersey Department of Environmental Protection and Energy (1991 to 1994) as Deputy Commissioner and Acting Commissioner. She was the New Jersey Commissioner on the Delaware River Basin Commission.

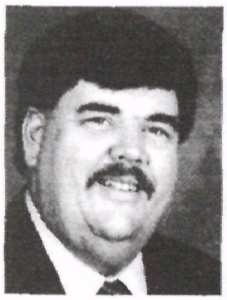
Fox also was the state's representative on the policy committees of two EPA estuary programs, Delaware River and New York Harbor, and was on the state's Superfund Policy Forum.

She attended Harvard University's John F. Kennedy School of Government, the Program for Senior Executives in State and Local Governments in 1990. She received a bachelor's degree in political science from Rutgers' Douglass College (1975) and a law degree from Rutgers University School of Law (1979).

As Administrator of EPA's Region 3, **Peter H. Kostmayer** will head the Agency's environmental programs in the middle Atlantic states covering Maryland, Delaware, Virginia, West Virginia, Pennsylvania, and the District of Columbia.

Prior to his appointment, Kostmayer served as a member of Congress from Pennsylvania's 8th Congressional District. A leading environmentalist in the House of Representatives for 14 years, he led the fight on many environmental fronts, authorizing a score of bills ranging from protection for the nation's rivers, additions to the country's wilderness areas and national parks, to tougher safety standards for nuclear reactors.

Kostmayer was a journalist and press secretary before running for office at age 30. He is an alumnus of Columbia University (1971).



**John H. Hankinson, Jr.**, is the new Regional Administrator for EPA's Region 4 office, headquartered in Atlanta. He will direct federal environmental programs in Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee.

His wide experience covers many environmental areas. From 1988 to 1994, Hankinson directed the Planning and Acquisition Department of St. Johns River Water Management District, Palatka, Florida. From 1986 to 1988, he was the district's Director of the Office of Land Acquisition. While at the district, he directed the acquisition of almost 200,000 acres of environmentally sensitive land for the state's Save Our Rivers program. Other positions include that of Director of Coastal and Land Use Programs for the Legal Environmental Assistance Foundation, Tallahassee, Florida; Senior Policy Analyst in Florida Governor Bob Graham's Office of Planning and Budgeting; and Staff Director for the Florida House of Representatives Committee on Regulatory Reform. He also established and directed the Florida Defenders of the Environment's Environmental Service Center, which facilitated participation of academic scientists in state environmental policy making.

Hankinson received his bachelor's degree in psychology from Florida Presbyterian College in 1970 and a law degree from the University of Florida in 1979.

**Valdas Adamkus** will continue as Regional Administrator for Region 5, a position he has held since 1981. Region 5 includes Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin.

As Administrator of EPA's midwestern region, Adamkus has also been the U.S. Chairman of the Great Lakes Water Quality Board since 1981, an advisory body of the U.S.-Canadian International Joint Commission. He has managed EPA's Great Lakes National Program since 1986. Since 1970, he has been one of the U.S. Commissioners on the Ohio River Valley Water Sanitation Commission. From 1983 to the present, he has been the chairman of the joint U.S. and Russian Federation Workgroups on water-pollution science and technology issues.

From 1971 to 1981, he served as Deputy Regional Administrator for Region 5. He is also a career member of the federal government's Senior Executive Service.

Adamkus has been frequently called upon to represent the EPA on environmental affairs in

the former Soviet Union, the Baltic countries, and other eastern bloc countries. In 1974, he was the first EPA representative to be invited for a lecture tour in the Soviet Union, and the following year he was invited to serve as advisor to the U.N. World Health Organization.

In 1985, Adamkus received the Distinguished Executive Presidential Award, and he holds EPA's highest award--the Gold Medal for Exceptional Service.

He received a bachelor's degree in civil engineering from Illinois Institute of Technology (1960), an honorary doctorate from the University of Vilnuis (1989), and an honorary doctor of laws degree from Calumet College of St. Joseph (1991).

**Jane N. Saginaw** is the new Regional Administrator for Region 6 in Dallas, Texas. In this position, she will direct the federal environmental programs affecting Arkansas, Louisiana, New Mexico, Oklahoma, and Texas.

She comes to EPA from the law firm of Baron & Budd in Dallas, Texas, where she was a partner for 12 years. There she specialized in litigation and appellate practice in the field of chemical and environmental injury.

From 1980 to 1981, Saginaw was a trial attorney for the Federal Energy Regulatory Commission. She has served on the Texas Agricultural Resources Protection Authority, City of Dallas Environmental Health Commission, and is a member of the American Bar Association, Association of Trial Lawyers of America, and the Texas Trial Lawyers Association.

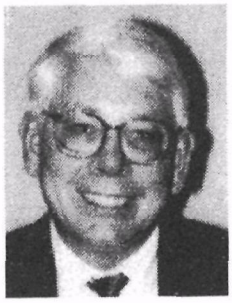
Saginaw received her bachelor's degree in geography from the University of California at Berkeley, where she graduated *summa cum laude* and Phi Beta Kappa in 1976. She is a 1980 honors graduate of the School of Law at the University of Texas at Austin.

As the new Regional Administrator of Region 7, **Dennis D. Grams** will direct federal environmental programs in the midwest states of Iowa, Kansas, Missouri, and Nebraska. He brings to the Agency 24 years of professional experience in the fields of environmental engineering and management.

Before joining EPA, Grams was President of Grams Environmental Management, and before that served as Director of the Nebraska Department of Environmental Control (1984 to 1991), where he was responsible for the development, implementation, and administration of all state environmental programs.

Other positions he held in the environmental field include Director of the Environmental Health Division of the Lincoln-Lancaster County Health Department (1972 to 1984) and Air Pollution Control Engineer for the Nebraska Department of Health (1970 to 1972). Grams is a registered professional engineer and a registered environmental health specialist.

He received a bachelor's degree (1969) and a master's degree (1975) in mechanical engineering from the University of Nebraska.



**Bill P. Yellowtail** is the new Regional Administrator for Region 8. There he will direct the operations of more than 600 employees who carry out federal environmental programs dealing with air, water, and land in Montana, Colorado, North Dakota, South Dakota, Utah, and Wyoming.

Prior to joining EPA, Yellowtail was a Montana state senator. From 1981 to 1982 he was Executive Director for the Montana Inter-Tribal Policy Board. From 1977 to 1980 he was Director of Human Resource Development and Education for the Crow Tribal Council in Montana. From 1974 to 1977, he was Assistant Supervisor for the Indian Education Division of the Montana Office of Public Instruction.

The Montana rancher currently serves on the Board of Directors, Burton K. Wheeler Center, Montana University; Advisory Council, Native American Program; and the Environmental Quality Control, Montana State Legislature.

Yellowtail received a bachelor's degree in geography and environmental studies from Dartmouth College in 1971.

**Felicia Marcus** is the new Regional Administrator for Region 9 which covers Arizona, California, Hawaii, Nevada, American Samoa, and Guam.

Marcus comes to EPA from the Los Angeles Board of Public Works, which she joined as a commissioner in 1989. In 1991, she was named President of this commission, which oversees the operations of the L.A. Department of Public Works and its seven bureaus.

From 1988 to 1989, Marcus was director of litigation for the Public Counsel, a public-interest law firm in Los Angeles that assists the underrepresented in such areas as poverty law, housing, immigration, and children's rights. From 1986 to 1988, she was Litigation Associate for the Los Angeles law firm of Munger, Tolles, and Olson. Previous positions also include: visiting fellow, Center for Law in the Public Interest (1984 to 1985) and law clerk, Office of the Honorable Harry Pregerson (1983 to 1984).

In addition to her career as a public interest lawyer, Marcus has been a community organizer. She was co-founder of Heal the Bay, Inc., an environmental watchdog organization in Santa Monica, California, and has earned several awards for community service.

She holds a bachelor's degree in East Asian Studies from Harvard College and a law degree from New York University School of Law.

**Charles C. Clarke** has been named Regional Administrator for Region 10, representing Alaska, Idaho, Oregon, and Washington.

He comes to EPA with over 17 years of public service. Since 1992, he was the Secretary of the Vermont Agency of Natural Resources, which provides technical and financial assistance to local governments and community-based agencies on a broad range of topics. Starting in 1992, he served as the State of Washington's Director for the Department of Ecology, and from 1987 to 1992 as the Director of the state's Department of Community Development. From 1982 to 1987, he was Deputy Director of the department. Before that he spent six years (1976 to 1982) in the Washington State Department of Ecology, serving there as Section Head for the Grants Administration Section, Municipal Division (1979 to 1981), and planner for the Water Quality Management Section, Water Quality Management Division (1976 to 1978).

Clarke received both his bachelor's degree (1971) and master's degree (1981) in biology from Pacific Lutheran University.

**Michelle Jordan** will serve as Deputy Regional Administrator of Region 5, which covers Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin. She has been a practicing attorney for 16 years, with 10 years' experience in environmental matters. With the Regional Administrator, she is responsible for the management of the region's air, water, hazardous waste, and other pollution control programs.

She specialized in environmental law at the firm of Hopkins & Sutter, where she represented clients before federal, state, and local agencies on environmental matters, and counseled clients on environmental regulations. Jordan, as an Illinois Assistant Attorney General (1984 to 1990) and Chief of the Environmental Control Division, was responsible for civil and criminal environmental cases. As chief of the division, she served as legal counsel to the Illinois Environmental Protection Agency and the Illinois Pollution Control Board, working closely with officials in Region 5.

Jordan graduated magna cum laude from Loyola University with a bachelor's degree in political science in 1974. She earned a law degree from the University of Michigan in 1977.

**Melinda L. McClanahan** is the new Director of the Office of Exploratory Research in the Office of Research and Development. She is responsible for the administration of EPA's extramural research grant program for U.S. colleges and universities, 14 programs of university-based research centers, the Small Business Innovation Research program, several fellowship programs, and the Senior Environmental Employment program.

She brings to the post 20 years' experience in administrative management, numerous contacts at national laboratories, major universities, and international organizations, and detailed knowledge of federal and state environmental laws.

As Dean of the School of Science and Engineering of New Mexico Highlands University, she administered all programs including grants for the departments of Engineering, Physical Sciences, Mathematics and Computer Science, Life Sciences, and other disciplines. From 1990 until her EPA appointment, she was Professor of Biology and Instructor of Marine Biology and Environmental Radiation.

As Head of the Department of Biology (1978 to 1990) at Northeast Louisiana University (NLU), she managed academic and research programs and supervised curatorial and field operations for NLU's Cancer Research Center/North Louisiana Regional Tumor Registry, Museum of Zoology, Herbarium, and Microbiology Laboratories.

While there, she was twice a visiting professor in radiation biology and medical genetics at Xuan WU Hospital and the Capital Institute of Medicine in Beijing, The People's Republic of China. During 1988 she conducted biological research in the mountains of Papua, New Guinea.

She earned a bachelor's degree (1971) and master's degree in biology (1972), and a doctorate degree in radiation biology (1974) from Texas Woman's University. She also received a master's in business administration from New Mexico Highlands University (1991). She is a certified hazardous materials manager (master's level) and a senior registered environmental manager.

**William Laxton** is the new Director of EPA's Office of Administration and Resources Management, Research Triangle Park (OARM-RTP). In this capacity, he is responsible for Agency-wide data management and telecommunications, and the operations of the EPA National Computer Center. He will manage EPA's RTP facilities, and provide human resources support for all EPA employees in RTP, North Carolina; Montgomery, Alabama; Bay St. Louis, Mississippi; and Bay City, Michigan.

Prior to becoming Director of OARM-RTP, he served as Director of the Technical Support Division of EPA's Office of Air Quality Planning and Standards in Durham, North Carolina (1987 to 1992). He also served as Deputy Director of OARM in RTP (1984 to 1987). Before moving to RTP, he had 14 years of federal government experience in personnel management, serving five of these years as Director of Personnel for two federal agencies, the Office of the Federal Inspector for the Alaska Pipeline (1979 to 1983) and the National Endowment for the Arts (1983 to 1984).

Laxton holds a bachelor's degree (1969) and a master's degree (1970) in philosophy from the Catholic University of America.

**Michael Shapiro** is the new Director of the Office of Solid Waste in the Agency's Office of Solid Waste and Emergency Response.

Prior to this appointment, he first served as Deputy Assistant Administrator (from 1989 to 1993) and then as Acting Assistant Administrator during 1993 in EPA's Office of Air and Radiation, where he directed the implementation of the Clean Air Act Amendments. From 1980 to 1989, he held several positions in the Office of Pesticides and Toxic Substances, including Acting Director and Director for the Economics and Technology Division (from 1982 to 1989); Branch Chief for the Regulatory Impacts Branch (from 1981 to 1982); and Policy Analyst (from 1980 to 1981). Among his accomplishments in that office, he oversaw the development of EPA's Toxic Release Inventory.

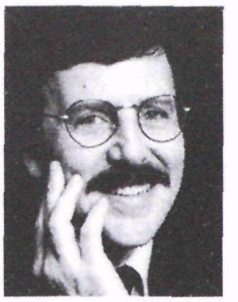
Shapiro earned a bachelor's degree in mechanical engineering from Lehigh University in 1970, a master's degree from Harvard University in 1972, and a doctorate in environmental engineering from Harvard University in 1976. He has also taught in the public policy program at the John F. Kennedy School of Government.

The new Deputy Director of the Office of Modeling, Monitoring Systems, and Quality Assurance within the Office of Research and Development is **John "Jack" Puzak**.

Puzak began his career with EPA in 1971 as a chemist at the ORD Laboratory located in Research Triangle Park, North Carolina. From 1991 to 1993, he held several senior positions at ORD including Acting Director, Office of Modeling, Monitoring Systems and Quality Assurance; Associate Director for Science, Office of Modeling, Monitoring Systems and Quality Assurance; and Acting Director, Environmental Research Laboratory, Duluth, Minnesota.

From 1985 to 1991, he held other key managerial positions in ORD including Director, Quality Assurance Division (1981 to 1985); Acting Director, Environmental Monitoring Systems Laboratory, RTP, North Carolina (1987); and Acting Director, Exposure Assessment Research Division (1989 to 1990).

Puzak received a bachelor's degree in chemistry from Carnegie Mellon University in 1966, a master's degree in chemistry from Duke University in 1974, and a master's in business administration from University of North Carolina in 1989.



**Jay Benforado** is the new Deputy Director of the Office of Science, Planning, and Regulatory Evaluation in EPA's Office of Research and Development (ORD).

Benforado brings extensive experience to this post from other positions he has held in ORD. He served as Director of the Regulatory Support Staff since 1988, and as Special Assistant to the Assistant Administrator from 1986 to 1988; he was a program analyst from 1985 to 1986.

Before that, he was a wetland ecologist in the Agency's Office of Federal Activities (1983-1985) and also for the U.S. Fish & Wildlife Service (1981-1982). He served as a wetland scientist in the Coastal & Water Resources Program of the Conservation Foundation from 1979 to 1981.

Benforado received a bachelor's degree in zoology/physical geography from the University of Wisconsin in 1977 and a master's degree in ecology/environmental sciences from Indiana University in 1979.

### Science Policy Council

A newly created Science Policy Council has been created to replace the Risk Assessment Council. The new council, which met in January, will address concerns raised by EPA's Science Advisory Board, the National Research Council, and others on how EPA integrates policy and science in decision making.

The Administrator named Deputy Administrator Robert Sussman as chair of the council and Lynn Goldman, Assistant Administrator of the Office of Prevention, Pesticides and Toxic Substances, as vice chair to ensure highest priority will be given to the council's policy decisions.

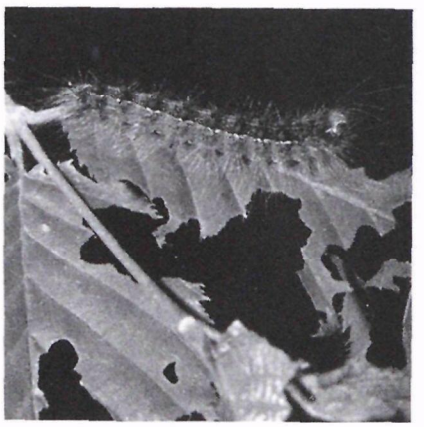
As an initial task, the council designated a steering committee to make ongoing assessments of science policy and to oversee the implementation of Agency science policies in programs and regions.□

## Environmental Q & A

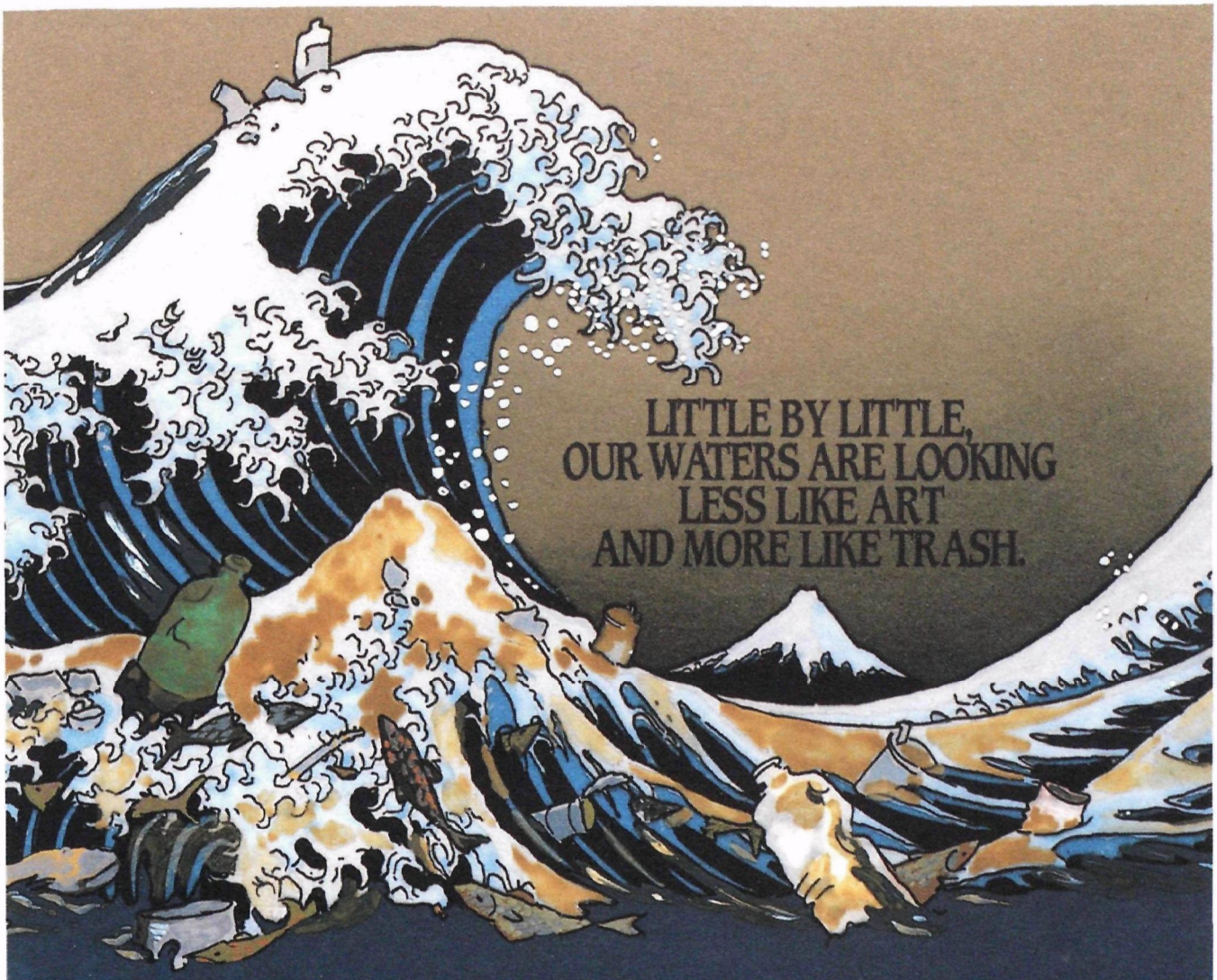
**Q What caused the gypsy moth pest problem in the United States?**

A The gypsy moth is a forest insect native to Europe. In the 19th century, a French astronomer working at Harvard brought the gypsy moth to America to use in his hobby--cross-breeding silk caterpillars. The gypsy moth became a serious pest problem when climatic changes brought on a population explosion 20 years after it was accidentally released in Medford, Massachusetts, in 1869. Caterpillars swarmed through the trees in Medford, eating the leaves and covering the ground with droppings.

—Submitted by Christine L. Gillis
Office of Pesticide Programs, EPA



*USDA photo.*




There are toxic chemicals in our water. Such as oil. And pesticides.

You might think industry is to blame. But they're only part of the problem. You and I, in our everyday lives, are also responsible for a tremendous amount of water pollution.

However, we can all help protect our water. For example, use less toxic household cleaners and practice natural lawn care by composting and using fewer chemicals. And instead of pouring used motor oil onto the ground or into storm drains, simply take it to a gasoline station where it can be recycled.

To find out more, call 1-800-504-8484, and we'll send you additional information on how you can help protect our rivers, lakes and oceans.

That way we can turn this terrible tide around. And restore the beauty to our water.

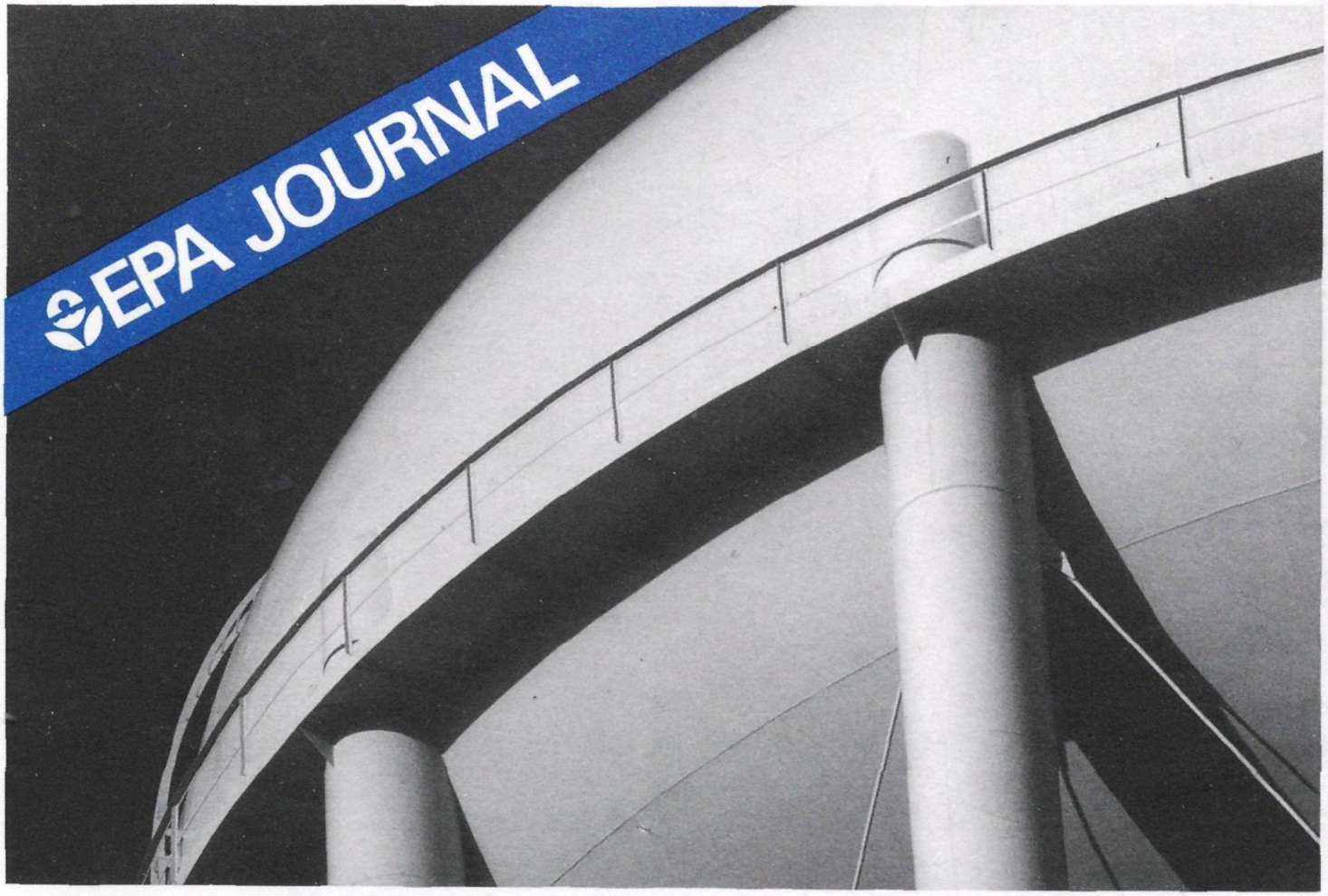
**CLEAN WATER.
IF WE ALL DO A LITTLE,
WE CAN DO A LOT.**

NRDC Natural Resources Defense Council

AC Japan Ad Council

Ad Council A Public Service of This Publication

EPA

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