

The Urban River

For the first settlers along the Atlantic and Gulf coasts, as well as 19th Century pioneers who settled the West, rivers marked the way.

Most early urban settlements were located on or near rivers to be close to water supplies and transportation arteries. Those early patterns of settlement are still evident today. Of the nation's 150 largest cities, 130 are sited along rivers; notable examples include Pittsburgh, Cincinnati, Memphis, St. Louis, Minneapolis, Boise, and Fairbanks. Most of our coastal cities are situated at the mouths of rivers.

For much of the nation's history, urban riverfronts were centers of commerce and industry. In this century, many urban riverfronts gradually declined, as trucks and cars superseded waterborne transportation and many old riverfront industries became obsolete and died. Urban riverfronts often were marred by decaying warehouses and docks or made inaccessible by multilane highways. In some cities, such as Providence, rivers were literally covered over and hidden from view.

Urban areas are a major source of environmental stress on waterways (Box 5.1). Today, thanks in large part to massive investments in pollution control and improvements in river water quality over

the past few decades, many urban rivers and harbors are a vital asset in the effort by city officials to bring old downtown areas back to life. For example, Baltimore's Inner Harbor and San Antonio's Riverwalk are two of the nation's recent urban success stories.

In Chattanooga, a five-mile waterfront park has replaced a no-man's land of abandoned factories. The Tennessee Riverwalk will eventually be part of a 75-mile network of city greenways. The \$45 million Tennessee Aquarium opened in 1992 and attracted 1.5 million people in its first year. The Chattanooga Audubon Society is now providing access by water taxi to Maclellan Island, a 20-acre downtown nature preserve. The amphibious "Chattanooga Duck" will cruise downtown streets picking up passengers, then roll into the river and travel several hundred yards upstream to the island. Tour guides provide information about the island's history and wildlife, including its great blue heron rookery.

Providence has uncovered its downtown rivers and invested in a river relocation project as part of its urban revitalization effort. Pittsburgh's Station Square, a massive restoration of the city's railroad buildings, is taking advantage of its strategic location along the Monongahela

Box 5.1
The Environmental Impact of Urbanization

Urbanization has a variety of impacts on rivers. As small towns grow into cities, trees that once intercepted rainfall are felled, natural dips or depressions that once held rainwater are lost through grading and filling for development, wetlands are destroyed, and layers of natural vegetation are replaced by impervious paved surfaces such as roads and roofs. As these changes occur, runoff increases and reaches water bodies faster and with greater force. The land loses its capacity to absorb and store rainwater, the groundwater table drops and stream flows decrease during dry weather.

Increases in paved surfaces can be directly linked to the accelerated loss of aquatic habitat. Urban runoff passes over and is warmed by paved surfaces and structures, eventually raising stream water temperatures. Even a slight increase in stream temperature can adversely affect some aquatic life and the insects in and around a watershed.

Heavier sediment loads clog streambeds with sand and silt, destroying habitat. Development, which inevitably requires that roads and pipelines cross streams, rivers, and wetlands, can upset ecosystems and block the movement of fish. Wildlife habitat also is affected by the replacement of vegetation by roads and structures.

Urban runoff carries pollutants from many sources and activities—automobiles, oil and salt on roads, atmospheric deposition, processing and salvage facilities, chemical spills, pet wastes, industrial plants, construction site erosion, and the disposal of chemicals used in homes and offices. In many of the nation's older cities, combined sewer overflows are used to handle stormwater runoff. During some storms, stormwater mixes with raw sewage and is discharged.

Urban rivers inherit some problems from upstream, notably sediment, nutrients, and pesticides from non-point sources. But cities add a panoply of new pollutants into the river, including:

- *Bacteria.* Urban runoff often contains high levels of harmful bacteria and viral strains, including fecal streptococcus and fecal coliform from human and animal wastes. When these levels exceed public health standards, drinking water may be unsafe, beaches may be closed, and harvesting shellfish beds may be restricted.
- *Oil and grease.* Oil, grease, and other petroleum-based substances contain hydrocarbons, some of which are harmful to sensitive animal species and aquatic life. Hydrocarbons degrade fisheries habitats and lower dissolved oxygen by limiting the interaction of water and air.
- *Heavy metals.* Heavy metals—including lead, copper, cadmium, zinc, mercury, and chromium—can be toxic to aquatic life and contaminate drinking water supplies. Most metals found in urban runoff come from corroding, decaying surfaces, including roofing materials, downspouts, galvanized pipes, metal plating, paint, catalytic converters, brake linings, and bridges and other structures.
- *Toxic substances and chlorides.* Toxic substances, which are found in household substances such as paint and cleaning materials, can seriously impair water quality. Chlorides or salts—used to remove ice and snow from roads and sidewalks—are toxic to many aquatic organisms and can have a major impact on groundwater.
- *Trash and debris.* Trash and debris from street litter and careless disposal washes into water bodies both over land and through the storm drain system, collecting at impasses in streams and lakes and disturbing water flow.

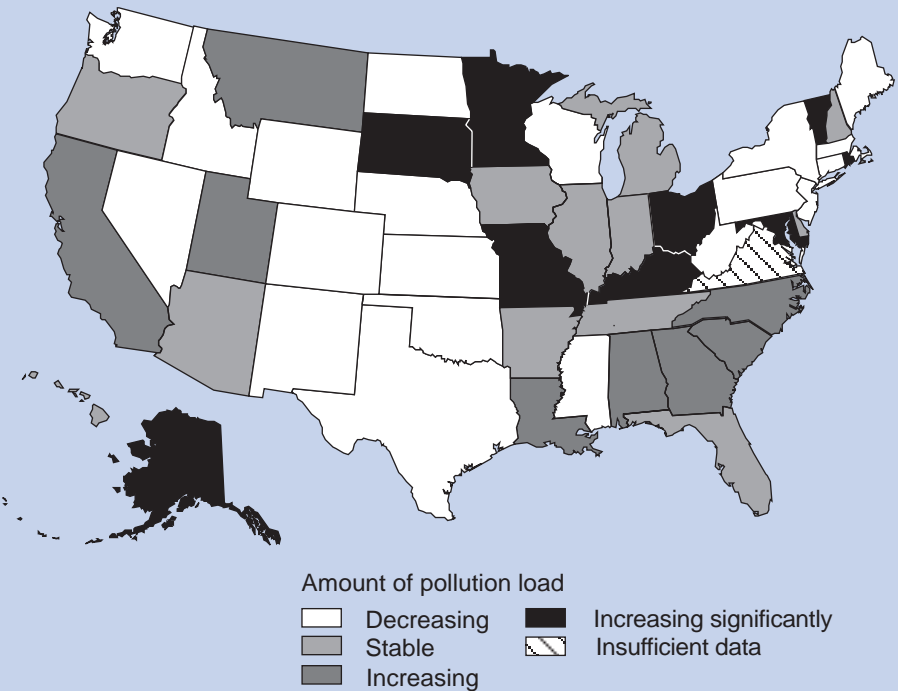
River. Both of these efforts, which are described in more detail later in this chapter, are generating substantial private investment; Station Square has already attracted \$87 million in private investment and expects to raise an additional \$150 million in private funds.

River restoration projects are an important way to restore and celebrate the unique cultural characteristics of urban neighborhoods and bring needed green space to developed downtown areas. Most such projects attract strong community support. Community groups, in turn, can be valuable sources of volunteer labor to

help clean up old urban waterfronts and push for improved riverfront access and amenities. Friends of the Chicago River, for example, has done everything from river cleanup projects to literally redesigning riverfront architecture.

The federal government, through traditional environmental protection, urban restoration programs, and new efforts such as Empowerment Zones and the redevelopment of urban brownfields, is providing strong incentives for the restoration of urban areas.

Figure 5.1 Point Source Loading Trends for BOD by State, 1990-1995



Source: U.S. Environmental Protection Agency, Office of Water, *Environmental Indicators of Water Quality in the United States: Fact Sheets*, EPA 841-F-96-001 (EPA, OW, Washington, DC, 1996).

URBAN WATER QUALITY

The challenge of managing urban water quality falls into two distinct parts. First, there is the traditional issue of managing point source discharges. Boston Harbor, an example of the point-source challenges facing older cities, is discussed in the next chapter. Second, there is the issue of nonpoint pollution.

Since passage of the Clean Water Act in 1972, most of the conspicuous point-source water pollution of the late 1960s and 1970s has been eliminated. During the 1972-92 period, the U.S. population and the amount of sewage treated at wastewater treatment plants each rose about 30 percent, yet biochemical oxygen demand (BOD)—an indication of organic pollutant loading—from treat-

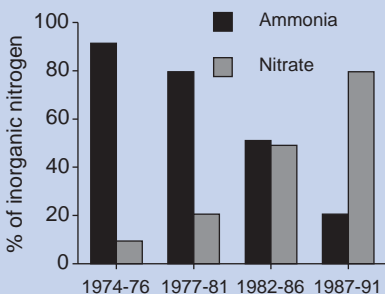
ment plants declined by 36 percent. National Pollution Discharge Elimination System (NPDES) permits, which limit the amount of pollution that can be discharged from industries and sewage treatment plants, have been issued for about 48,000 industrial facilities and about 15,000 municipal facilities nationwide. All told, EPA's NPDES permit, pre-treatment, and biosolids programs now regulate over 500,000 sources.

In 1995, 66 percent of states reported BOD as either decreasing or stable (Figure 5.1). Recent improvements in wastewater treatment have also decreased ammonia concentrations downstream from some urban areas, but the result has been an increase in nitrate concentrations (Figure 5.2). This condition limits the direct threat of toxicity to fish and other aquatic life but does not change the potential for eutrophication downstream.

Another significant trend identified in urban rivers and streams has been the sustained decrease in phosphorus caused by limits on phosphorus content in detergent and by additional treatment used in some plants to remove phosphorus. The Potomac, Chattahoochee, Connecticut, and several other urban rivers have all shown decreases in phosphorus concentrations as a result of decreased phosphorus in wastewater effluent (Figures 5.3 and 5.4). Direct discharges of toxic pollutants are also down dramatically since 1988 (Figure 5.5). (For more on the federal framework for point source pollution control, see Box 5.2.)

A major urban challenge is to reduce nonpoint pollution. Urban managers have two broad methods to reduce non-

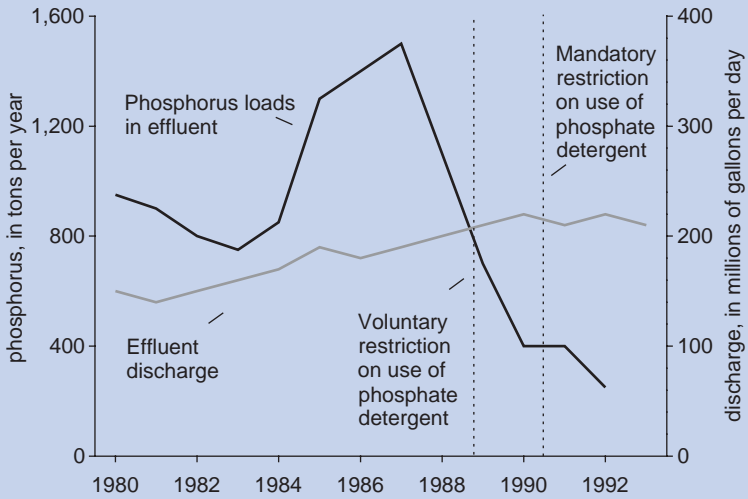
Figure 5.2 Results of Sewage Treatment Plant Improvements, Dallas, Texas, 1974-1991



Source: Mueller, D.K. & D.R. Helsel, *Nutrients in the Nation's Waters -- Too Much of a Good Thing?* USGS Circular 1136 (USGS, Reston, VA, 1996).

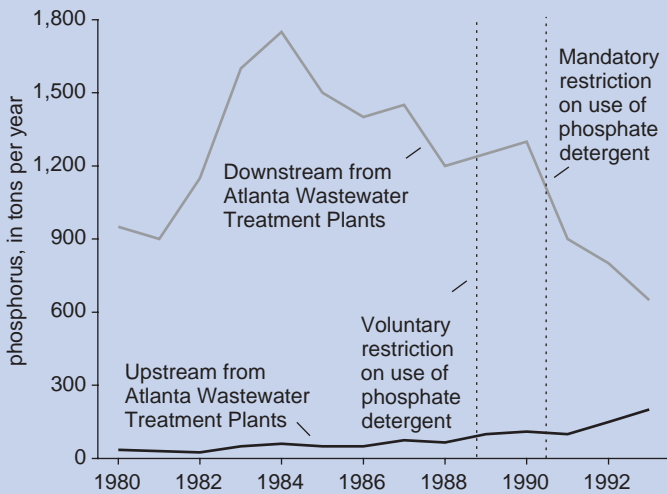
Note: Wastewater treatment upgrades in the late 1970s changed the predominant form of nitrogen in effluent from ammonia to nitrate. This reduced the potential for fish kills but not for eutrophication because the total amount of nitrogen in effluent is not necessarily reduced.

Figure 5.3 Phosphorus Loads in Wastewater Treatment Plant Effluent in the Chattahoochee River, 1980-1993



Source: Wangness, D.J. et al., USGS Open-File Report 94-99 (USGS, Reston, VA, 1994).

Figure 5.4 Phosphorus Concentrations in the Chattahoochee River Near Atlanta, Georgia, 1980-1993



Source: Wangness, D.J. et al., USGS Open-File Report 94-99 (USGS, Reston, VA, 1994).



Educational programs are an important part of the Anacostia River restoration effort.

Photo Credit:
S.C. Delaney/EPA

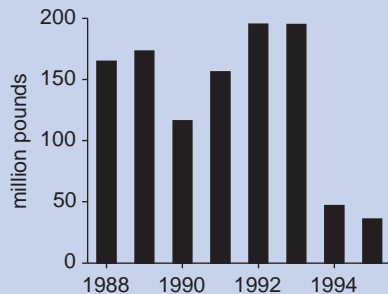
point-source urban pollution—the installation of “best management practices” (BMPs) that can control or reduce pollution, and ongoing pollution prevention programs that can reduce the amount of pollution generated. In most cases, pollution prevention is more cost-effective than structural measures. Both strategies are generally necessary to fully control the effects of urbanization.

Among the options for pollution prevention, local governments can consider collecting and recycling crankcase oil; beginning leaf and other yard waste collection; establishing catch basin drainage programs; redesigning road salting techniques; starting remedial erosion control; removing illegal and improper industrial and commercial connections to storm

drains; and plugging or sealing abandoned wells and cisterns.

Best management practices for a development site include using downzoning to restrain development; specifying minimum lot sizes; restricting development in

Figure 5.5 Toxic Discharges to U.S. Surface Waters, 1988-1995



Source: See Part III, Table 8.6.

Box 5.2
Point Source Pollution Control: The Federal Framework

Under the Clean Water Act, industrial facilities are required to comply with technology-based effluent limitations. These technology-based controls, defined as effluent limitation guidelines, have been specified for over 50 kinds of industries. Similarly, municipal sewage treatment plants are required in most areas to provide at least secondary treatment to assure that 85 percent of conventional pollutants, such as organic waste and sediment, are removed.

Today, most facilities are in compliance with their permit conditions (Box Figure 5.1). Of the 3,731 major municipal facilities, all but 423 achieved compliance with the Clean Water Act by July 1, 1988. Since that time, 188 more facilities have come into compliance and, of the remaining 235 facilities, all but 50 have been placed on enforceable compliance schedules.

Pretreatment is another important focus of the nation's point source control program. Across the nation, there are some 270,000 industrial users discharging their waste to publicly owned treatment works (POTWs). For these industrial users, EPA has developed "pretreatment" regulations for pollutants that a) interfere with the operation of a POTW, including interference with its use or disposal of municipal sludge, or b) pass through the POTW and contaminate receiving streams or are otherwise incompatible with the operation of the treatment works.

Currently, 31 of 43 NPDES-authorized states have approved pretreatment programs. In addition, 1,578 POTWs have been required to develop pretreatment programs, of which 1,535 (97 percent) are approved. Pretreatment POTWs receive about 80 percent of national wastewater flows—about 30 billion gallons per day.

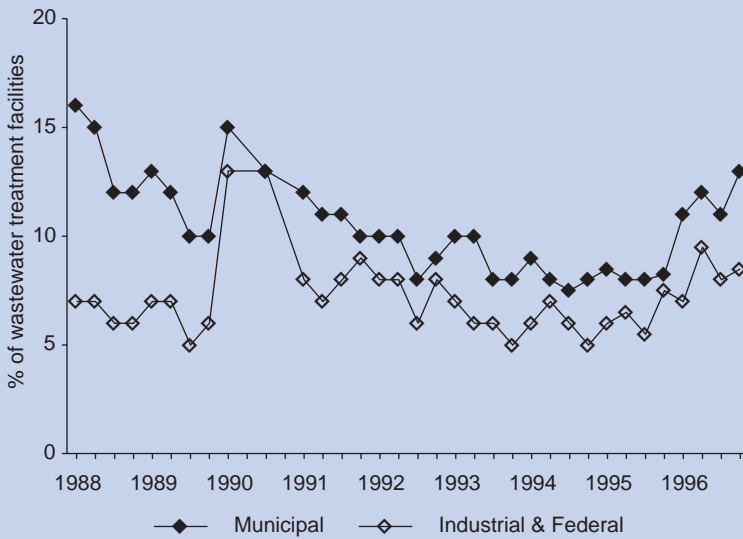
Implementation of secondary and advanced treatment at wastewater treatment plants has increased the amount of biosolids generated by those plants. Municipalities currently generate about 7 million dry metric tons of biosolids per year. Several management options exist. Since biosolids contain nutrients and have physical properties that make them useful as a fertilizer and soil conditioner, one attractive option is to use biosolids on agricultural lands, in forests, for landscaping projects, and to reclaim strip-mined land. Regulation of biosolids is important, however, because improper disposal can harm surface water, groundwater, wetlands, and public health. In February 1993, EPA published standards for the use or disposal of biosolids.

EPA has outlined the requirements for states to seek EPA approval to operate state biosolids management programs. Two state programs, Utah and Oklahoma, were approved by the end of 1996. In February 1997, EPA proposed streamlining changes to the permitting regulations to make it easier for states to become authorized.

About 1,000 communities, mainly in the older cities of the Northeast and Midwest, use combined sewer overflows (CSOs), which are designed to carry sanitary and industrial wastewater combined with stormwater. In major storms, the capacity of these systems is exceeded and part of the combined flow is discharged untreated into rivers, lakes, and estuaries. Under the Clean Water Act State Revolving Fund Program (SRF), states have the flexibility to address high-priority concerns such as CSO controls. To date, loans totaling more than \$17 billion have been made to fund more than 5,500 clean water projects in all eligible categories.

In many of the nation's older cities, the physical infrastructure to manage and treat point source discharges is outdated and subject to numerous breakdowns. In its 1996 national survey of municipal wastewater treatment needs, EPA found a total of \$128 billion in documented and modeled needs—including \$44.7 billion in modeled needs for combined sewer overflows—that are eligible for SRF funding.

Box Figure 5.1 Facilities in Significant Noncompliance with NPDES Permit Requirements by Quarter, 1988-1996



Source: U.S. Environmental Protection Agency, 1997.

sensitive areas; increasing development density through cluster development that preserves green space; allowing no modification of the natural floodplain; prohibiting development in nontidal wetlands; retaining trees; reserving some open space; revegetating immediately after construction; providing for stormwater collection or treatment; and maintaining infiltration capacity by using natural drainage conditions where possible.

Vegetation controls can be valuable in controlling urban nonpoint pollution. For example, landscaping can route stormwater runoff through green areas and away from erosion-prone steep slopes and other areas. Grassed swales—depressions, or gullies, which transport runoff—are often used in residential developments and on highway medians as an

alternative to curb and gutter drainage systems. Swales can control peak discharges by reducing runoff velocity and allowing some runoff to infiltrate the soil. But their effectiveness varies from site to site, and they require continual maintenance.

The Clean Water Act's State Revolving Fund (SRF) has the potential to become a major source of funding for nonpoint source, wetlands, and estuary projects. Eligible projects, which must be in a state's Nonpoint Source Management Plan, include those that reduce runoff from agricultural lands or urban areas, protect or improve wetlands, improve stream banks and shoreline, and many others. So far, 17 states have provided over \$650 million for approximately 900 nonpoint source projects. In addition,

tion, \$5 million has gone towards estuary projects. EPA is working with the states to increase the use of the SRF for projects other than traditional wastewater treatment activities.

GETTING PEOPLE INVOLVED

Citizens groups are a valuable weapon in the fight against urban pollution and the restoration of urban rivers.

As part of a total water quality monitoring program and assisted by qualified specialists, citizen groups can collect valuable information on stream water quality. They can monitor and identify problems, collect surface water samples, and measure turbidity. Citizen monitoring is also a valuable tool to build grassroots interest in water quality issues. Citizens groups can play an important role in building public support for urban pollution control programs.

Two cases—the Anacostia River in Washington, D.C., and the Chicago River in Chicago, Illinois—are characteristic examples.

The Anacostia River

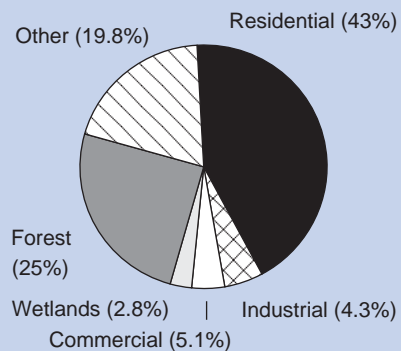
The headwaters of the Anacostia—in Prince Georges and Montgomery counties in Maryland—are in rural or suburban areas with relatively low population densities but rapidly increasing development and population growth. The tidal portion of the river flows through a densely populated urban area lying mostly in the District of Columbia. The lower Anacostia flows through some of the

poorest neighborhoods in the District of Columbia, which are mostly African American. It is among the most polluted river sections in the nation, and fish contamination is a critical issue because fish from the river are regularly eaten by neighborhood residents.

Typical of a watershed with agricultural, suburban, and urban land uses (Figure 5.6), the Anacostia has been subjected to nonpoint source pollution and stream degradation. Nearly 60 percent of streams in the Maryland portion of the watershed lack a riparian buffer that is at least 100 meters on each side (Figure 5.7). As a result, sediments, nutrients, toxic compounds, and water with elevated temperature flows into the river.

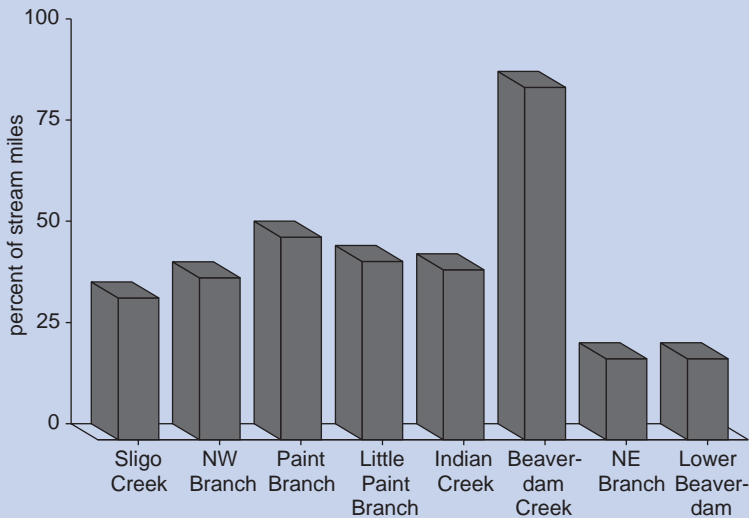
Urbanization has profoundly altered the flow, shape, water quality, and ecology of the Anacostia's streams, leaving many with only a fraction of their original biological diversity. Populations of fish and other aquatic organisms are

Figure 5.6 Land Use/Land Cover in the Anacostia Watershed, 1990



Source: U.S. Environmental Protection Agency, *Anacostia Watershed* (an Internet accessible report), 1997.

Figure 5.7 Riparian Forest Buffer in the Anacostia Watershed by Tributary, 1990



Source: U.S. Environmental Protection Agency, *Anacostia Watershed* (an Internet accessible report), 1997.

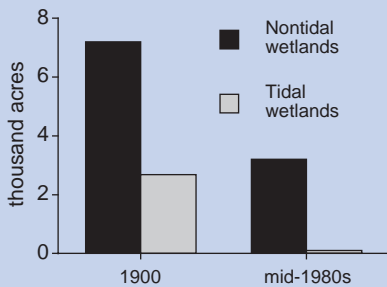
greatly reduced from historic levels and are generally sparse. Fish have been contaminated with PCBs and chlordane, and there is a fish-consumption advisory for bottom-feeding fish for all D.C. waters.

More than 98 percent of tidal wetlands along the river were lost to filling/dredging operations and seawall construction, and nearly 75 percent of the Anacostia watershed's freshwater wetlands have been destroyed by agriculture and urbanization. Today, it is estimated that there are fewer than 100 acres of emergent tidal wetlands left (Figure 5.8).

A recent report by the Metropolitan Washington Council of Governments evaluated the amount of pollution received annually by the Anacostia and its tributaries from nonpoint sources, point sources, and combined sewer over-

flows, with primary attention to nitrogen, phosphorus, 5-day bio chemical oxygen demand, lead, zinc, and total suspended

Figure 5.8 Wetlands in the Anacostia Watershed, 1900 and mid-1980s



Source: U.S. Environmental Protection Agency, *Anacostia Watershed* (an Internet accessible report), 1997.



Debris along the Anacostia River.

Photo Credit:
S.C. Delaney/EPA

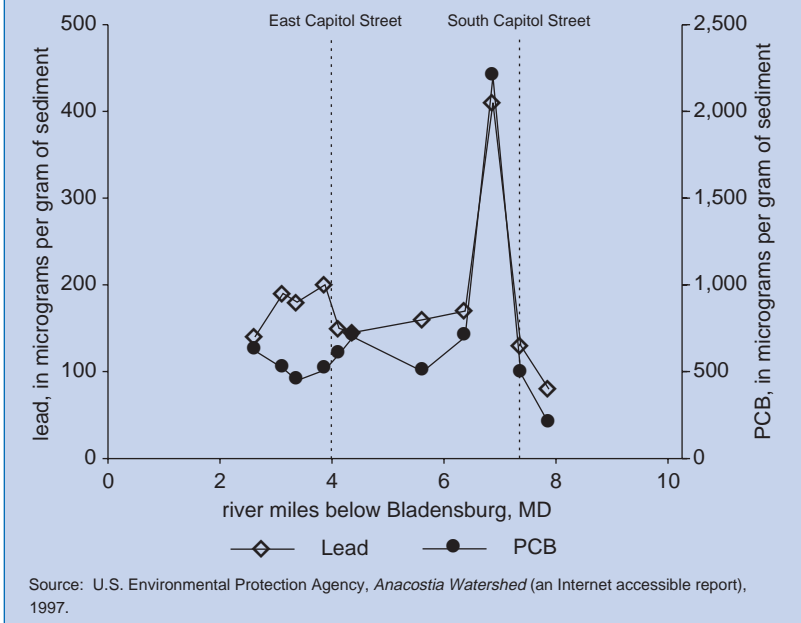
solids. Findings show that nonpoint sources comprise 75 to 90 percent of the total annual loads, while point loadings from the 30 permitted municipal and industrial facilities in the watershed account for only one percent or less. Combined sewer overflows typically contribute five to 25 percent of the total annual pollutant loads to the river, except for lead, where combined sewer overflows contribute about 85 percent of the annual load. Although erosion control has been required for new development for 15 years, much of the Anacostia basin was developed prior to these regulations.

Severe sedimentation and high bacteria levels are common throughout the basin. Many sediments contain hydrocar-

bons, heavy metals, and other toxic compounds (Figure 5.9), and nutrients. Pollutant levels are three to 20 times higher during storms. Dissolved oxygen levels seasonally fall below water quality standards in the tidal area and frequently fall below the standards in the upper reaches. Debris from upstream also is a serious problem.

The Anacostia River Watershed Restoration Initiative. The Anacostia River Watershed Restoration Initiative was conceived by representatives of state and local jurisdictional areas over a period of several years. An important partner in the effort has been the Metropolitan Washington Council of Governments, a regional organization that includes repre-

Figure 5.9 Contaminated Sediment Concentrations in the Tidal Anacostia River, 1992



sentatives from the District of Columbia and major counties and cities in suburban Maryland and northern Virginia.

In 1979, the Council's Water Resources Planning Board identified the Anacostia as a priority watershed that was critical in the effort to restore the Potomac River basin. In 1984, jurisdictions in the watershed signed the Anacostia River Watershed Agreement, targeting two major pollutants—raw sewage from combined sewer overflows in the District of Columbia and sediment runoff and erosion from Maryland.

In 1987, a new restoration agreement was signed that set goals for restoring the river. The agreement spurred creation of the Anacostia Watershed Restoration

Committee, with six members from the District of Columbia, the state of Maryland, and Prince Georges and Montgomery counties in Maryland plus the Metropolitan Council of Governments as the lead agency. The Interstate Commission on the Potomac River Basin was asked to coordinate public education programs, and in 1991 the Army Corps of Engineers was invited to join the committee to represent federal agencies.

In 1991 and 1992, the committee devised a set of six goals and strategies to help restore the river by the turn of the century. Some of the progress towards achieving the goals is shown in Figure 5.10.

- *Goal 1.* Dramatically reduce pollutant loads in the tidal estuary. *Strategy:* Sharply reduce the number of sewage overflow events and stormwater pollutant loadings. Prevent increased stormwater loadings from new development. Remove trash and floatable debris trapped in the estuary and prevent future trash accumulation.
- *Goal 2.* Restore and protect the ecological integrity of degraded urban Anacostia streams to enhance aquatic diversity and encourage a quality urban fishery. *Strategy:* Apply stream restoration techniques to improve habitat and require strict land-use controls and stormwater and sediment practices at new development sites.
- *Goal 3.* Restore the spawning range of anadromous fish to historical limits. *Strategy:* Remove key barriers to expand the available spawning range for anadromous fish. Improve the quality of the watershed's spawning habitat.
- *Goal 4.* Increase the natural filtering capacity of the watershed by sharply increasing the acreage and quality of tidal and nontidal wetlands. *Strategy:* Accept no further net loss of wetlands in the watershed. Restore the ecological function of existing degraded wetland areas. Create several hundred acres of new wetlands.
- *Goal 5.* Expand forest cover throughout the watershed and create a contiguous corridor of forests along the margins of its streams and rivers. *Strategy:* Reduce the loss of forest cover from new development through

local implementation of Maryland's 1991 Forest Conservation Act. Reforest suitable sites throughout the basin. Reforest 10 linear riparian miles by 1994, with the ultimate goal of an unbroken forest corridor from the tidal river to the uppermost headwater streams.

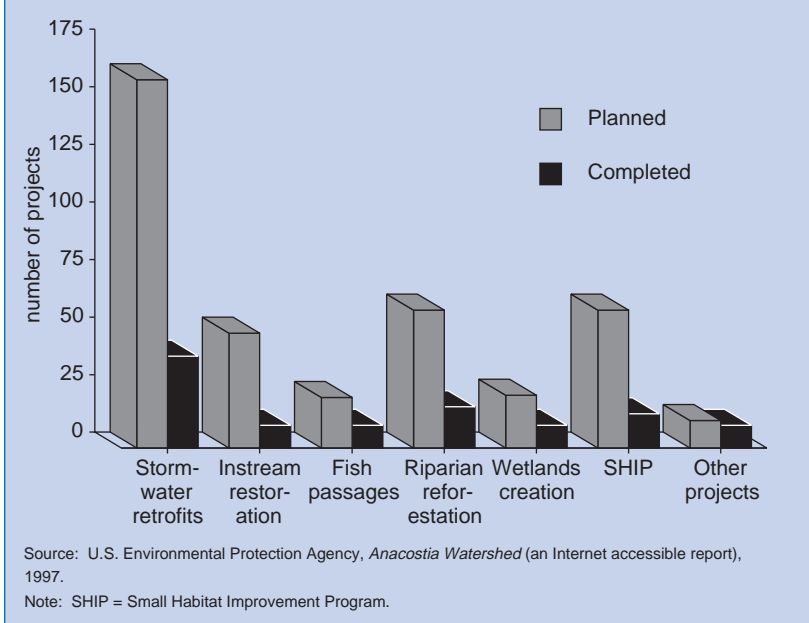
- *Goal 6.* Make the public aware of its role in the Anacostia River cleanup and increase public participation in restoration activities. *Strategy:* Raise public awareness of the river's problems and the restoration effort. Encourage a grassroots network of citizens to participate in a variety of ways.

A case study prepared by the Interagency Ecosystem Management Task Force noted that the Six-Point Action Plan provided a good initial framework for action, but was not comprehensive enough in terms of planning, coordinating, monitoring, and evaluating to provide a vision for restoring the watershed.

Cooperative projects in the Washington area present a difficult challenge of coordinating a wide variety of federal, state, and private interests. Particularly challenging is finding representation for the federal government, when so many federal agencies may have an interest in such projects. Although federal programs and activities were praised for supporting and facilitating basin restoration, the authors of the case study heard repeated criticism that federal restoration initiatives were not well-coordinated.

There also appeared to be a tension between, on the one hand, the desire and need for coordinated federal participation

Figure 5.10 Status of Restoration Projects in the Anacostia Watershed as of 1994



and funding, and, on the other hand, a fear that federal involvement could overwhelm or derail local efforts.

The difficulties in forging effective public participation were evident in May 1994, when the Anacostia Watershed Restoration Committee published a four-point outreach plan calling for increased elected official participation, increased opportunities for citizen participation, increased public awareness of the restoration effort, and a formal mechanism for providing greater citizen input into the restoration committee's activities.

The authors of the case study found that some participants felt there were insufficient efforts to involve the watershed's low-income communities in the restoration effort. Residents of these com-

munities also faced pressing problems of homelessness, unemployment, and crime that tended to compete with environmental issues for the attention of community members.

Nevertheless, there have been a number of successes in both the educational and public participation aspects of the project. In 1991, for example, the Chesapeake Bay Foundation began an environmental education program on the tidal Anacostia and the Chesapeake Bay that reaches several thousand District of Columbia students each year. Montgomery County has developed a program for training teachers and helping them incorporate Anacostia restoration issues into the school system's curricula. In the District of Columbia, the Kramer Middle

School for Environmental Studies is forming its curriculum around environmental themes. Students at Kramer will study the Anacostia and its relationship to the Potomac River and the Chesapeake Bay.

In July 1994, under the aegis of the Chesapeake Bay Program, federal agencies signed an agreement on ecosystem management in the Chesapeake Bay, including an agreement on a federal workplan to clean up the Anacostia in cooperation with the Anacostia Watershed Restoration Committee.

Three months later, EPA Region III announced its Anacostia Ecosystem Initiative, which focuses on watershed restoration, multi-media risk reduction, environmental justice, and public education and involvement. As part of the initiative, EPA hired a community liaison staffer who maintains regular contact with citizens, community leaders, and interest groups on both the day-to-day and long-term aspects of the restoration effort. In May 1996, the relationship between EPA and local groups was formalized in a memorandum of understanding between EPA and the Anacostia Watershed Restoration Committee.

Several initiatives have stemmed directly from the 1994 agreement with federal agencies. In March 1996, a Special Tributary Strategy for Federal Lands in the District of Columbia was signed by 18 federal officials. This voluntary agreement calls for improved control of stormwater runoff on all federal lands in the District of Columbia and supplements the District's strategy to meet the 40 percent nutrient reduction goal of the

Chesapeake Bay Program. In November 1996, a draft Biennial Federal Workplan for the Anacostia River Watershed was introduced by the Chesapeake Bay Program and the Baltimore District of the U.S. Army Corps of Engineers in cooperation with the Anacostia Watershed Restoration Committee. The workplan translates the committee's six-point action plan into specific actions to be undertaken by federal agencies and facilities that impact water quality in the Anacostia and its watershed. In October 1996, supported by grants from the Chesapeake Bay Program, the District of Columbia completed a regional action plan for toxics that defines a series of steps to minimize toxic loading into the Anacostia.

Since the start of the Anacostia Ecosystem Initiative in 1994, EPA Region III has channeled more than \$1 million to projects designed to generate community involvement and awareness, including fish advisory signs along the river, educational canoe trips for school children, science fairs and festivals, comparative risk studies on overall health risk, and environmental justice projects. Another \$2.5 million has been used for general environmental protection work in the District of Columbia and Maryland. Since 1996, the Corps of Engineers has spent about \$6 million on restoration projects and \$2 million on planning and engineering studies. (Figure 5.10)

The Chicago River

The Chicago River travels through the heart of downtown Chicago, through natural, suburban, and industrial areas, and



Friends of the Chicago River volunteers and Youth Corps members work to restore Prairie Wolf Slough.

Photo Credit:
Friends of the Chicago River

ultimately discharges into the Des Plaines and Illinois rivers in the farmland of central Illinois.

For most of its recent history, the river has been at the mercy of urban development. At the turn of the century, the river's flow was reversed to minimize pollution to Lake Michigan, the source of Chicago's water. The city's 19th Century sewer system was designed to handle both sewage from plumbing and runoff from streets. Through the 1970s, the system overloaded almost 100 times per year, causing raw sewage intended for treatment facilities to flow directly into the Chicago River.

Along the river's South Branch, from Harrison Street to Ashland Avenue, are wide expanses of industrial land, much of

it owned by railroads, utilities, and investors. The North Branch south of the North Shore Channel flows through areas of heavy industry, including foundries, breweries, and warehouses, as well as parks and residential neighborhoods. The downtown portion of the river includes major commercial and residential projects, along with several river-side parks and plazas.

In the 1960s and 1970s, millions of dollars were invested to clean up pollution from industrial sources and treatment plants, yet the sewage overflow problem continued to plague the river. The sewage had reduced the river's clarity to no more than a foot or two in spots, and the lack of oxygen was killing fish and other wildlife. In the summer of

1975, the Metropolitan Sanitary District (MSD) removed more than two tons of dead carp, alewives, and goldfish from a mile-long stretch of the North Shore Channel in Evanston.

To solve the sewage overflow problem, the Sanitary District designed the Tunnel and Reservoir Plan, otherwise known as TARP or the Deep Tunnel. The project consisted of 125 miles of tunnels 15 to 30 feet wide and some 150 to 300 feet beneath the ground. The system was designed to catch almost all of the overflow from the 5,000 miles of existing sewers and send it to treatment plants.

TARP succeeded in greatly reducing the incidence of sewage overflows into the river. As a result of improving water quality and other factors, land uses along the river began to change. Recreational use of the river increased, and wildlife began to return to the river corridor. By the late 1970s, the river held great promise for redevelopment, yet something was missing. Writing in *Chicago* magazine in 1979, Robert Cassidy said:

“The main reason why so little has been done is that the river has no advocate. The parks have Friends of the Parks. Lincoln Park Zoo has Friends of the Zoo. The river, alas, is friendless. Worse still, the many federal, state, and local agencies (27 at last count) that deal with river-related problems are often at odds over trivial matters....The first step, then, is to get everyone who has a stake in the river’s future to participate in a Friends of the River advocacy group.”

Friends of the Chicago River. Thus was born Friends of the Chicago River, which has grown to over 1,000 members

and has been remarkably successful as a guardian of the Chicago River and its waterways.

Established in 1979, Friends of the Chicago River has organized grassroots support for cleanup and formed partnerships with business, government, and community groups to restore the river system.

Among its grassroots events, Friends sponsors the Great Chicago River Rescue Day. In June 1996, about 500 volunteers picked up about 10 tons of trash from 19 sites along the Chicago River and waterways. In a single 200-yard stretch of the river, volunteers picked up food wrappers, hardened sacks of cement, three syringes, lampshades, baby bottles, broken glass, rusted soda cans, shoes, a fuel tank, radiator grill, tire, car bumper, safe, toy, stuffed leopard, and a set of bed springs embedded in the river so long that a tree was growing out of it.

The effort seems to help discourage using the river as a trash can. During the 1996 cleanup, volunteers noticed that areas cleaned up in 1995 had remained fairly clean. The volunteers also helped restore river banks by planting native grasses and flowers and removing non-native plants.

Friends has gone substantially beyond river cleanup. For example, working with the Chicago Department of Planning, Friends helped develop an environmentally friendly set of urban design guidelines for the downtown corridor that was approved by the Chicago Plan Commission in 1990 and is used by the City of Chicago to review proposals for development on the waterway. The guidelines’

main objectives are to establish a riverside walkway through the downtown river corridor, create green space, and transform the downtown river reaches into a high-profile tourist attraction and recreational amenity. The guidelines are specific:

- The river elevation of any riverside building should be treated architecturally as one of the principal facades. Every effort must be made to take advantage of river views, from the standpoint both of someone looking out of the project from within and looking at it from a distance.
- To accommodate riverside walkways, buildings throughout the river corridor must be set back from the river edge a minimum of 15 feet at dock level and an additional 15 feet at street level and above for a total setback of 30 feet. The optimal setback is 50 feet.
- To provide a livelier view for passersby, the use of reflective glass at dock or street level should be avoided.
- Where the river has not been “hardened” with bulkheads or seawalls, the natural river edge should be preserved. Trash and debris should be removed. Vegetation may be pruned to improve views of the water. Steep riverbanks may be recontoured to provide a gentler slope.
- When existing bulkheads must be rebuilt or replaced or new bulkheads installed, edge treatments that would give the riverbank a more natural appearance should be employed. Derelict bulkheads should be

removed. If a hard edge is necessary, concrete or masonry steps that would permit access by small craft should be provided. Both new and existing bulkheads should be clad in attractive materials.

Friends is also active in both education and training programs.

- In 1996 and 1997, the Chicago River Schools Network, which gives schools access to in-school slide shows, river-related art projects, water-quality monitoring, wetlands planting, and other field activities, included 30 local high schools, elementary schools, colleges, and universities.
- Urban Canoe Adventures (U-CAN) is a program to recruit urban young people to be trained as canoe guides. Each trainee learns paddling skills and river history and is matched with a mentor recruited from an environmental field. Partners in the program include public schools, forest preserve districts, and the Chicago Academy of Sciences. Funding has been provided by the North American Fund for Environmental Cooperation, the National Fish and Wildlife Foundation, and other sources.

Working with the National Park Service’s Rivers, Trails, and Conservation Assistance Program and several other federal agencies, Friends has for several years been actively engaged in creating demonstration projects to restore the river along its entire 156-mile length. Two such demonstration projects—Prairie Wolf Slough and Gompers Park—involve wetlands restoration.

In southeastern Lake County some 30 miles from Chicago, the North Branch of the Chicago River is a modest 15-foot waterway flowing through an orphaned farm field in a suburban area immediately adjacent to a retail shopping mall. The site is owned by the Lake County Forest Preserve District.

The Prairie Wolf Slough demonstration project is designed to restore 42 acres of former wetlands, prairie, and savanna. Friends is an active partner in this collaborative project, which has attracted enthusiastic local support plus funding from state and federal agencies, including the Fish and Wildlife Service.

The project's first priority is to restore the wetlands' hydrology, clear away non-native vegetation, and plant wetlands, prairie, and savanna vegetation. Led by staff from Friends and local agencies, such as the Lake County Forest Preserve District, volunteers planted 51,000 wetlands plants in 1996. The initial plantings have fared well and are the basis for an ever increasing diversity of plant life.

One of the questions the project is trying to answer is the relationship between different plant communities and groundwater levels. The DePaul University Environmental Sciences Department is managing a long-term groundwater monitoring study at the project site. The water wells they have installed will be measured periodically to study groundwater flow and provide estimates of the new plants' drinking habits. The monitoring should provide information on the fluctuating water needs of plant communities to determine optimal planting times and the best seed mixes for wetlands.

The project also includes new environmental education projects for nearby schools, including construction of a loop trail with interpretive signage and a connecting trail between the wetlands, a high school, and a local park district property.

Working together, the Chicago Park District and Friends have spearheaded a project to restore 1½ acres of wetlands at Gompers Park along Foster Avenue in the heart of the city. The site was selected from 12 potential areas within the city because it had strong community support and because local schools wanted to use it for ecology education. The Chicago Park District, which manages the project's restoration component, felt that it would be an excellent model for restoring other urban parks.

Projects such as Gompers Park can also play a valuable role in bringing people together.

"The great thing about these projects is that they can create social links between people that never would have formed otherwise. And it allows the community to contribute to the environment along the river," according to Geri Weinstein of the Park District.

Friends receives funding from grants, foundations, membership fees, and individual donations. The Gompers Park Wetlands project received \$50,000 from the Urban Resources Partnership (URP), which finances natural improvement projects in the Chicago area. The Prairie Wolf Slough project received \$78,000 from URP and additional funding from EPA's Region 5 office and the Lake

County Stormwater Management Commission.

WATERSHEDS AND COMMUNITY WATER SUPPLIES

Americans have come to expect that reservoirs and aquifers would provide plentiful supplies of water in most regions, and that chlorinization and filtration would remove most waterborne diseases and surface-water pollutants. But residential development and other factors are putting drinking water at risk. For the nation as a whole, EPA has estimated the capital cost of treating, storing and delivering safe drinking water at \$138.4 billion over the next 20 years.

A frequently overlooked but promising approach to maintaining safe drinking water supplies is to invest in watershed protection. Many of these initiatives are described in a recent report by the Trust for Public Land, entitled *Protecting the Source: Land Conservation and the Future of America's Drinking Water Supply*.

For example, the state of New Jersey's new master plan for statewide water management abandoned plans for increasing capacity and instead emphasizes water resource protection, water management, and water conservation. Threatened with development in a forest that is the watershed for some 2 million people, New Jersey used state money plus other sources to buy about 17,500 acres for \$55 million, leaving the developer with 2,200 acres of the least sensitive land for development. The primary watershed was pro-

tected and the two states gained badly needed parkland.

Similarly, voters in California recently approved referenda funding land acquisition for watershed protection. Residents of Spokane, Washington, are paying \$15 a year to fund watershed acquisition, while Providence, Rhode Island is collecting a tax on water usage for this purpose.

The town of Gunnison, Colorado, recently spent over \$500,000 to buy the 460-acre Van Tuyl Ranch, which sits directly atop the town's aquifer. City officials concluded that development would curtail groundwater recharge and increase pollution, which could threaten the town's drinking water. Preserving the ranch as a hay-growing facility will protect the town's water supply as well as preserve open space.

The federal government increasingly supports these kinds of approaches. The 1996 amendments to the Safe Drinking Water Act, which authorized a Drinking Water State Revolving Fund at up to \$1 billion per year, provides that, at the state's discretion, up to 10 percent of the state's capitalization grant money may be used to provide loans to public water systems, to acquire land or conservation easements from a willing seller or grantor to protect the source water and to ensure compliance with national drinking water regulations. The amendments require states to assess the susceptibility to contamination of public water supplies and provide the results of these assessments to the public. The law also provides a source of federal funds for the assessments.

Under the Clean Water Act's nonpoint source grant program, the Environmental Protection Agency in 1995 approved a \$250,000 grant to the city of Waynesville, North Carolina, which the city intends to use to protect one of two acquisition priorities in its watershed.

Without watershed protection, cities may be required by EPA to build costly filtration plants. Portland, Maine, which relies on nearby Lake Sebago for its drinking water, is on the cusp of this dilemma. Six towns border the lake, and there are some 2,700 residences within 200 feet of the shoreline.

To ensure safe water quality, the Portland Water District has purchased roughly 98 percent of the land—about 1,500 acres—in a 2-mile shoreline zone that includes the district's two intakes. Within this zone, swimming and all other body-contact activities are prohibited. To manage possible giardia contamination, the district also constructed an ozonation facility. Many other regulatory mechanisms—affecting zoning, minimum lot sizes, plumbing codes, and septic systems—have been instituted to protect the lake's water quality. All of these measures have combined to ensure high levels of water quality and enable the district to avoid construction of a filtration plant, which would cost \$25 million to build and \$750,000 per year to operate.

The Chattahoochee River, which supplies the Atlanta region's water, is stressed by intense development and growth. Efforts are underway to augment the Chattahoochee National Recreation Area and negotiate conservation easements with developers. In one recent

case, the builder of a 600-home subdivision near Lake Lanier agreed to protect a 300-foot buffer between the development and the river.

Altogether, some 140 cities have sufficiently clean water that EPA does not require filtration plants. However, many of these cities do not control their watershed and are faced with the possibility of development-related pollution in the future.

San Antonio. The Edwards Aquifer is the sole source of drinking water for some 1.5 million people in the middle of Texas, including residents of the city of San Antonio. The land is characterized by porous limestone, so that nearly all precipitation seeps directly into the aquifer below. In the Government Canyon area not far from San Antonio, rainfall within a matter of hours increases water pressure at San Antonio's intake wells.

The possibility of development in the Government Canyon area could diminish the quantity of water entering the aquifer and threaten the aquifer's water quality. In the 1960s, a proposal to develop 12,000 acres of Government Canyon hill country was successfully fought by environmentalists all the way to the U.S. Supreme Court. More recently, a project to build 766 homes and a golf course on a 5,200-acre portion of the Government Canyon watershed failed financially and wound up being taken over by the Resolution Trust Corporation (RTC). This time a Government Canyon Coalition that included 40 agencies and organizations sought to find ways to preserve the property. In 1993, RTC agreed to sell the property for \$2 million. The Edwards

Aquifer Underground Water District, the San Antonio Water System, and the Texas Parks and Wildlife Department provided the money for the purchase. Since the purchase, the area has experienced two years of drought and the aquifer's level has continued to drop. Water managers believe they need to continue to acquire land to protect the recharge zone.

New York. In 1990, New York City faced a drinking water financial crisis. EPA notified city officials that they must protect their upstate watershed or invest in filtration plants to protect the quality of the 1.5 billion gallons of upstate water used daily. The cost of new filtration plants was estimated at \$6 to \$8 billion plus annual operating costs of \$300 million; with activated carbon technology installed to remove organic materials, construction costs would double and operating costs triple.

Faced with such staggering costs, city officials turned to the watershed protection strategy. City officials devised a three-party watershed protection agreement with the upstate communities that includes land acquisition on a willing-seller basis, revised watershed protection regulations, and direct city investment in upstate water pollution controls.

The city set aside \$250 million for land acquisition, initially targeting 80,000 acres of highly sensitive lands. Another \$250 million was committed to upgrade all 114 wastewater treatment facilities in the watershed to tertiary treatment standards.

Part of the watershed protection strategy involves the closure of aging septic sys-

tems and strict standards for the construction of new systems. The strategy also includes finding alternatives to impervious surfaces—paved roads and parking lots—that are close to reservoirs and watersheds; improved controls for storm-water runoff; and better storage of highway salt.

REBUILDING URBAN WATERFRONTS

In the last few decades, many cities have recognized that decaying urban rivers are potentially valuable natural and economic resources that can provide jobs and help improve economic conditions in an urban area. The success stories in cities such as San Antonio and Chattanooga are by now well-known, yet other cities such as Hartford, Providence, and Pittsburgh have also seized this opportunity.

The Connecticut River, Hartford

For many years residents of the city of Hartford had little opportunity to enjoy the Connecticut River's amenities because of a flood control wall and interstate highway that blocked access to the river. In addition, urban decay had left the riverside area unsafe for recreation and generally unappealing.

In 1981, city officials held a day-long seminar to assess public support for a campaign to make the riverfront area more accessible to the community. Out of this meeting was born Riverfront Recapture, Inc., a nonprofit organization

with a mandate to restore public access and create a riverfront network of parks and recreational facilities. The group's 65-person board includes representatives the city's business community, civic organizations, local and state government, various Hartford neighborhoods, and regional groups.

Two other groups played key roles in the effort. Friends of the River is a grass-roots organization with members from some 80 towns across the state. The Connecticut Department of Transportation, which had the responsibility to redesign Highway I-91, also played a key role.

After the 1981 meeting, Riverfront Recapture began soliciting recommendations from the community about how best to revive the waterfront. Some low-income residents worried that the group's efforts would largely benefit the corporate community, but Riverfront Recapture convinced these groups that the redevelopment would provide amenities they would enjoy such as parks and fishing and boating programs.

In 1984, the Connecticut Department of Transportation agreed to restore public access to the riverfront during reconstruction of Highway I-91. A new dock and overlook were constructed along the river, and in 1986 the Connecticut General Assembly authorized funds to Riverfront Recapture for park development. The first two phases of the Great River Park in East Hartford opened in 1987, and in 1988 planning began on a plaza over Highway I-91. In 1989, the first section of the riverwalk system opened. In 1994, construction began on the plan's final phase, which includes riverwalks on

both banks and an amphitheater adjacent to Highway I-91. The highway's elevated section was demolished to allow construction on the plaza connecting the downtown area to the river.

Water quality in the river had been gradually improving during the 1980s, though the city still had to contend with occasional combined sewer overflows during heavy rains. In part because of the effort to redevelop the river, Hartford voters in 1990 voted overwhelmingly for an \$80 million series of projects designed to dramatically reduce combined sewer overflows to the rivers.

Riverfront Recapture also succeeded in bring people back to the river. The group launched a community boating program in 1988, offering rowing classes to adults for a fee and to teenagers for free. The boating program's success led to a creation of a popular crew club at Hartford High School. Another program, "Get Hooked on Fishing—Not on Drugs," has introduced hundreds of urban youths to the pleasures of fishing along the river. Riverfront Recapture also sponsors a summer youth-employment program that brings low-income Hartford youths to the river to serve as Riverfront Rangers. Some participants planted trees and flowers, while others built boats under the supervision of a local boat builder.

Most of Riverfront Recapture's capital budget is from public sources, including \$14.5 million in state funding and \$18 million in federal funding. The operating budget is primarily from private funds, including contributions from foundations, individuals, and corporations.



Station Square development on the Monongahela River in Pittsburgh.

Photo Credit:
Jim Judkis/Pittsburgh History & Landmarks Foundation

Station Square, Pittsburgh

Station Square is situated on the south shore of the Monongahela River in downtown Pittsburgh. In the 19th Century, Station Square was the headquarters of the Pittsburgh and Lake Erie Railroad, which specialized in hauling coke, ore, and coal to Pittsburgh's steel mills. Passengers and freight were also part of the railroad's business. To handle a growing volume of passenger business and its central offices, the railroad developed a large terminal in the early 1900s. The site includes 52 acres and over a mile of waterfrontage.

Until recently, Station Square was owned and managed by the Pittsburgh History and Landmarks Foundation, a nonprofit organization. The Foundation

has been very active in Pittsburgh for several decades, working to revitalize historic properties, assist inner-city neighborhoods, provide technical assistance to community groups, and survey Allegheny County's historical, architectural, landscape, and industrial resources and complete nominations to the National Register of Historic Places.

In Station Square, the Landmarks Foundation created a lively urban environment by combining the renovation of five historic railroad buildings with new construction. The riverfront location and the improvements in river water quality were vital parts of this development's success.

The project's first phase began in 1976 and concluded in 1992. Two restored railroad warehouses became The Shops

Box 5.3
The Commercial Value of the Riverfront

"In Pittsburgh before Landmarks undertook Station Square in 1975, Pittsburgh's riverfronts were given over to highways and industry only. Although a railroad line still parallels the river at Station Square, Landmarks opened up over a mile of riverfront for people to experience.

"The local population had a growing awareness that the river waters were being cleaned. Ducks were swimming around the banks of Station Square and boaters were registering thousands of pleasure craft to the enjoy the waters. The Gateway Clipper fleet of tourboats moved to Station Square and more than doubled its business. The Sheraton Hotel has enjoyed the highest occupancy in the city for years, in part because of the riverview and in part because of the active, clean environment looking toward the city skyline."

Arthur Ziegler

(Arthur Ziegler is President of the Pittsburgh History and Landmarks Foundation.)

at Station Square, which includes some 70 stores and more than a dozen restaurants. Four major railroad buildings have been renovated into first-class office space, including the Commerce Court built in 1917, the Gatehouse of 1916, and the Landmarks Building, the railroad's passenger terminal built in 1901.

America's largest and most successful excursion-boat operation is headquartered at Station Square. The Gateway Clipper Fleet includes the 1,000-passenger flagship *Majestic* and the 150-passenger *Good Ship Lollipop*.

A Phase II Master Plan was completed and adopted by the city in 1992. An additional 32 acres will be developed in the plan at the western end of the site, including restoration of the historic Lawrence Paint Building of 1897. Riverpark, a two-and-a-half acre site looking out toward the Monongahela and the city skyline, will contain a greensward for outdoor events, sitting areas, and gardens. Adjoining the park will be a terrace restaurant and the Riverwalk of Industrial

Artifacts, which includes giant Bessemer converters that celebrate Pittsburgh's industrial history.

Station Square has been a remarkable economic success. It has already created about 3,000 jobs and pays real-estate and income taxes totaling about \$6 million annually. About \$87 million has been privately invested in the project, and over \$12 million has been contributed through philanthropic and public funds. For the second phase, which will require about \$150 million in private capital, it is projected that 5,100 construction jobs will be created over the 15-year period, that 2,500 people will be employed by 60 new businesses, and that the annual return to taxing bodies will be an additional \$7 million. Two million more visitors are expected to come to Station Square, bringing the total annual visitation to 5 million people. (Box 5.3)

Because the master plan involves entirely new construction, Landmarks sold the project to a major developer interested in building in downtown areas,



Bessemer converters once filled Pittsburgh night skies with fiery light. The last converter stands in Station Square.

Photo Credit:
Jim Judkis/Pittsburgh History & Landmarks Foundation

Forest City Enterprises of Cleveland. Under the terms of the sale, Forest City will implement the new development and finance it, with Landmarks continuing to handle daily operations and maintain economic interests. Funds from the sale have assisted in endowing Landmarks' programs.

Waterplace Park and River Relocation Project, Providence

In the late 1970s, Providence officials realized that downtown Providence was the urban equivalent of a Gordian Knot. Elevated rail tracks and parking lots divided the downtown area from the State House and Smith Hill. The Providence River, which flowed between downtown

and the city's East Side, was covered over with acres of roadway decking. Cross-town traffic and interstate access ramps converged at the roadway decking and became congested and dangerous because of the highly irregular and poorly defined roadway pattern. Pedestrian circulation under the railroad tracks and across the roadway decking was unpleasant and dangerous.

The effort to redesign the city and reclaim the beauty and usefulness of the city's rivers began in 1979 with a plan that called for relocation of the city's railroad station and tracks, construction of a major downtown interchange at Route I-95 and a boulevard connecting the interchange to the roadway deck over the Providence River, and a 35-acre develop-

ment district to be known as Capital Center. The 1979 plan did not address the decking covering the rivers. It did include plans for a 4-acre "Waterplace" park, but provided no funding for this project.

In 1984, a waterfront study sponsored by the city, state, Providence Foundation, and the National Endowment for the Arts proposed removing the decking and opening up the Providence River. The project, which became known as the River Relocation Project, had four major features. These are:

- Improving and consolidating traffic patterns by extending several roads and building seven new bridges for vehicles and five new bridges dedicated to pedestrians.
- Developing a "Y" shaped landscaped river corridor at the center of the city that connected existing parks, accommodated boat traffic, and created an independent walkway system. This was accomplished by relocating portions of the Woonasquatucket, Moshassuck, and Providence rivers and removing the old bridges and decking that covered one and one-quarter miles of the rivers.
- Dredging the rivers and establishing uniform clearances under the bridges to accommodate boat traffic. Three docking places are provided for boats to discharge and take on passengers.
- Creating "Waterplace," a four-acre park that punctuates the western terminus of the walkway system. The park includes a 30-foot high fountain, an amphitheater, several smaller

plazas with seating, two pedestrian bridges, and a pavilion building to accommodate a restaurant and visitors' center.

With the completion of the \$50 million project, over 11 acres of urban riverfront parks have been created for the enjoyment of residents and visitors. Boats utilize Waterplace and nearly a mile of downtown river channels. Nearly 1.5 miles of riverwalks are available for pedestrians and joggers.

All told, the city's redevelopment effort has cost about \$150 million in public funds, with about three fourths of the total provided by the Federal Railway Administration and Federal Highway Administration. To date, the Capital Center project has generated about \$600 million in private investment and created about 4,000 permanent jobs. It is expected to ultimately generate an additional \$400 million in private investment and 6,000 more permanent jobs.

The new riverfront amenities and parks have given the city a popular new face. Particularly noteworthy is a new multimedia fire installation by artist Barnaby Evans called "Water Fire Providence." Forty ritual bonfires hover above the surface of the Woonanquatucket River and thread through a half-mile section of Waterplace Park. Created initially as a temporary installation in 1996, Water Fire proved so popular that a community effort has raised funds to bring it back as an ongoing "signature" event for the city. In 1998, the multimedia show was held several times through the summer and attracted some 215,000 people.

LEVERAGING URBAN PROGRESS

An important focal point of national policymaking in recent years has been the effort to devise new ways to encourage the economic revitalization of decaying inner cities.

Many of the nation's older cities have been through a difficult cycle of expansion and contraction in this century. In Detroit, the first Ford Model T rolled off the assembly line in 1915. When Ford announced it would pay \$5 per hour for an 8-hour shift—nearly twice the standard wage in the countryside—crowds of workers flocked to the city. Detroit's population rose from 284,000 in 1900 to well over 1 million by 1921 and nearly 2 million by 1950.

In the last two decades, however, Detroit's population dropped by 32 percent and was again around the 1 million mark. The percentage of poor in the city more than doubled over the 1970-90 period. Many social indicators also showed a widening economic gap between cities and suburbs. In Detroit, for example, infant mortality rates widened to some three times higher than the neighboring suburb of Warren.

What happened? The causes are complex. Ironically in the case of Detroit, one of the principal causes was the emergence of the automobile as the dominant mode of transportation, which made industrial expansion into outlying areas relatively easy and gave workers the mobility to drive to those plants. At the same time, industries began to use trucks instead of trains to move materials, and freeway con-

struction allowed plants to be located at greater distances from materials.

Suburbs provided open space that was easy to develop, and suburban governments courted industries with tax and infrastructure incentives to encourage such moves. Older inner cities, by comparison, were filled with abandoned buildings and "brownfield" sites—land and buildings possibly contaminated by previous industrial activity that now stood empty. Aside from the costs of removing these structures, companies hesitated to redevelop brownfields because of expensive cleanup regulations.

The experience in Detroit was mirrored in many other cities across the nation, prompting an intense new effort to find ways to redress the suburban-urban gap. Two approaches—empowerment zones and brownfields redevelopment—have emerged as promising approaches.

Empowerment Zones

Started in December 1994, the Clinton Administration's Empowerment Zone and Enterprise Community Initiative provides tax incentives and performance grants and loans in 72 urban areas and 33 rural communities across the nation. All told, these communities are receiving more than \$1.5 billion in performance grants and more than \$2.5 billion in tax incentives. Private investments amount to about \$1.5 billion.

The communities were nominated by state and local governments; each area met eligibility requirements related to population, distress, size, and poverty

rate. The designations remain in effect for 10 years.

Each urban Empowerment Zone (EZ) received \$100 million and each rural zone received \$40 million in performance grants for job creation and job-related activities. The urban EZs are Atlanta, Baltimore, Chicago, Detroit, New York, and Philadelphia/Camden. The rural EZs are Kentucky Highlands, Mississippi Delta, and Rio Grande Valley. As Supplemental Empowerment Zones, Los Angeles received a grant of \$125 million and Cleveland received \$90 million. Boston, Houston, Kansas City, and Oakland each received \$25 million as Enhanced Enterprise Communities. The remaining 93 urban and rural areas received \$3 million. As a result of the Taxpayer Relief Act of 1997, Cleveland and Los Angeles become Empowerment Zones in the year 2000.

Employers in the urban and rural empowerment zones are eligible for up to \$3,000 in wage tax credits for every employee who lives and works in the Empowerment Zone. EZ businesses also are eligible for increased tax expensing for purchases of buildings, plant and equipment. All of the 105 zones and communities are eligible to receive tax-exempt bond financing that offers lower rates than conventional financing to finance business property and land, renovations, or expansions.

With the help of past experience gained in federal programs and some of the 37 state enterprise zone programs, the EZ/EC Initiative seeks to combine targeted tax incentives with direct financial assistance, job readiness training and

placement services, improvements to physical infrastructure and public safety, and the development of strong community partnerships. It is designed to encourage community involvement and better coordination among elected local, state, and federal officials.

To date, studies suggest that the level of citizen participation that occurred during development of each city's strategic plan has been significantly greater than under previous federal initiatives, that outreach was more extensive, and that a wide variety of community stakeholders were involved in the planning process.

Though not the major focus of the effort, environmental initiatives are nevertheless an important part of the mix. For example:

- In the Atlanta Empowerment Zone, "Renewal Atlanta" is a new recycling business established on a former industrial site that will create up to 65 full-time jobs for EZ residents and 200 temporary jobs for youth. The company will offer EZ youth up to 2-year internships in various recycling enterprises, with interns earning stipends of \$4,000 for each year in the program.
- In the Baltimore EZ, the Baltimore Development Corporation is establishing an eco-industrial park to make use of more than 1,200 acres of underutilized land. A minimum of 10 new businesses are being sought for the park. The Park will attempt to ensure environmentally sound industrial development by matching businesses that can make productive use of one another's waste materials. When the

project reaches its full potential, 1,500 jobs will be available to EZ residents.

- In the Atlanta EZ, a partnership that includes the city, U.S. EPA, and several private firms is distributing free of charge about 1,000 ultra-low-flush toilets and low-flow showerheads to EZ residents. The project could save participating EZ residents about \$120 annually on their water bill and reduce overall water consumption by about 25 million gallons.
- In the Minneapolis Enterprise Community, the Green Institute ReUse Center sells used materials donated by individual do-it-yourselfers or contractors and manufacturers. The goal is to encourage economical homeownership improvements while saving and reusing materials, and reducing the amount of discarded building materials entering the city's solid waste stream.
- In the St. Louis Enterprise Community, a community greening program assists neighborhood groups in implementing greening projects such as planting trees, flowerbeds, neighborhood entrances, and vacant lots.
- In the San Diego EC, Operation Embrace is working in the Barrio Logan community, which is badly blighted by gang graffiti. Community youth and adults form Neighborhood Watch groups to identify increases in graffiti and areas where ivy could be planted to cover it. Ivy planting is an effective alternative to painting because it eliminates the need for additional painting.

- In the Tampa EC, the Neighborhood Environmental Action Team (NEAT) educates the community on methods for reducing graffiti such as the installation of thorny shrubs, drought-tolerant plants, vines, textured walls, and murals, and on low-cost ways to remove graffiti. NEAT also trains, equips, and hires 16- to 21-year old youth from the EC to remove weeds, mow, caulk, lay cold asphalt, remove graffiti, and install graffiti-prevention methods.

Many federal agencies are trying to find creative new ways to apply their program resources to Empowerment Zones and Enterprise Communities. For example, the National Park Service's Rivers, Trails, and Conservation Assistance program works with communities nationwide to help them protect their rivers, trails, and greenways. The program provides technical assistance to citizens' groups and all levels of government to facilitate community-based conservation. Examples include:

- In Milwaukee, many residents and community-based organizations within Milwaukee's enterprise community are involved in the South Side conceptual plan for an eight-mile urban greenway and recreational corridor through the Menomonee River valley. The greenway will connect Lake Michigan shoreline parks and downtown Milwaukee with the western suburbs.
- In Seattle, the program provided a \$40,000 partnership grant in 1994 for the Duwamish Youth Initiative, a student ambassador program that focuses on improving the Green/Duwamish

watershed. The objective is to recruit more than 200 young people; perform 20,000 hours of watershed restoration and community revitalization service; offer leadership training, career development, and mentoring services to youth; and certify more than 100 “Duwamish Ambassadors” to recruit and train other residents.

- In Detroit, the program has actively supported the Detroit River Greenway Partnership, in which over 25 community and government organizations are working to improve and restore 37 miles of the Detroit River and its waterfront resources.

As a result of the Taxpayer Relief Act of 1997, an additional 20 Empowerment Zones will be designated before January 1, 1999 and remain in effect for 10 years. No more than 15 of the Second-Round Empowerment Zones are to be located in urban areas and no more than five in rural areas. The present-law geographic and poverty eligibility criteria are expanded slightly for these new zones. In particular, the zones are expanded to include developable sites that are 2,000 acres but not subject to the poverty rate criteria. Within the 20 new zones, qualified enterprise zone businesses are eligible to receive increased expensing (except in the developable sites), brownfields-remediation-expense current deductions, and benefits from tax-exempt bond financing outside the State private activity bond caps.

Historic Rehabilitation tax credits, which provide a 20 percent tax credit for the rehabilitation of certain historic

buildings to National Park Service standards, are another valuable contributor to urban restoration projects. The Interior Department can work with state and local governments to identify eligible historic districts, to provide information to Empowerment Zones and Enterprise Communities about the uses of the tax credit program, and to facilitate certification of rehabilitation programs within Empowerment Zones and Enterprise Communities.

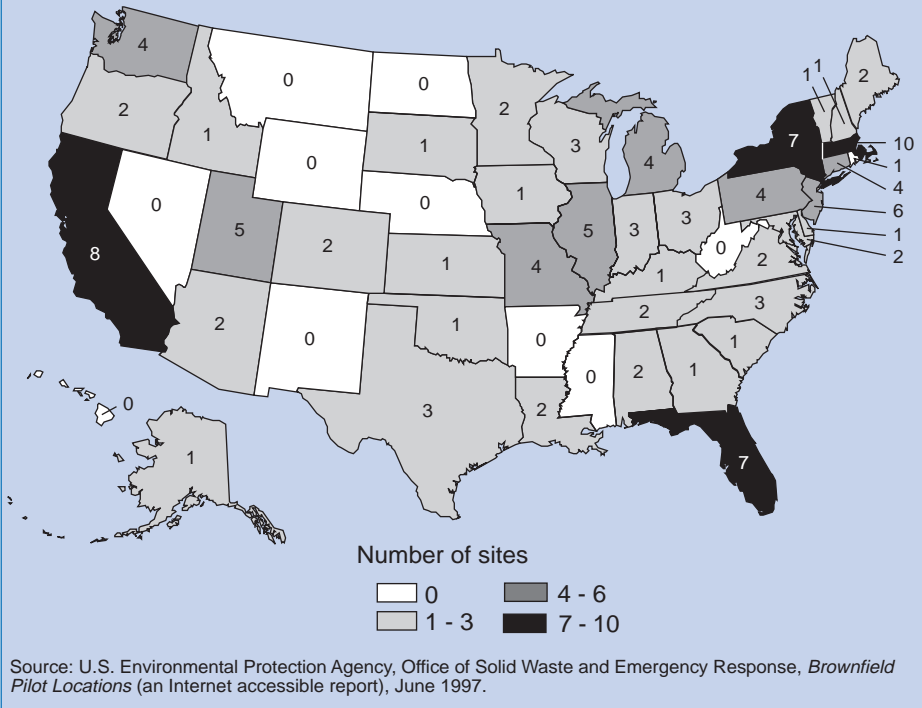
Since 1977, the program has generated over \$17 billion in historic preservation activity, representing rehabilitation work on more than 26,000 historic buildings. In Denver, for example, six of the city’s 27 historic districts lie wholly or partially within the boundaries of the city’s current Enterprise Communities. All told, these districts include well over 940 individual properties. Any historic income-producing property (commercial, industrial, and rental residential) within these districts would qualify for the tax credit program.

Brownfields

In communities all around the country lie thousands of old, abandoned industrial sites—old steel mills in western Pennsylvania and Chicago’s southeast side, dry cleaning plants, metal plating and machine shops, and chemical plants.

These “brownfield” sites—perhaps as many as 450,000 across the nation—are a potent symbol of decay and economic stagnation. Many seem to be golden opportunities for redevelopment and revitalization. Yet the possibility that the

Figure 5.11 EPA Brownfield Pilots by State, June 1997



Source: U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, *Brownfield Pilot Locations* (an Internet accessible report), June 1997.

buildings, equipment or surrounding land might be contaminated as a result of past industrial practices presents a real barrier to redevelopment. Lenders, developers, and investors are all afraid that getting involved with these sites might result in liability for contamination they did not create.

Faced with these legal uncertainties, many developers opt for suburban “greenfields,” which require more investment in infrastructure such as sewers and roads but are much less risky than sites requiring cleanup. The tendency to choose greenfields over brownfields means lost employment opportunities for

city residents, lost tax revenue for city governments, and more suburban sprawl.

About 1,400 sites are real environmental nightmares that have been placed on the Superfund’s National Priority List. Thousands of other sites are only lightly contaminated, yet still present many of the same legal uncertainties. To begin dealing with this problem, EPA has removed more than 30,000 of the sites listed in the inventory of potential Superfund sites. EPA anticipates no further action under the federal Superfund program at these sites.

Increasingly aware of this barrier to revitalization, many mayors and community organizations are pressing the federal

government to find ways to safely expedite the redevelopment of urban brownfields. The National Conference of Mayors has identified brownfields as the number one environmental issue in the nation.

EPA's Brownfields Economic Redevelopment Initiative is designed to help communities revitalize brownfields both environmentally and economically and to mitigate potential health risks. It has four components: providing grants for brownfields pilot projects; clarifying liability and cleanup issues; building partnerships and outreach among federal agencies, states, tribes, municipalities, and communities; and fostering local job development and training initiatives.

The brownfields assessment pilots—each funded at up to \$200,000 over two years—test cleanup and redevelopment planning models, assess the removal of regulatory barriers without sacrificing protectiveness, and encourage coordination at the federal, state, and local levels. Through June 1997, EPA has provided funding to states, cities, towns, counties, and tribes for 115 brownfields assessment pilots (Figure 5.11). For example:

- In Astoria, Oregon, the city is working with the state and community groups to clean up an abandoned plywood mill site and transform it into a thriving waterfront property. Located adjacent to downtown Astoria's historic area, where the mouth of the Columbia spills into the Pacific Ocean, the former industrial property will soon house a public promenade, shops, and residential housing.

- In Trenton, New Jersey, city officials are working to redevelop a site that was home to commercial lead-acid battery manufacturers from the 1930s to the 1980s, and then host to a manufacturer of felt-tip pens until the company filed for bankruptcy and abandoned the site in 1989. The city is experimenting with a new soil clean-up technique called *phytoremediation*, in which plants such as Indian Mustard are used to extract lead and other heavy metals from the ground. Following an initial planting of Indian Mustard in April 1996, tests show that lead levels on the property have already been reduced.

- In Emeryville, California, some 230 acres of former heavy industry and research sites now lie vacant or underused, with 213 acres known to have soil and groundwater contamination. EPA and city officials are working to rejuvenate the area, targeting 10 sites and more than 180 acres for redevelopment. Cutting-edge technology companies plan to return to the area. The city also plans to create recreational parks to replace the abandoned lots that have long been eyesores for the community.

EPA has issued several guidances and policies that seek to clarify and eliminate liability concerns at contaminated properties. For example, EPA's "Policy for Owners of Property Containing Contaminated Aquifers" reassures landowners that EPA does not plan to sue them for groundwater contamination if they did

not cause or contribute to the contamination.

EPA also has issued guidance that states the conditions under which EPA will not sue prospective purchasers for contamination that existed before the purchase; issued a policy on the use of "Comfort" letters that describe EPA's intent to exercise its response and enforcement authorities under Superfund at a particular property based on currently known information; and issued soil-screening guidance to help decision-makers quickly determine which portions of a site require further study

In May 1997, Vice President Gore announced that 15 federal agencies have committed over \$300 million over two years plus an additional \$165 million in loan guarantees to support the Brownfields National Partnership Action Agenda, an expansion of the original initiative. All told, the project could help clean up as many as 5,000 properties, leverage from \$5 billion to \$28 billion in private investment and support the creation of up to 196,000 jobs.

Many other federal agencies are involved in the effort to expedite brownfields redevelopment. For example:

- The Department of Housing and Urban Development (HUD) is providing assistance in community development and housing support and up to \$165 million in loan guarantees. HUD is revising Community Development Block Grant regulations to encourage use of funds for brownfields redevelopment.
- The Economic Development Administration (EDA) is supporting

brownfields redevelopment in distressed areas.

- The National Oceanic and Atmospheric Administration (NOAA) is providing assistance for waterfront and coastal revitalization.
- The Department of Health and Human Services (HHS) is leading an administration effort to develop a public health policy for brownfields to protect community residents.
- The General Services Administration (GSA) is conducting environmental surveys on federal properties to expedite brownfields development.

The partnership has solicited applications from communities to serve as "Brownfields Showcase Communities"—models demonstrating the benefits of collaborative activity on brownfields. More than 200 communities responded to the proposal, and 40 communities were chosen as finalists and asked to submit detailed applications by December 10, 1997. The Showcase communities will receive a mix of technical and financial support depending on their specific needs and will develop models of cooperation that can be copied across the country.

In general, unless the taxpayer contaminated the land, brownfields remediation expenses are not currently deductible but must be capitalized. In the Taxpayer Relief Act of 1997, Congress extended current deductibility to qualified environmental remediation expenditures. These are expenditures that would otherwise be capitalized and are paid or incurred in connection with the

abatement or control of hazardous substances at a qualified contaminated site. A qualified contaminated site must be within a targeted area, i.e., census tracts with at least 20 percent poverty rates, current and second-round Empowerment Zones and Enterprise Communities, and the 76 designated EPA Brownfields Pilot projects. Current deductibility is available for qualified environmental remediation expenditures paid or incurred after August 5, 1997, and before January 1, 2001. In order to claim a deduction, the taxpayer must obtain a statement from a designated State environmental agency that the qualified contaminated site satisfies the statutory geographic and contamination requirements.

NEW APPROACHES TO URBAN GROWTH

In the spring of 1994 a “public committee” of community, industry, and environmental leaders began a three-year project to characterize and rank environmental problems in the greater Cleveland area, set environmental priorities for the region, and develop new approaches to address environmental problems.

After getting input from a variety of organizations, the group was asked to rank 16 environmental problems in terms of risks to public health, ecological resources, and other quality of life aspects. The problems included surface water and groundwater quality, indoor and outdoor air quality, acid rain, stratospheric ozone loss and global warming,

quality of natural areas, environmental and economic impacts of outmigration from the urban core, solid waste disposal, and others.

In the course of these deliberations, members of the committee realized that many of these problems were directly or indirectly driven by urban sprawl. This insight led to a decision that urban sprawl should take priority as the “umbrella issue” for the implementation phase of the project.

Like this committee in Cleveland, many other groups have been rethinking the costs and benefits of urban development. In many regions, studies found that new growth was typified by new housing developments encroaching farther into agricultural and environmentally sensitive lands, an increasing dependence on automobiles, and the isolation of central cities and older communities.

Between 1970 and 1990, cities like Chicago and Philadelphia grew by more than 30 percent in land use but less than 5 percent in population. Between 1960 and 1990, the overall population in the Kansas City metropolitan area grew by less than one third, while the developed land area doubled.

Many factors have pushed urban development in this direction. Suburban communities often offer lower crime rates and greater access to skilled labor than many central cities. In addition, suburban community officials have provided tax breaks, public infrastructure, and other incentives to lure commercial and industrial employers from the urban core. Federal tax dollars have been frequently used to construct beltways

around urban areas that encouraged suburban development. Tax provisions, such as the preferential treatment of housing capital gains and the deductibility of home mortgage interest, lead to more housing investment than would occur without the current preferential tax treatment.

Many studies over the past few decades have questioned the wisdom of this growth pattern, noting that new suburban residents often demanded more in government services than they paid in taxes, that growing use of automobiles meant increasing traffic congestion and air pollution, that older inner cities were losing jobs and being left behind, and that farmers and small residential communities were being swallowed up by urban sprawl.

In response, many states and communities have been trying to develop new approaches. For example, residents of Portland, Oregon, elected a regional government with broad powers to carry out a regional vision and a more conscious effort to direct regional growth and development.

The key elements in Portland's success include: encouraging intensive development near transit; requiring development at a pedestrian scale with a mix of uses; limiting commuter parking; investing heavily in transit; and creating an Urban Growth Boundary that defines urban and rural areas.

Portland has made a deliberate decision to invest in transit rather than new road capacity. No new road capacity has been added to the downtown area for 20 years. In addition, the city removed a six-

lane expressway to create a downtown riverfront park, and shifted money designated for two new freeways into new transit construction.

Portland has worked closely with the Tri-Met, the Portland Transit Authority, to coordinate land use with transportation and encourage cluster development next to the new MAX subway line. Voters have twice approved measures expanding the light-rail system from 15 to 58 miles. Over \$1.3 billion worth of development is under construction or completed adjacent to the MAX since the decision to expand the line, and plans have been announced for another \$440 million worth of improvements. The transit line also is credited with accelerating historic renovations, influencing the design of office buildings, and helping to make new retail development feasible.

The city's vision of its future seems to be a success. Downtown employment has grown from 50,000 jobs in 1975 to 105,000 jobs today. Air quality violations have improved from over 100 annually in the 1970s to no violations since 1987. Portland has added no additional parking spaces downtown, and over 50 percent of downtown trips are taken on the transit system.

Growing Smart

In many regions, coalitions of developers, environmentalists, citizens, and government officials are getting together to think about new approaches to growth and development.

One of the most dynamic examples is Maryland's Smart Growth Initiative. The

initiative was built on the Maryland Economic Growth, Resource Protection, and Planning Act of 1992, and further strengthened in 1997 with enactment of the Neighborhood Conservation and Smart Growth package of initiatives.

Maryland's approach was built from seven widely accepted "visions" that were part of the regional Chesapeake Bay Agreement. These visions, intended to guide Maryland's future development, are:

- Development is concentrated in suitable areas.
- Sensitive areas are protected.
- In rural areas, growth is directed to existing population centers and resource areas are protected.
- Stewardship of the Chesapeake Bay and the land is a universal ethic.
- Conservation of resources, including a reduction in resource consumption, is practiced.
- To assure the achievement of 1 through 5 above, economic growth is encouraged and regulatory mechanisms are streamlined.
- Funding mechanisms are addressed to achieve these visions.

The centerpiece of the 1997 package is the "Smart Growth Areas" legislation. This new law limits most State spending on housing, infrastructure, economic development, and other programs to "Priority Funding Areas," which are areas that local governments determine are suitable for further growth. This serves to channel state funds to already developed

areas and to areas selected by local governments for further growth, while restricting State funding for infrastructure or development in other rural areas.

To encourage economic development and help stabilize older developed areas, the Smart Growth Initiative also facilitates the re-use of brownfields and provides tax credits to businesses creating jobs in a Priority Funding Area. A new "Live Near Your Work" pilot program provides cash contributions to workers buying homes in certain older neighborhoods.

To spur more preservation of undeveloped land, a new "Rural Legacy" program provides financial resources for the protection of farm and forest lands and the conservation of these essential rural resources.

In a proposed federal rule on stormwater management, EPA is asking for ideas on how the agency could create incentives that would encourage local governments to use Smart Growth programs as a way to ease stormwater run-off pollution in urban watersheds. This is the first time that EPA has attempted to reward smarter land use and development practices with less burdensome regulation.

Under the proposed rule, EPA is considering approaches that would provide incentives for local decisionmaking that would limit the adverse water quality impact associated with uncontrolled growth in a watershed. In situations where there are special controls or incentives (e.g., transferable development rights, traditional neighborhood development ordinances) in place directing development toward compact/mixed use

development and away from wetlands, open space, or other protected lands, EPA is considering providing some relief to municipalities. The relief would per-

tain to minimum control measures concerning construction and new infill development or redevelopment.

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