Smart Growth for Clean Water

Helping Communities Address the Water Quality Impacts of Sprawl

National Association of Local Government Environmental Professionals
Trust for Public Land
ERG

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2003

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Top 10 Actions for Advancing Smart Growth for Clean Water in Your Community

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2. Establish a Greenprint and a Blueprint for Your Community
3. Think and Act Like a Region
4. Revitalize Brownfields
5. Expand Urban and Community Forestry
6. Provide Incentives to Developers
7. Use GIS Technology
8. Partner with State Programs
9. Leverage New Resources
10. Use Watershed Management Approaches to Protect Land and Water Quality

Introduction

Communities across America are coping with the results of poorly planned, scattered, high-impact development – or sprawl. When she was Governor of New Jersey, EPA Administrator Christine Todd Whitman put it succinctly: "Suburban sprawl is eating up open space, creating mind-boggling traffic jams, bestowing on us endless strip malls and housing developments, and consuming an ever-increasing share of our resources."

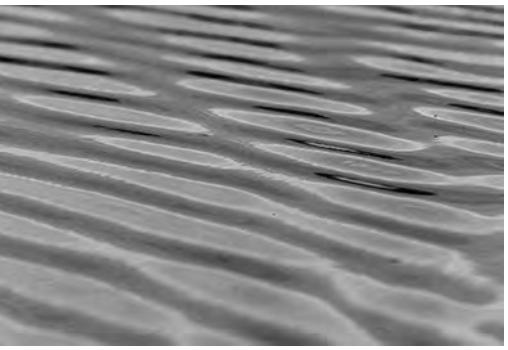
Sprawling growth can also cause the degradation of water quality in our rivers, streams, lakes, shores, and groundwater. As stated by Luna Leopold, former Chief Hydrologist for the U.S. Geological Survey, "the health of our waters is the principal measure of how we live on the land." Despite progress in improving the nation's waters under the Clean Water Act, nearly 45 percent of water bodies remain polluted, due in large part to "nonpoint source" runoff pollution. Poor land use management is a chief cause of nonpoint pollution.

> "The health of our waters is the principal measure of how we live on the land."
>
> Luna Leopold
> Former Chief Hydrologist, USGS

The need to address urban and suburban runoff has led to new Clean Water Act requirements for localities, like EPA's Phase I and Phase II stormwater requirements, and Total Maximum Daily Load (TMDL) restrictions. As a result, communities are struggling to find cost-effective solutions to meet the new requirements and local clean water goals. There is clearly a need for new approaches that can help communities address the land-water connection.

Smart growth is emerging as a key strategy for clean water. Across America, examples are emerging where communities are utilizing "smart growth" tools like land conservation, greenway buffers, the creation of park and recreational areas, natural and constructed wetlands, urban and community forestry, waterfront brownfields revitalization, low impact development, watershed-based management, Geographic Information Systems (GIS) mapping, and other tools to reduce nonpoint source pollution, control stormwater, and improve water quality. These smart growth for clean water approaches are often more cost-effective than traditional structural solutions like building new wastewater plants or stormwater collection facilities. Moreover, these smart growth tools not only enable localities to achieve clean water goals, but they also help attain other community objectives such as preservation of open space and parks, cleanup of environmental contamination and community eyesores, creation of sustainable economic development, saving tax dollars through efficient use of infrastructure, and the improvement of overall quality of life.

Local communities facing sprawling development are turning to smart growth to protect their rivers, lakes, streams, and oceans. For example, the City of Chicago has launched an ambitious project to use brownfields cleanup, land conservation, wetlands protection, and urban forestry to



improve water quality and create new jobs and sustainable industry in the Lake Calumet area. A coalition of communities in the Denver metropolitan area is working to establish a continuous natural greenway and innovative green infrastructure enhancements to protect the water quality and the public enjoyment of the Cherry Creek and its tributaries. In North Carolina, the City of Charlotte and Mecklenburg County are using low impact development and working with the Trust for Public Land to purchase and preserve hundreds of stream-side properties and thousands of acres of waterfront property around Mountain Island Lake, the area's primary drinking water source. Iowa is one of a handful of states that has authorized its Clean Water State Revolving Fund to provide funding for smart growth tools including waterfront brownfields redevelopment, riparian land conservation, watershed management, constructed wetlands, and agricultural best management practices. In the fast-growing areas of the Merrimack River watershed, northwest of Boston, four towns are integrating their land use planning with water protection goals through innovative, GIS-based mapping techniques to form a blueprint for smart growth. Fayetteville, Arkansas has determined that, by increasing its tree canopy from 27 percent to 40 percent, this fast-growing city could save up to $135 million on stormwater benefits alone (American Forests, 2003).

The connection between land use and water quality has long been recognized by the U.S. Environmental Protection Agency (EPA), and the Agency has recently taken several steps to help localities and states develop and implement new smart growth approaches to protect water resources. In early 2002, EPA Administrator Whitman announced a new Watershed Initiative that will provide $15 million in Fiscal Year 2003 to help local entities protect and restore their local watersheds. The Watershed Initiative is focused on promoting a more comprehensive approach to protecting water quality – "one that recognizes that the health of aquatic resources is affected by what happens on the land that drains into a water body." On December 3, 2002, the **Office of Water** renewed its commitment to watershed management. A new Watershed Management Council will evaluate the potential for further integration of water programs, recommend strategies for funding local watershed initiatives, increase training and technical assistance opportunities, continue to work with states and tribes to build strong watershed programs, and encourage innovation.

The Office of Water has also been collaborating with the **EPA Division of Community and Economic Development** (DCED) on several smart growth/clean water projects. In addition to working with the Office of Water on how to credit smart growth approaches in TMDL and stormwater plans, DCED is perfecting a modeling tool that will help communities assess the water quality impacts associated with different types of development patterns.

The **EPA Brownfields Program** has provided numerous grants to help communities clean up and revitalize brownfields along waterfronts in

urban areas. From its inception, the EPA Brownfields Program has embodied a new model of environmental management through its innovative partnerships and market-based approach. This was re-emphasized on January 11, 2002 when President Bush signed the Small Business Liability Relief and Brownfields Revitalization Act. The redevelopment of brownfields is a critical smart growth tool that helps to revitalize communities and alleviate development pressure on farmland and open space. In addition, the Brownfields Program is encouraging brownfield developers to use innovative stormwater controls, such as low-impact development techniques, to further protect water quality when they revitalize these waterfront properties. The EPA Brownfields Program has also partnered with the Office of Water to promote the use of Clean Water State Revolving Fund resources for the cleanup of waterfront brownfields contamination.

Sprawl Happens Even with No Population Growth

Between 1970 and 1990, the Cleveland metropolitan area lost 11 percent of its population but consumed more than 33 percent in developed land.
(Earth Day Coalition, 2001).

The **U.S. Forest Service** is also working to develop smart growth tools to help communities meet their water quality goals. Specifically, the Forest Service has partnered with American Forests to demonstrate how urban forestry (strategic planting of trees) can help protect water quality by preventing stormwater runoff, promoting groundwater recharge, and lessening the impacts of drought. According to American Forests, "trees slow stormwater flow, reducing the volume of water in urban areas and decreasing the amount of runoff that containment facilities must store." Moreover, this forestry strategy can save communities millions of dollars in capital improvement costs.

The Smart Growth for Clean Water Project

This report showcases the results of the ***Smart Growth for Clean Water Project***, launched in 2000 by the National Association of Local Government Environmental Professionals (NALGEP) in partnership with the Trust for Public Land, U.S. EPA, the U.S. Forest Service, ERG, and five state/local demonstration projects. This Project is designed to help states and localities use smart growth tools as key strategies for achieving clean water goals. Project objectives include:

- **Educating local and state elected and appointed officials** on opportunities to use smart growth tools to improve water quality and meet federal regulatory mandates.
- **Fostering interaction among smart growth, brownfields, water quality, and urban and community forestry leaders**.
- **Showcasing and assisting specific demonstration projects** that illustrate how state and local governments can use smart growth tools to improve water quality, control stormwater, meet regulatory mandates, and achieve other community objectives.
- **Identifying state and federal policy barriers** that are discouraging the use of smart growth tools for clean water and **developing solutions to overcome these barriers**.
- **Disseminating information** on available smart growth tools, projects, programs, and resources to help local and state governments achieve their water quality objectives.

This ***Smart Growth for Clean Water*** report shares ideas for using smart growth to advance clean water goals based on the experiences of communities across the nation. The report includes background on the impacts of sprawl on water quality; information on the clean water benefits of smart growth approaches; identification of smart growth for clean water tools; findings on the barriers to smart growth for clean water and recommended solutions for overcoming these barriers; case study profiles of innovative projects and programs across the country; a "Top 10" list of actions that local governments can take to promote smart growth for clean water; and links to further resources and information for communities that seek to put these tools to use.

There is an old Swedish proverb that says *"Don't throw away the old bucket until you know whether the new one holds water."* Smart growth is emerging as a new tool for improving our nation's communities – and this approach clearly holds water. We hope that this report can help localities and their partners find ways to use smart growth to address important development and water resource issues in their communities.

Sprawl Threatens Water Resources

Sprawling development patterns increase stormwater runoff and nonpoint source pollution, harm water ecosystems, reduce the recharge of groundwater aquifers, and worsen drought.

Land use affects water quality. A major culprit for unhealthy water is the conversion of natural lands to **impervious surfaces**, such as roads, parking lots, driveways, and rooftops, and the polluted runoff that results. This runoff can produce discharges to water of oil, salt, sediment, tire particles, and other pollutants. Such pollution is called nonpoint source pollution because it comes from many different locations and types of activities. By increasing runoff volume, altering stream flow and the natural hydrology of the land, and significantly reducing groundwater recharge, water resources are degraded (U.S. EPA, 2001(a)).

New construction in previously undeveloped "greenfield" areas causes soil disturbance and increased sedimentation and other runoff. Post-construction, the increase in the amount of impervious surface increases the amount of pollutants that enter water bodies. In fact, a one acre parking lot produces almost 16 times the runoff amount of a one acre meadow (U.S. EPA, 2001(a)). The EPA estimates that watersheds beyond 10 percent imperviousness experience stream degradation. Beyond 26 percent imperviousness, streams are seriously degraded and may never recover to predevelopment conditions (U.S. EPA, 2002(a)). Likewise, runoff pollution can negatively impact the treatment cost and quality of drinking water.

How Impervious Surface In a Watershed Can Affect Water Quality

0-10% Impervious Cover: Sensitive stream which typically has good to excellent water quality

11-25% Impervious Cover: Impacted stream which typically shows clear signs of degradation from watershed urbanization

> 25% Impervious Cover: Non-supporting stream which typically can no longer support a diverse stream community

For more information, visit the Center for Watershed Protection at www.cwp.org.

The low density development pattern of **sprawl is a tremendous consumer of land**. The American Farmland Trust found that from 1982—1997, U.S. population grew by 17 percent, while urbanized land grew by an alarming 47 percent. The average acreage per person for new housing almost doubled over the past 20 years due to the preponderance of low density development. This voracious consumption of land threatens our forests, stream buffers, vegetative cover, and wetlands, which are all critical natural water quality protectors.

Sprawl adversely impacts **drinking water supplies**. With high amounts of impervious cover, the natural recharge of groundwater is greatly reduced. Such reduction threatens both the quality and quantity of drinking water supplies. The reduction of groundwater recharge becomes even more critical as communities struggle to keep the water running during times of drought. American Rivers, the Natural Resources Defense Council, and Smart Growth America estimate that from 1982—1997, the potential amount of water unable to infiltrate annually was more than 6.2 billion gallons in Dallas to more than 56.9 billion gallons in Atlanta (American Rivers, 2002).

Sprawl also increases vehicle miles traveled and associated **air pollution,** which also impacts water quality. The automobile is often the only option for mobility in sprawl development, as destinations are so far from each other that walking from your house to the store is nearly impossible. With more people traveling greater distances to accommodate basic needs, air pollution problems are exacerbated. The link between air quality and water quality is clear. Air pollutants can be deposited on land and water, sometimes at great distances from their original sources, and can be an important contributor to declining water quality. For example, studies show that 21 percent of all nitrogen pollution entering the Chesapeake Bay comes from the air (U.S. EPA, 2000).

Smart Growth Can Help Protect Water Quality

Smart growth provides an alternative to sprawl. Smart growth directs development towards existing communities while preserving open space, farmland, and natural areas that are critical to clean water. Smart growth increases transportation and housing choices and promotes the use of existing infrastructure. **Smart growth saves money.** Smart growth can reduce the costs to taxpayers of new development and foster new investment in communities that have been left behind. Controlling water pollution after it is generated can be tremendously expensive. Also, the cost of major sewer and water extensions to accommodate new development located far from existing communities can be exorbitant. By using green infrastructure, low impact (and often low cost) development techniques, and building closer to existing communities served by water and sewer infrastructure, the high costs of providing gray infrastructure (roads, bridges, etc.) can be avoided. Moreover, smart growth tools, such as land conservation and brownfields revitalization, often work best when integrated with smart transportation and environmental planning.

Increasingly, local and state governments are exploring the use of innovative smart growth approaches that help achieve their water protection goals. **Smart growth uses less land than conventional development**, often reusing brownfields or previously developed sites, thus limiting the amount of land converted from farmland, forest, or open space to impervious surface. These lands can serve as buffer zones for water bodies, reducing stormwater runoff and filtering out pollutants before they reach the water. Smart growth recognizes the importance of targeting protection efforts and avoiding development on those lands that are critical to our drinking water supply, such as recharge areas. In addition, smart growth reduces vehicle miles traveled (by as much as 15—52 percent) and thus reduces the amount of air pollutants entering water bodies (U.S. EPA, 1999).

Smart growth can be directly linked with water resource protection. By including water protection considerations upfront and examining the potential water quality benefits available through infill and brownfields redevelopment, land conservation and other approaches, localities can often achieve multiple objectives. Using tools such as GIS and other mapping technology, planners can identify areas most suitable for growth and target other areas for conservation. Designating specific areas for development and conservation is one of the first critical steps in a comprehensive smart growth strategy.

Georgia Greenspace Program Furthers Water Protection Goals

Georgia's Greenspace Program awards grants to counties and cities to develop and implement plans to permanently protect at least 20 percent of their greenspace and meet at least one of nine specific goals. Five of these goals address water resource protection: water quality protection for rivers, streams, and lakes; flood protection; wetlands protection; reduction of erosion through protection of steep slopes, areas with erodible soils, and stream banks; and protection of riparian buffers and other areas that serve as natural habitat and corridors for native plant and animal species. The state also created a Greenspace Trust Fund for use by counties and municipalities to help offset the costs of acquiring property or conservation easements that qualify as greenspace. The Georgia General Assembly has appropriated $30 million annually to the program since its inception, July 1, 2000. The Georgia Greenspace Commission approved community greenspace programs for 39 counties and 54 cities during fiscal year 2001 and approved grants for 55 counties and 59 cities during fiscal year 2002.

For more information, visit www.state.ga.us/dnr/greenspace.

Smart Growth for Clean Water Tools

This report highlights how five smart growth approaches can improve water quality – land conservation, waterfront brownfields revitalization, urban and community forestry, low impact development, and watershed management.

Land Conservation

Land use changes affect water quality. By preserving land, communities can directly control its use. Acquiring land or conservation easements offers permanent protection for critical natural resources. The most effective land conservation programs identify critical land resources and preserve those first. In terms of water protection, critical land resources include forested buffers along water bodies, drinking water recharge zones, and wetlands. Land conservation maintains water quality and can actually improve water quality if critical natural habitat is preserved (such as headwaters, buffers, and wetlands). Conserving land also provides the additional benefits of flood control, recreational uses, and the protection of historic and environmental resources. Over the years and across the nation, voters have indicated their willingness to pay for measures to protect land for water quality purposes. In 2002, 75 percent (141 of 189) of parks and open space ballot measures passed in communities across America—up from 70 percent in 2001. The 141 successful measures will generate over $10 billion in 28 states, including an estimated $5.7 billion specifically for land acquisition, preservation, and protection (Trust for Public Land and Land Trust Alliance, 2003).

Brownfields Redevelopment

Brownfields redevelopment is the conversion of abandoned or underused industrial or commercial properties into clean, actively used areas. This tool recognizes that cleaning up contaminated property located along water bodies and converting portions of these waterfront brownfields into greenways, riverfront parks, or other forms of open space can reduce the flow of contaminants into the water. This strategy helps to further protect waterways from the contaminated runoff that flows off of urban streets when it rains. Any contamination identified at these sites that is cleaned up prior to redevelopment can reduce or eliminate the potential contamination of nearby waters. In addition, brownfields revitalization with commercial, retail, residential, or industrial uses takes development pressure off undeveloped greenfield areas, including sensitive watershed sites, on the fringe of local communities. Typically, this redevelopment takes place on old sites that were already covered with impervious surfaces. Moreover, additional stormwater control, best management, and low impact practices can be implemented to minimize water pollution associated with the new development on brownfield properties.

Urban and Community Forestry

Like water, trees are an excellent indicator of environmental health. As land is developed, trees are removed to make way for impervious surfaces such as homes and roads. However, trees are a cost effective way to reduce stormwater – exactly what is necessary with increased imperviousness. Urban and community forestry manages forests within developed areas for environmental benefits. Community forests function as nonstructural stormwater management facilities. In addition to slowing stormwater flow, trees increase soil permeability, thus facilitating groundwater recharge. Reduced stormwater flow decreases the amount of pollutants that wash into waterbodies since pollutants can be absorbed naturally into the soil and vegetation. Today, there is a clear understanding of the active role trees play in improving the urban environment. Data documenting the environmental characteristics of trees are now available based on research from the United States Department of Agriculture Forest Service (USDA Forest Service, 2000). In addition, an analysis conducted by the organization American Forests found that the existing tree canopy in the Washington, D.C. metropolitan area has reduced the need for additional stormwater retention structures by 949 million cubic feet. Indeed, Washington's trees have saved the region $4.74 billion in gray infrastructure costs per 30-year construction cycle.

Washington, DC's trees have saved the region $4.74 billion in gray infrastructure costs.

TreePeople

TreePeople in Los Angeles is working in partnership with the Center for Urban Forestry at U.C. Davis, Pacific Southwest Research Station, USDA Forest Service to study the effects of stormwater management at the residential scale. The study includes the use of trees and residential stormwater management techniques such as cisterns, retention/detention basins, swales and driveway grates and drywells. Trees work in combination with other stormwater controls to produce comprehensive solutions to rainfall interception, runoff, and landscape water use. The study has found that:

> Small storms are responsible for most of the annual pollutant loading of receiving waters, and trees are most effective in intercepting "first flush" rainfall during small rain events; and
>
> A typical medium-sized tree can intercept as much as 2,380 gallons of rainfall per year.

For more information, visit www.treepeople.org.

Low Impact Development

A relatively new approach to site design strategy, low impact development attempts to maintain or replicate the pre-development hydrology of the site (U.S. EPA, 2002(b)). Low impact development (LID) can be accomplished through the preservation and protection of natural site features such as stream buffers and wetlands, or through the creation of green infrastructure, such as rooftop gardens, porous pavements, constructed wetlands, or raingarden facilities in parking lot medians. By mimicking the natural hydrology of the land, the problems associated with increased impervious surface are mitigated. By accommodating stormwater runoff on-site, the need for expensive management structures, such as detention ponds and concrete stormwater systems, is greatly reduced. LID is also more cost effective and, with its emphasis on natural landscaping techniques, can be both very beautiful and an economic premium for development projects. In addition, by using LID in new development, natural areas can be preserved and more of the site can be left undisturbed. Low impact development techniques can also be used for infill and redevelopment projects. With the redevelopment or replacement of urban infrastructure (roads, parking lots, roofs, etc.), LID techniques can be used to filter, treat, recharge, and reuse rain water, thereby lowering the impact of stormwater on urban waterbodies. LID's decentralized, micro-scale techniques (rain gardens, planter boxes, etc.) can be easily integrated into redevelopment plans.

Watershed Management

If we were to erase the geo-political boundaries of nations, states, counties, and municipalities and instead adopt boundaries based on our physical environment, we would all know which watershed we lived in. A watershed is an area that drains into a body of water, such as a river or lake. Water quality protection and improvement is best accomplished at the watershed level rather than the individual waterbody, zoning parcel, or political boundary. Land conservation, brownfields redevelopment, urban and community forestry, and low impact development are tools that are applied in communities–and watersheds–around the country. Watershed management deals with water quality issues comprehensively, relies on creative problem solving and innovative solutions, and encourages strong citizen involvement while offering the most cost-effective solutions. The watershed approach provides opportunities for all levels of government to better understand the cumulative impacts of human activities and determine the highest priority problems within each watershed. Smart growth is founded on the principles of watershed management because it transcends geo-political boundaries and focuses growth in less sensitive areas.

> "Every parcel of land is part of a larger watershed."
>
> First Principle of Stormwater Management, National Association of Homebuilders

While there are many other smart growth techniques and practices available to local communities, the five approaches outlined here are proven strategies for protecting public health and the environment, reducing costs, and improving local quality of life.

Anacostia Watershed Toxic Alliance

The Anacostia Watershed Toxic Alliance (AWTA) was created to develop and implement a multi-jurisdictional urban retrofit program to reduce toxics and improve water quality in impaired sub-watersheds within the Anacostia Watershed using low impact development techniques. The Anacostia Watershed encompasses three governmental jurisdictions: Prince George's County, Montgomery County, and the District of Columbia, and is governed by a multi-jurisdictional Steering Committee, Technical Advisory Committee, and several project teams. The focus of the program is on the treatment of runoff from the following four land use types: residential, commercial, industrial, and institutional. LID retrofit techniques apply small-scale source control practices to reduce runoff peak discharge, volume, and frequency and significantly improve the water quality of the receiving streams. LID designs include a wide range of techniques to retain, detain, filter, and eliminate pollutants and can easily be integrated into the urban landscape to address critical watershed issues.

For more information, visit http://response.restoration.noaa.gov/cpr/watershed/anacostia/start.html.

Prince George's County Innovation

In an attempt to deal with the challenges of stormwater management, the Prince George's County, Maryland, Department of Environmental Resources began to develop alternative stormwater management practices in 1990. Their research led to the development of bioretention or "rain gardens" — the use of green space to manage runoff. This began their intense examination of low impact development. In 1999, Prince George's County and the EPA published the nation's first LID manual.

For more information, contact Larry Coffman, Associate Director, Prince George's County, Department of Environmental Resources, Phone: (301) 883-5839, or visit www.co.pg.md.us or www.epa.gov/owow/nps/lid/lidnatl.pdf for a copy of the manual.

Profiles of Smart Growth for Clean Water Innovation

Communities across America are demonstrating the value of smart growth for clean water approaches. This section of the report profiles the innovation of several local partnerships that are putting land conservation, brownfields revitalization, urban and community forestry, low impact development, and watershed management to use for clean water goals. While these initiatives are diverse, they all share certain key qualities: they seek to fulfill regulatory requirements and meet community objectives simultaneously; they build on the strength of multi-stakeholder collaboration to reach multi-media environmental goals; they make use of available tools and resources, yet forge ahead with innovative new approaches; and they seek to attain long-term solutions with actions that also produce short-term community benefits.

INCLUDED ARE THE FOLLOWING CASE STUDIES:

★	The Calumet Initiative
★	Charlotte/Mecklenburg Surface Water Improvement and Management Initiative
★	Cherry Creek Smart Growth for Clean Water Partnership
	Fayetteville Urban and Community Forestry
★	State of Iowa Clean Water Revolving Fund
★	Merrimack Watershed Open Space and Water Resources Protection
	State of Massachusetts Community Preservation Initiative
	New Bedford Waterfront Brownfields and Economic Revitalization
	San Diego Creek Watershed and Natural Treatment System
	Suffolk County Land and Water Resource Protection
	United States Army Corps of Engineers Waterfront Preservation and Revitalization

★ These five National Demonstration Projects received in-depth technical assistance from NALGEP, TPL, and/or ERG.

The Calumet Initiative

The 20-square mile Calumet area on Chicago's southeast side is the focus of a new initiative centered on rehabilitating both the region's economy and ecology through innovative, smart growth projects. The Calumet area was once one of the largest wetland complexes in lower North America, teeming with native flora and fauna. However, due to its strategic geographic location along the Calumet River and adjacent to Lake Michigan, the Calumet area attracted major development and more than 120 years of heavy industrial activity. As a result, Calumet has thousands of acres of contaminated brownfields in need of cleanup, interspersed with thousands of acres of open space that provide critical habitat for a range of species, including state-endangered and state-threatened birds.

In 2000, Chicago Mayor Richard Daley and former Governor George H. Ryan announced the "Calumet Initiative" to revitalize the Calumet area both economically and ecologically. A long list of partners, including the Illinois Department of Natural Resources (DNR), the U.S. Forest Service, the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, the Illinois Environmental Protection Agency, and 15 other government partners have been working collaboratively with residents and local environmental groups to implement a vision of a revitalized Calumet. The Calumet Initiative will utilize a variety of smart growth approaches through brownfields revitalization, wetlands and land preservation,

Forest Service and Cook County Collaboration

Staff from the USDA Forest Service North Central Research Station have a longstanding partnership with Cook County to help guide and inform management decisions on all Forest Preserves throughout the County. The 68,000 acres of the Forest Preserve District of Cook County (District) tend to be concentrated near water resources. Research has guided the District in estimating public use of its areas; identifying public perceptions of and preferences for forest preserve environments; restoring forest, prairie, and wetland ecosystems; responding to exotic invasive species; and managing areas along the Chicago River and in the Calumet Region. Forest Service researchers continue to work with the District and other partners on the management of important riparian areas in the Chicago Metropolitan Area and beyond.

For more information, contact Lynne Westphal,
Research Social Scientist, USDA Forest Service
North Central Research Station at (847) 866-9311x11
or visit www.ncrs.fs.fed.us/contact/profile/?id=234.

urban forestry and phytoremediation, renewable energy, and low impact development. Chicago seeks to make Calumet a national model of ecological innovation. As stated by Mayor Daley, the Calumet project recognizes that "good environmental management is good for business, and good industrial development is good for the environment."

The initiative targets 3,000 acres for brownfields redevelopment with sustainable technologies and industry. This redevelopment will include the construction of a new Ford Motor Company supplier park that will utilize low impact development innovations to improve energy efficiency and drastically reduce stormwater runoff into adjacent waters like Indian Creek. Chicago has also created the Calumet Tax Increment Financing District to provide incentives for industry to locate in Calumet's brownfields.

Calumet's sustainable brownfields redevelopment will be linked with natural ecosystem rehabilitation and preservation through the creation of a 4,800 acre Calumet Open Space Reserve. This area of wetlands, creeks, and uplands already plays host to 700 plant species and 200 bird species. The Chicago Department of Environment DNR, Chicago's Environmental Fund and the U.S. Forest Service have established a "Calumet Area Ecological Management Strategy" as the framework and guidance for land managers to rehabilitate their respective parcels within the Open Space Reserve. This strategy is the result of extensive collaboration among a range of government agencies, local museums, residents, and environmental groups. The plan calls for looking at the watershed as a whole, with an eye toward preserving critical habitat, improving the ecology, establishing public recreational corridors, and creating new ecosystems appropriate for the area.

Coupled with the ecological management strategy is a land acquisition and preservation strategy for the Calumet Open Space Reserve. Chicago, the DNR, and many other partners have targeted millions of dollars to the permanent preservation of Calumet marshes and waterfront areas, with DNR, the Chicago Park District and the Forest Preserve District of Cook County slated as potential long-term stewards. The U.S. Department of Agriculture Forest Service is building on its long-term involvement in natural resources management in the greater Chicago area, with its work on the Calumet Open Space Reserve. Work at the Calumet site is focused on ecological restoration of the area, including a project to use tree planting and urban forestry to help remediate contaminated soils and water in the Calumet area. The Forest Service is also working with Chicago and area industries to transform the degraded, channelized Indian Creek into a more natural, meandering stream that can support aquatic insects and fish.

To help interpret and celebrate the uniquely linked natural and industrial history of the Calumet region for visitors, schoolchildren, and other citizens, the Calumet Initiative will build a new Calumet Environmental

Center within the Open Space Reserve. The City of Chicago has already committed $1.5 million toward constructing a state-of-the-art, energy-efficient facility, and Ford Motor Company has also dedicated $6 million to help build and provide programming. Chicago's Environmental Fund and the Illinois Institute of Technology are cosponsoring an international architectural design competition to solicit an environmentally friendly building design that will be one of the only buildings in the nation to achieve platinum status under the Leadership in Energy and Environmental Design (LEED) criteria established by the Green Building Council.

The Calumet Initiative seeks to strike a sustainable balance between the Calumet area's economy and environment – to provide jobs, reinvigorate neighborhoods, and nurture Calumet's remaining natural areas and water quality.

For more information, contact N. Marcia Jimenez,
Commissioner, Chicago Department of Environment at (312) 774-7609
or visit www.ci.chi.il.us/environment.

Charlotte and Mecklenburg County, North Carolina—SWIM Initiative to Protect Creeks and Mountain Island Lake

Mecklenburg County and the City of Charlotte, North Carolina have partnered with other local governments in the region to acquire over 4,400 acres in the Mountain Island Lake watershed, permanently protecting 53 percent of Mountain Island Lake's shoreline and 18 percent of its creekbanks from the impacts of development in one of the fastest growing communities in America. With a goal of ensuring that all Mecklenburg County surface waters are "suitable for prolonged human contact and recreational opportunities and supportive of varied species of aquatic life," this strategy is based on an innovative "Surface Water Improvement and Management" (SWIM) plan that combines land conservation, tree buffers, water quality monitoring, GIS mapping, and inter-jurisdictional collaboration.

Under SWIM, the Charlotte-Mecklenburg Office of Water & Land Resources has established a Creek Coordination Committee with representatives from Charlotte/Mecklenburg Utilities, Charlotte/Mecklenburg Parks & Recreation, Charlotte/Mecklenburg Stormwater Services, the Charlotte/Mecklenburg Planning Commission, Mecklenburg County Water & Land Resources, and other local, state, and federal stakeholders. This collaborative body was instrumental in the adoption of a county-wide stream buffer system and the implementation of a number of streamside forestry and ecosystem restoration projects.

The SWIM coalition recently led an effort to adopt an innovative water quality protection tool for the Town of Huntersville, north of Charlotte. Under this new approach, all development projects must use a "Site Evaluation Tool" (SET) that assesses pre-development and post-development runoff, infiltration, and pollutant loading rates. Using the SET analysis, development projects must incorporate low impact development and non-structural water protection methods, including land use controls and vegetated buffers. This new ordinance is expected to modify land development practices and promote smart growth approaches in Mecklenburg County, including the identification and protection of environmentally sensitive properties; the establishment and expansion of greenway programs; the enhancement of existing riparian buffers and conservation areas; and the identification of stream reaches in need of retrofitting with best management practices, such as constructed wetlands, urban and community forestry, or other low impact development tools. This initiative will also incorporate water quality monitoring data into a long-term system for measuring and verifying the actual water quality benefits of applied smart growth practices.

Another key component of the SWIM water protection strategy is the targeted conservation of streamside and lakeside properties. Mecklenburg

County has partnered with groups like the Trust for Public Land and the Catawba River Conservancy to establish GIS maps that identify stream segments and drinking water resources most in danger of degradation, based on hydrologic data and projected development and impervious surface patterns. According to Owen Furuseth, Chair of the Department of Geography and Earth Sciences at the University of North Carolina, Charlotte and the director of the land/water modeling project, "With this information in hand, local governments can steer development away from areas with the greater water quality risk, and conservation groups can focus on the most environmentally sensitive lands for conservation."

Using these tools, Mecklenburg County and local municipal governments have been able to permanently preserve thousands of acres of land along Mecklenburg's creek system, for a total of 2,700 acres in the Mountain Island Lake watershed (not including lands conserved in neighboring Lincoln and Easton Counties, also in the watershed), and put 53 percent of Mountain Island Lake's shoreline into public control. These smart growth for clean water approaches are becoming more important in the Mecklenburg County area. In November 2001, Mecklenburg, York, and Lancaster Counties signed a "Memorandum of Understanding" pledging their intent to work together to restore the Sugar Creek watershed, a drinking water source for York County, balancing the economic needs of this fast-growing area south of Charlotte with protection of the local water supply. This collaborative statement details several steps to preserve the quality of local waters, including the development of a 50-year watershed protection strategy; the acquisition and preservation of remaining undeveloped lands within the historic floodplain of Sugar Creek and its tributaries; restoration of upstream portions of creeks through the establishment of streamside buffers; and the development of joint funding, outreach, and regional stewardship programs to connect land use and clean water.

For more information, contact Rusty Rozelle, Mecklenberg County, Department of Environmental Protection at (704) 336-5500 or visit www.co.mecklenburg.nc.us.

"Trees are our signature"

The Charlotte Metropolitan Area is among the top ten fastest growing metropolitan areas in the country. Mecklenburg County has seen a 72 percent growth in population since 1980 (U.S. Census Bureau). American Forests conducted an analysis of 17 years of changing landcover in Mecklenburg County, North Carolina. With a boom in population, tree cover is threatened. In Charlotte, the study found that between 1984 and 2001 the county saw a 127 percent increase in impervious surfaces (streets, buildings, parking lots, etc.) and a 22 percent loss of tree cover and open space. The loss of these trees could cost approximately $1.87 billion in additional infrastructure to handle stormwater runoff. "This analysis points out that we need a regional tree canopy policy that deals with sprawl and works across political boundaries," said Charlotte Mayor Patrick McCrory on March 19, 2003. "The policy should set specific and measurable goals for canopy. Trees are our signature in the Charlotte region and we should be a role model for the nation."

For more information, see Urban Ecosystem Analysis Mecklenburg County, North Carolina, March 2003, American Forests at www.americanforests.org/resources/rea.

The Cherry Creek Smart Growth for Clean Water Partnership

The Cherry Creek has its headwaters 50 miles south of the City and County of Denver in El Paso County, Colorado. The Creek flows through four counties, including Douglas County, the fastest growing county in the United States. This watershed includes the Cherry Creek State Park, a highly valued natural and recreational resource mainly due to the presence of the Cherry Creek Reservoir. Because of its proximity to Denver, Cherry Creek State Park is the most heavily visited state park in Colorado. However, the Cherry Creek Reservoir is overloaded with nutrients, including phosphorus, caused in part by land disturbance and increased runoff from the rapid growth in the southern end of the watershed. In 2001, the State of Colorado enacted a "Cherry Creek Reservoir Control Regulation," requiring a Total Maximum Annual Load plan to reduce the runoff of phosphorus into the reservoir, thus creating a framework for local governments and citizens to formally address water quality.

The Cherry Creek Stewardship Partners, a broad coalition of municipal and county governments, developers, environmental and community organizations, and state and federal government officials, began in 2001 to craft a plan to promote smart growth approaches to meeting the phosphorus and other nutrient challenges in the Cherry Creek watershed. This "Cherry Creek Smart Growth for Clean Water Partnership" is promoting the establishment of a continuous natural greenway and innovative watershed enhancements to protect the water quality and the public enjoyment of Cherry Creek and its tributaries.

A key resource for the coalition was the "Cherry Creek Greenprint," a project led by the Trust for Public Land. The purpose of the Greenprint is to guide the creation of an interconnected open space system aimed at protecting key riparian, upland, and aquatic zones, as well as create a vision for the future of parks and open space in the context of continued growth and development. The Greenprint provides a comprehensive inventory of existing conditions, developed with GIS mapping, including data on vegetation and riparian areas, water resources, visual and scenic resources, existing, and future land use, and wildlife habitat. The Greenprint also includes an in-depth analysis of water quality, including historic, existing and future predictions of stormwater runoff and phosphorous conditions based on historic, existing and future land use. By doing so, the Cherry Creek Greenprint helped establish a quantifiable benefit of land conservation with respect to water quality improvements. Efforts are now underway to purchase land and conservation easements that serve multiple benefits, including parks, open space, habitat protection, and water quality improvements.

Another key element of the Cherry Creek Smart Growth for Clean Water partnership is to promote the use of innovative streamside, watershed,

and development enhancements along the Cherry Creek and its tributaries. These include the use of constructed wetlands instead of typical brick and mortar pollution removal facilities, low impact development techniques that exceed current best management practice standards, green infrastructure buffers, and other practices to mitigate the impacts of development and reduce stormwater runoff and phosphorus pollution. Results from this component of the Cherry Creek initiative include the design and implementation of low impact development projects at several new, mixed-use development projects in the Cherry Creek watershed, and a report identifying the economic and environmental benefits achieved at local development projects that utilized green infrastructure approaches. This has led to the funding of a "Cherry Creek Phosphorus Ombudsman," which will be a single person or team of local engineers and water quality experts that will both serve as a resource to local developers to help them understand the benefits of low impact development practices and as an advocate for the adoption of these practices to local governments and development review agencies.

The Cherry Creek coalition has also developed a comprehensive funding strategy that seeks to utilize a variety of federal, state, local, and nonprofit resources to fund the land conservation and green infrastructure goals of the initiative. The coalition has created a funding matrix that assesses and ranks the most promising funding sources based on criteria including the eligible uses of these resources, typical size of funding awards, the likelihood of obtaining these funds in the competitive solicitation process, and the level of matching and regulatory requirements tied to these funding sources.

A Few Key Findings of the Cherry Creek Stewardship Partners
There is a competitive advantage to Smart Growth practices: Smart Growth "pays its way."
There are environmental benefits to utilizing smart growth strategies.
Local and regional land use planning entities will require educational opportunities to feel comfortable applying smart growth practices applicable to the watershed.
There is a need to provide assistance to developers and land use agencies in the watershed.
Citizen participation is a key component in maximizing opportunities for watershed enhancements.

The Cherry Creek strategy calls for the establishment of an intergovernmental "Cherry Creek Regional Agreement" to legitimize the recommendations for innovative enhancements, land preservation, and green infrastructure. Through this agreement, county and municipal governments, regional entities, and state and non-profit partners will agree on the smart growth concepts for the Cherry Creek watershed and make commitments including: establishing incentives for land conservation and best development practices; conducting education and outreach campaigns on the water quality benefits of smart growth; establishing joint funding strategies; enacting agreements on inter-jurisdictional integration of land use and water quality programs; and providing commitments of financial

and staff resources. The Cherry Creek coalition has hired a facilitator to craft and gain consensus on the intergovernmental agreement, which the coalition expects to adopt in 2003.

The Cherry Creek Smart Growth for Clean Water Partnership has already led to substantial results. In addition to the successes listed above, the foundation has been established for a lasting, cross-jurisdictional partnership that will integrate land use and water protection strategies and potentially lead to the widespread public acceptance of low impact development and green infrastructure practices as standard practice in this fast-growing region.

For more information, contact Chris Rowe of the Cherry Creek Stewardship Partners, at (303) 291-7437, or visit www.cherry-creek.org.

Developers Implement Low Impact Development Techniques

The Friends of the Rappahannock, a grassroots conservation organization in Virginia, is informing developers of the benefits of low impact development practices in a high-growth area midway between Washington, D.C. and Richmond, Virginia in the Rappahannock River watershed. As a result of these efforts, three major developers in the Fredericksburg, Virginia area have implemented bioretention practices to filter runoff and allow it to infiltrate through the soil (instead of potentially polluting surface water bodies in the area).

For more information, visit http://www.forestry.state.ar.us/community/community.html.

Fayetteville, Arkansas—Urban and Community Forestry Avoids Gray Infrastructure Costs

A number of communities across the nation are partnering with groups like American Forests to identify how the "green infrastructure" of trees can help reduce stormwater runoff and nonpoint source pollution, protect the quality of surface and groundwater, save localities millions of dollars in gray infrastructure costs, and meet the regulatory mandates of stormwater and TMDL rules. One such community is the fast-growing City of Fayetteville, Arkansas, where American Forests recently released a study demonstrating the environmental and economic benefits of maintaining – and increasing – local tree cover. *See www.americanforests.org.*

As explained by American Forests, more trees means less stormwater runoff. Trees slow stormwater flow, reducing the volume of water in urban areas and decreasing the amount of runoff that containment facilities must store. Trees intercept rainwater on leaves, branches, and trunks, reducing the volume of runoff and slowing its movement into channelized drainage areas. Without tree roots, water-saturated ground becomes unstable, causing devastating floods and landslides. Even in light rain, trees increase soil permeability, enabling rain to be soaked properly into the soil.

In Fayetteville, rapid growth and development has led to an 18 percent decline of heavy tree canopy in the last 15 years. American Forests recently conducted an "Urban Ecosystems Analysis" using satellite and aerial imagery, Geographic Information System technology, scientific research, and the organization's CITYgreen® computer software to calculate the benefits trees provide to Fayetteville's urban environment. The findings show that the City of Fayetteville's existing tree cover currently reduces stormwater runoff by 50 million cubic feet during a storm event. The study also noted that, if the tree canopy in Fayetteville were increased from 27 to 40 percent, the environmental benefits would be significant and the cost-saving benefits of stormwater reduction alone would be $135 million.

Tree planting is a smart growth strategy that can be undertaken by local communities in nearly every situation, whether it be through the creation of a park or waterfront recreational area or the use of tree cover in development projects to reduce environmental impact and infrastructure costs. Moreover, tree cover provides other community benefits, including cleaner air, energy savings, and improvements to local quality of life. For the stormwater reduction and water quality benefits alone, trees are a smart growth tool worth planting in every locality.

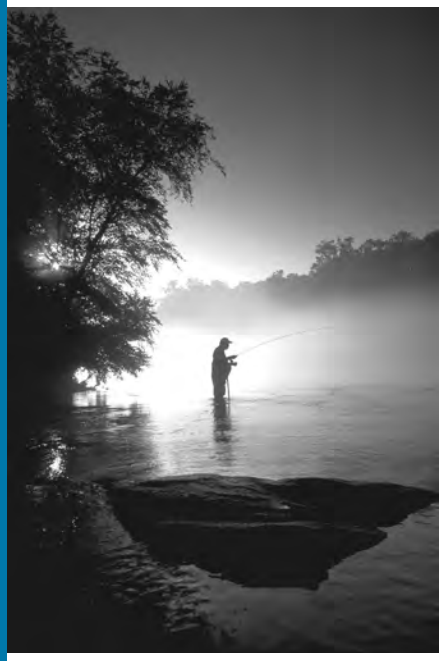
For more information, contact Patti Erwin,
Arkansas Forestry Commission, Phone: (479) 442-8627,
http://www.forestry.state.ar.us/community/community.html.

State of Iowa—Smart SRFs for Iowa Clean Water

While pursuing brownfields revitalization and sustainable economic development, the State of Iowa has struggled to maintain the water quality of its many rivers and streams. In 2002, Iowa passed a new law that will help its communities pursue these clean water and smart growth goals simultaneously. This law establishes a "Smart SRF for Iowa Clean Water" program that will allow the use of Clean Water State Revolving Funds not only for sewer infrastructure, but also for innovative smart growth practices such as waterfront brownfields cleanup, low impact development practices, riparian land conservation, watershed management programs, and other best management practices.

The federal Clean Water State Revolving Fund or "SRF" program provides approximately $1.35 billion annually to states, primarily to support wastewater treatment infrastructure construction projects through low-interest, long-term loans. In recent years, U.S. EPA has encouraged states and localities to use SRF resources to support a wider variety of smart growth approaches to improve water quality. However, few states have taken advantage of this approach.

The Iowa Finance Authority and the Iowa Department of Natural Resources launched an effort in 2001 to change the State's nonpoint source protection plan and its SRF statute to allow localities the option of using SRF funding for smart growth projects that protect and improve water quality. In late 2002, a broad coalition of state, local, environmental, agricultural, municipal infrastructure, and federal representatives held a "Smart SRFs Summit" to implement the new Iowa SRF law and seek consensus on the best uses of Iowa's nearly $300 million fund.



Consensus was reached. The parties participating in the Summit agreed that a variety of approaches should be undertaken with SRF resources to achieve water quality goals, and that waterfront brownfields revitalization, land conservation, and streamside best practices are critical to achieving clean water. These Iowa participants also agreed to explore an innovative "SRF sponsorship" approach under which nonpoint source, smart growth projects could be sponsored and fully supported through loan packages for traditional municipal infrastructure projects. Modeled after a very successful program in the State of Ohio, this SRF sponsorship approach would allow the smart growth projects to be conducted without any requirement for SRF loan repayment, because the costs of repayment are folded into a favorable repayment arrangement for the traditional, point source project.

Already, local Iowa communities are considering how to put Smart SRFs to use on smart growth for clean water projects. For example, the City of Des Moines is exploring a project that will clean up and turn a 1,100 acre

brownfield along the Des Moines River into an "Agrimergent Technology Park." The Agrimergent Technology Park project seeks to include the innovative use of constructed wetlands and urban forestry for the control of urban runoff and the enhancement of the industrial park's environmental quality.

For more information, contact Michael Tramontina, Executive Director, Iowa Finance Authority at (800) 432-7230 or visit www.ifahome.com.

Innovative Uses of State Revolving Funds

Below are a few illustrative examples of innovative uses of Clean Water State Revolving Fund programs:

The New Jersey State Revolving Fund provides low interest loans for land acquisition projects for water quality protection. To qualify, the land parcels must demonstrate water quality benefits. One-half of the loan has a 0% interest rate from the New Jersey Department of Environmental Protection (NJDEP), and the other half has a market rate from the New Jersey Infrastructure Trust, resulting in a half market rate Clean Water SRF loan. These Clean Water SRF loans are coordinated with the NJDEP Green Acres Program, which provides funds to help preserve land and develop parks.

For more information, visit www.njeit.org/index2.html.

The Ohio Environmental Protection Agency funds both point and nonpoint source projects through the Water Resource Restoration Sponsor Program (WRRSP), which is financed through the Water Pollution Control Loan Fund (Ohio's Clean Water State Revolving Fund program). When a community applies for a Clean Water SRF loan for a point source control project, the community can request assistance for a nonpoint source project through the WRRSP program. The Ohio EPA will reduce the interest rate on the total amount of the loan. For example, under the WRRSP, the City of Massillon, Ohio received a low-interest loan of over $6.7 million, a portion of which is dedicated to water resource restoration projects, including the purchase and preservation of high quality wetland bogs, riparian and forested habitat, restoration of agricultural lands and 30 miles of river, and the development of a free-flowing stream to bypass a dam to help fulfill state Total Maximum Daily Load requirements.

For more information, visit ftp://www.epa.state.oh.us/pub/defa/WRRSP_Fact_sheet.pdf.

Funding from California's Clean Water State Revolving Fund helped the Nature Conservancy of California purchase a 12,362 acre or 19.3 square mile portion of the Howard Ranch in southeast Sacramento County, the largest land conservation acquisition in the history of the Sacramento region. The Conservancy's Howard Ranch land conservation project is the largest land acquisition ever funded in the United States under the federal Clean Water Act's State Revolving Fund. The California State Water Resources Control Board (SWRCB) and U. S. Environmental Protection Agency collaborated on providing an $8 million low-interest loan to the Conservancy to complete the $13.6 million fundraising target. The significance of this arrangement was highlighted by Walt Pettit, Executive Director of the SWRCB, "While state revolving funds have been used in the past to acquire property on which to construct stormwater treatment facilities, this is the first time an SRF loan has been issued specifically to purchase property in order to preserve wetlands, which include vernal pools, and riparian habitat."

For more information, visit www.tnccalifornia.org/news/pr_04.asp.

Merrimack River Watershed, Massachusetts—GIS Mapping Links Open Space and Water Resource Protection

In the Merrimack River Watershed, a fast-growing area north of Boston, four localities are using Geographic Information System maps to help them identify and preserve open space lands where streams and productive aquifers are threatened by sprawling growth. The towns of Westford, Littleton, Chelmsford, and Boxborough, which share common aquifers for their drinking water, are working with the Massachusetts Executive Office of Environmental Affairs, the Trust for Public Land, and ERG to use GIS tools to preserve those lands critical to the future of their precious water resources. This approach promises to shape the direction of growth in order to preserve both drinking water and local quality of life.

These GIS maps will help enhance local resource planning efforts, including comprehensive "Community Development Plans." These plans, part of a Commonwealth-wide effort known as the Community Preservation Initiative, help local officials balance economic progress with preserving the quality of life in their communities. The plans incorporate environmental planning issues, such as habitat and watershed protection, with economic development, housing, and transportation issues as they relate to the challenges of growth management. Massachusetts is providing $30,000 in services in partnership with local consultants to any interested locality to create Community Development Plan, and is encouraging all 351 municipalities in the Commonwealth to participate. So far, about 250 communities have signed up to prepare plans.

The GIS mapping project focuses on the four municipalities in the 51-square mile Stony Brook subwatershed of the Merrimack River, located along Route 495 about 25 miles northwest of Boston. This is one of the most rapidly growing areas of the Commonwealth. These communities range in size from 8,000 to 33,000 people, and all four share a rural, small-town character that is being threatened by rapid growth along major highway corridors. Top issues of concern for these towns include drinking water quality and quantity, rapid development (residential and commercial), increasing levels of impervious cover, and the protection of remaining open space lands.

ERG and the Massachusetts Executive Office of Environmental Affairs developed detailed GIS maps for each of the towns that highlighted unprotected open space lands abutting surface waters, and overlayed high- and medium-yield aquifers, which are important current or potential drinking water sources. These GIS maps identify those lands that might best serve as buffer zones to protect water resources. The maps can be integrated with impervious surface and stormwater runoff data in these localities to help determine the ecological carrying capacity of these communities and this subwatershed area. This information can be used to

identify the ability of the water resources to support various build-out scenarios, land preservation strategies, allowable land uses and densities, and other important smart growth approaches.

Using these tools, the Trust for Public Land is now helping the municipalities identify specific properties for conservation and create lasting open space buffer areas adjacent to key water resources. Funding for such land preservation can be pursued through the Massachusetts Community Preservation Act, which authorizes communities to approve a referendum allowing them to levy a community-wide property tax surcharge of up to 3 percent for the purpose of creating a local Community Preservation Fund. Those communities that create a Community Preservation Fund can get those resources matched dollar-for-dollar from the Commonwealth. Funds can be used to acquire and protect open space, preserve historic buildings and landscapes, and create and maintain affordable housing.

For more information, contact Robert O'Connor, Massachusetts Executive Office of Environmental Affairs, at (617) 626-1170.

The Massachusetts Community Preservation Initiative

Massachusetts is known around the world for its pedestrian-friendly cities, attractive historic downtowns, and quaint New England villages. These vital community centers are characterized by dense settlement, narrow streets, public parks, and mixed uses that allow citizens to live within easy strolling distance of shops, restaurants, commercial services, and places of work. These communities have typically blended well with a healthy, natural environment and have provided a high quality of life.

However, recent growth trends in Massachusetts have ignored this village center concept and spread development diffusely across Massachusetts' landscape. From 1950 to 1990, the Commonwealth's population grew by 28 percent while the amount of developed land grew by 188 percent. Recognizing the importance of protecting the unique character of Massachusetts as the Commonwealth continues to evolve, the Executive Office of Environmental Affairs (EOEA) launched the Community Preservation Initiative in January 1999. Community Preservation is dedicated to providing tools and programs to help local leaders and residents make informed decisions about growth and development.

Community Preservation is an organizing principle focused on preserving and enhancing the quality of life in Massachusetts, community by community, watershed by watershed. The Initiative provides tools, technical assistance, and outreach to local decision-makers to help them make informed decisions about future growth. Community Preservation focuses on land and watershed protection, affordable housing, historic preservation, economic development, and transportation. Community Preservation seeks to balance these interests while encouraging communities to preserve their unique characteristics and quality of life as they continue to develop.

Community Preservation is also about forming partnerships on the local and state level and involving them in the planning process. Comprehensive planning involves a variety of issues and a diversity of interests and people. At the state level, Environmental Affairs partnered with the Department of Housing and Community Development, the Department of Economic Development, and the Executive Office of Transportation and Construction to spread the Community Preservation approach. This innovative, interagency partnership is crucial since environmental, housing, transportation, and economic development are inextricably linked, and balanced thinking in local decision-making is essential. Community Preservation promotes bringing individual areas of interest into the same forum for decision-making. A crucial partnership has been with the Massachusetts Watershed Initiative. The active involvement of EOEA's Watershed Team Leaders was an important part

of buildout project since Team Leaders are invested in the communities within their watershed.

Through the Community Preservation Initiative, the Executive Office of Environmental Affairs is providing communities with a set of integrated tools and programs to help plan for their future: buildout maps and analyses; professional planning assistance through programs such as UrbanRiver Visions and software tools such as the Fiscal Impact Tool and Alternative Futures Tool; planning assistance to complete and implement Community Development Plans; information about the Community Preservation Act; and coursework in planning and growth through the Community Preservation Institute, including its newest program for high school students called Community Preservation: YouthVisions. Information on all of these programs and tools can be found on the Community Preservation website at *http://commpres.env.state.ma.us*.

On the local level, Community Preservation is about maintaining the quality of life in Massachusetts' municipalities by empowering cities and towns to preserve what is important to their individual character. And because no community exists in isolation, the Community Preservation approach encourages cities and towns to look beyond their municipal borders—to an intercommunity level—to plan for growth while preserving a region's most important assets.

The Community Preservation Initiative works to provide constituents with an understanding of the Community Preservation Act (CPA). The Community Preservation website provides outreach materials and staff is available to make PowerPoint presentation to interested communities to help them better understand the mechanics of the Act. The Community Preservation Act is enabling legislation designed to help communities plan ahead for sustainable growth and raise funds to achieve their goals. CPA allows towns and cities to approve a referendum to levy a community-wide property tax surcharge of up to 3 percent for the purpose of creating a local Community Preservation Fund and qualify for state matching funds. (For example, a CPA surcharge of 1 percent on a real property tax bill of $1,000 would be $10, or 1 percent of $1,000, per year. The surcharge can be in any increment up to 3 percent.) The Fund must be used to acquire, create, and preserve open space, acquire and preserve historic resources, create, support, and preserve affordable housing, and acquire, create, and preserve land for recreational use. The state will provide matching funds to communities approving a local CPA surcharge.

To date, 59 communities have adopted the Community Preservation Act. In its inaugural year (FY 02), receipts from the local surcharge generated a total of nearly $18 million in local funding for affordable housing, open space, and historic preservation initiatives. The state awarded another $18 million in grants to match the funds raised locally. Even though it generally takes close to a year before communities are in a position to appropriate CPA monies (*e.g.*, place the surcharge on the tax bill, collect

revenue, and develop and approve a spending plan), an impressive array of local initiatives has been funded with CPA dollars. Projects underway include nearly 1,000 acres of open space acquisitions, over $4 million for historic preservation projects, and approximately 100 units of new affordable housing, either completed or in the pipeline. The CPA appropriations have been further leveraged with more than $1.2 million in private funding and more than $6 million in other state matching grants.

For more information, visit http://commpres.env.state.ma.us/index.asp.

New Bedford, Massachusetts—Waterfront Brownfields and Economic Revitalization

New Bedford is a coastal port city with a rich history of whaling, fishing, and manufacturing. To address the major decline in these industries over the past decades and the brownfields left behind, New Bedford is revitalizing its waterfront and port areas into new tourism, recreational, multi-modal transportation, and marine industrial facilities. Moreover, the community is undertaking major ecological restoration projects to address the unfortunate legacy of pollution associated with the City's 30 brownfield sites. As a U.S. EPA Brownfields Showcase Community, and a partner with a variety of federal, state, and non-profit agencies, New Bedford is sailing toward success.

Several projects are underway in New Bedford's waterfront area to address past contamination. In November, 2002, U.S. EPA provided New Bedford $6.5 million in Superfund money for the cleanup of a section of New Bedford Harbor. The New Bedford Harbor Trustee Council, charged with conducting efforts to restore natural resources in the Harbor harmed by PCB contamination, has approved funding for nearly $10 million for 17 water resource restoration projects, including more than $1.75 million in the acquisition and preservation of nearly 275 acres of waterfront properties; the creation and restoration of salt marshes and reefs; and other habitat restoration and environmental education projects. A 25 acre intermodal transportation center, currently in the beginning stages of construction, is an excellent example of the potential such brownfield sites present.

Coupled with these waterfront restoration projects are smart growth, sustainable development projects. A New Bedford National Historic Whaling Museum has been established in the center of the New Bedford National Historic Park and plans are underway for a world-class New Bedford Oceanarium. The National Oceanographic and Atmospheric Administration (NOAA) has committed $2 million for the revitalization of a brownfield site into a waterfront park and recreational area, and NOAA and U.S. EPA recently signed a Memorandum of Understanding in New Bedford pledging to collaborate on the renewal of blighted coastal brownfields in communities like New Bedford throughout the nation. Together, these integrated economic development and shoreline restoration initiatives will create great opportunity for New Bedford for coming generations.

For more information, contact Mike McCormack, Chief of Staff, Mayor Kalisz, New Bedford, (508) 979-1410, mmccormack@ci.new-bedford.ma.us.

San Diego Creek Watershed Natural Treatment System

The Irvine Ranch Water District (IRWD) was established in 1961 to provide potable water, sewage collection and treatment, and water reclamation for a 133 square mile area in Orange County, California. The IRWD's boundaries coincide with the San Diego Creek Watershed. The San Diego Creek, located in an urbanized watershed and the primary tributary to Newport Bay, is listed as an impaired waterbody due to excess nutrients, sediments, pathogens, and toxics. As a result of this listing, the IRWD made a commitment to improve the water quality of the San Diego Creek.

The most significant sources of contaminants in the San Diego Creek are stormwater and urban runoff. In order to deal with these sources, IRWD developed a unique program to reconstruct the San Joaquin Marsh, an historic wetland on IRWD property. Since 1997, the IRWD has successfully treated San Diego Creek water runoff through a system of ponds. These ponds naturally remove sediment, phosphorus, and nitrates from the water. The stormwater spends seven to ten days moving through the pond system before reentering San Diego Creek and ultimately Newport Bay and the Pacific Ocean.

Based on this success, the IRWD plans to implement a project entitled the Natural Treatment System (NTS) within the San Diego Creek Watershed. The NTS is a water quality improvement system that is both cost effective and environmentally sound. This system will involve the creation of small, manmade wetlands placed in strategic locations throughout the watershed. Extensive scientific review and environmental assessment of the watershed will determine the most environmentally suitable locations for these smaller wetlands and the number of sites needed to achieve maximum cleanup potential. Planners initially studied 68 possible locations throughout the San Diego Creek Watershed and have now reduced that list to the 31 best sites in terms of treatment effectiveness, availability, cost, and constructability. Many of these sites include public facilities such as county retention basins where water quality wetlands can be constructed without interfering with their primary purpose as flood control mechanisms.

Modeling has shown the potential to improve water quality in San Diego Creek and Newport Bay. In fact, the Natural Treatment System is expected to remove 126,000 pounds of nitrogen annually, 21,000 pounds of phosphorus annually, and reduce fecal coliform levels by 26 percent. The NTS also serves multiple functions as a natural resource, riparian habitat, and open space. Moreover, the NTS is expected to cost significantly less than what would otherwise be required to build new or upgrade existing wastewater and stormwater infrastructure systems. Perhaps most importantly, the NTS will provide a regional, watershed-wide approach to solving a water quality problem.

For additional information, contact John Hills, Director of Water Quality, Irvine Ranch Water District at (949)453-5850 or hills@irwd.com.

Land Protection Criteria Guide Conservation in Suffolk County, New York—Pioneering Programs Help Protect Land and Water Resources

Located at the eastern end of Long Island, an area rich in ecological importance and scenic beauty, Suffolk County and its towns have pioneered local land conservation efforts for more than 25 years. During this time, the county has spent roughly $283 million protecting about 24,000 acres of land and has established the nation's first purchase of development rights program to preserve farmland. Suffolk County voters have also embraced every conservation spending measure placed before them by county and state government, including a $1.9 billion environmental bond act that was rejected statewide in the recession of 1990. Now the county is in the midst of the biggest conservation push in Long Island history: in the past few years, voters have approved millions of dollars for conservation measures and legislative authorizations.

The county has distinct programs to preserve agricultural lands, watershed lands, open space, and greenways. The system of prioritizing lands depends on the program; some programs have established very specific targeted acquisition areas and criteria while others define the parameters more broadly.

In addition to county programs for farmland and open space protection and greenways and recreational lands, concern about the protection of groundwater led to the creation of the Suffolk County Drinking Water Protection Program in the 1980s. Funded with a one-quarter cent of the sales tax, the program acquires watershed lands, primarily in the core area of the Central Pine Barrens as defined by the Long Island Pine Barrens Protection Act. This Act is a national model for groundwater protection that created a 100,000 acre preserve above the deep aquifer drinking water recharge area, effectively eliminating development in the 50,000 acre core area and setting aside the other half, the Compatible Growth Area, for limited use. Various land use and zoning tools are used to accomplish the preservation goals of the Act, including transfer of development rights, cluster zoning, and conservation easements. In addition, New York's Clean Water State Revolving Fund has made a loan of $75 million to Suffolk County to acquire land in priority aquifer recharge areas in the Pine Barrens.

To acquire land under the drinking water protection program, parcels are first recommended by the County Planning Department, the state/local Central Pine Barrens Joint Planning Program, or other county or municipal stakeholders. These recommendations are then approved by the County Parks Trustees and subsequently authorized for acquisition by the legislature. Any one of the following criteria are used to determine

eligibility: location in deep flow recharge areas; proximity to ground water divide; local source supply ground water aquifer; proximity to existing wellsite; or within zone of influence of any proposed or existing wellsites.

Excerpt from The Trust for Public Land's "Local Greenprinting for Growth" Volume IV, 2003. For more information, contact Stephen M. Jones, Chief Executive Officer, Suffolk County Water Authority, Phone: (631) 589-5200.

Drinking Water Protection Tools

Some source water protection programs make direct connections among sprawl, smart growth, brownfields redevelopment, and watershed management. The following examples describe some of the best practices and lessons learned.

Projects that buffer drinking water sources are one of four priority areas that receive grants under Connecticut's Open Space and Watershed Land Acquisition Grant Program. Municipalities, nonprofit land conservation organizations, and water companies can apply for grants that can be used towards the purchase of open space that protects water resources. For example, the Town of Westbrook, Connecticut acquired 24 acres as permanent open space because the property was identified as a priority for aquifer protection and for linkage to adjacent town-owned property and a proposed open space network.

For more information, visit http://dep.state.ct.us/rec/opensp31.htm.

The Los Angeles Department of Water and Power (LADWP) owns 314,000 acres of land in the Eastern Sierra Watershed in Inyo County, CA, a key source of drinking water for the City of Los Angeles. The LADWP leases a significant portion of these lands to ranches and commercial businesses, which must adhere to lease policies, guidelines, and plans that protect the watershed and water quality. LADWP staff conduct routine inspections to ensure that the policies are implemented. For ranches, the guidelines include using irrigation practices that minimize runoff, return flows, and erosion. Commercial business leases must conform to the Inyo County General Plan, which includes a land use policy to manage ground water basins to ensure water quality and quantity.

For more information, visit www.ladwp.com.

Instead of spending $8 billion on water treatment system improvements and expansions to meet increased demands, New York City's Department of Environmental Protection (DEP), which is also the city's water utility, acquired land and conservation easements in upstate watersheds for $1.5 billion to protect the quality of the City's drinking water supplies. DEP paid fair market value for the land and also pays property taxes. No land is taken by eminent domain, and municipalities can exclude certain parcels from acquisition. DEP consults with communities about lands in which it is interested and provides up to $20,000 to each municipality to support local review processes.

For more information, visit www.nyc.gov/html/dep/html/watersup.html.

United States Army Corps of Engineers Emerges as Community Partner on Waterfront Preservation and Revitalization

The Army Corps of Engineers (Corps) is a federal agency with a mission to protect and utilize the nation's water resources for the benefit of localities, the economy, and the environment. While historically some Corps projects have been criticized as being harmful to the environment, more and more Corps programs and projects are focusing on a mission of environmental stewardship that meets the needs and desires of local communities for restoration and preservation of water resources.

For example, in 2002, Corps Commander Robert Flowers issued a set of "Environmental Operating Principles" to guide the efforts of the Corps to protect and preserve valued environmental resources (*see www.hq.usace.army.mil/cepa/envprinciples.htm).* Likewise, many Corps' programs have focused in recent years on projects to restore waterfront ecosystems of rivers, lakes, and coasts while addressing growth and economic development goals of local communities. Most Corps projects are specifically authorized and funded. However, Water Resources Development Acts have provided programmatic authorities for planning, design, and construction, including: Section 1135, Project Modifications for Improvement of the Environment; Section 206, Aquatic Ecosystem Restoration; Section 204, Beneficial Use of Dredged Material (for Ecosystem Restoration); and Section 312, Environmental Dredging (contaminated sediments). Additional programmatic authorities empower broad planning assistance, including the Section 729 Watershed and River Basin Assessments program, and the Section 22 Planning Assistance to States program, among others. Many communities support the concept of optimizing and expanding these limited Corps authorities so that they can better meet the urban waterfront and watershed revitalization goals of local governments.

Some promising efforts are already underway. In Stamford, Connecticut, the community seeks to revitalize the Mill River waterfront in downtown Stamford into a mixed-use development and 26 acre urban park. The project will involve the establishment of a new urban park, biking and walking trails, open space, and "green infrastructure" along the Mill River, including constructed wetlands and low impact development practices. The Corps is using its Aquatic Ecosystem Restoration program to study the feasibility of restoring the degraded ecosystem and water quality of the Mill River and to address the problems of urban stormwater runoff and harmful channel modifications conducted in the past. The Trust for Public Land is also partnering with Stamford to acquire and preserve open space along the Mill River and the Long Island Sound.

The Corps of Engineers has partnered with the City of Des Moines, Iowa to build a new riverwalk, develop constructed wetlands, and address flood control needs along the Des Moines and Raccoon Rivers in downtown Des Moines. This project includes activities on the Riverpoint West and Agrimergent Technology Park areas, where brownfields will be converted to mixed-use and eco-industrial development projects on these urban rivers, with designs that incorporate open space, recreational space, and low impact development techniques.

Likewise, the Corps of Engineers has partnered with Indianapolis, Indiana on the "Central Indianapolis Waterfront Project." The goal of the project was to reverse the environmental and economic decline of the White River and reclaim this valuable asset for the citizens of Indianapolis and Indiana. After the great flood of 1913, levees and flood walls were built to protect the city from ravaging floods. However, these flood control structures became barriers, cutting the city off from its river. The new design has created public spaces and continuous walkways along the water's edge, while providing equal flood protection. The project was recently selected for a Chief of Engineers Award of Excellence *(see: www.hq.usace.army.mil/cepa/pubs/apr02/story12.htm).*

These community-based, well-engineered approaches demonstrate how the Corps of Engineers can help promote smart growth for clean water projects that meet local community needs.

For more information, contact Larry Prather, Chief of Legislative Management Branch, US Army Corps of Engineers, (202) 761-4580, larry.j.prather@hq02.usace.army.mil.

Barriers and Solutions to Smart Growth for Clean Water

As states and communities plan and implement their smart growth for clean water programs, many are finding that existing policies, regulations, and organizational structures can be impediments to smart growth and water resource protection. Some of the most common barriers to implementing smart growth for clean water programs are discussed below, along with possible solutions. While these solutions are seldom "quick fixes," many communities have found that the results are often worth the effort to protect threatened water resources and community quality of life.

Common challenges include:
Coordination Between Land Use Planning and Water Quality Programs
Integration of Water Quality Goals in Local Zoning Ordinances
Connecting Infrastructure Decisions to Land Use Planning
Measuring the Water Quality Results of Smart Growth Approaches
Providing Adequate Resources to Implement Smart Growth for Clean Water Tools
Developing New Technologies and Innovations
Increasing Public Awareness and Support
Providing Flexible Regulatory Requirements

Coordination Between Land Use Planning and Water Quality Programs

BARRIER

At local, state, and federal levels of government, there is a lack of coordination and communication between land use and water quality officials and programs.

SOLUTIONS

- ✓ Consolidate state land use and watershed planning, as the Massachusetts Executive Office of Environmental Affairs has done. In addition, conduct joint training programs with land management and water quality officials.

- ✓ Establish a state smart growth office, such as the Maryland Governor's Office of Smart Growth (OSG). Established with a mission to implement the state's comprehensive smart growth program, OSG coordinates state agency activities and ensures consistency among the various smart growth programs.

- ✓ Promote land use approaches in state and local water quality programs. For example, EPA and states should reward local governments that incorporate smart growth in TMDL and stormwater plans with regulatory credit and incentives. In addition, federally approved water quality management plans and programs should more explicitly recognize current and future sources of pollution resulting from the water quality impacts associated with development.

- ✓ Encourage comprehensive plans on the regional and/or municipal level to integrate water quality, drinking water supply, and watershed concerns with development/land use plans and community economic and quality of life goals.

- ✓ Develop new types of partnerships that link land use planning and water resource protection. Promoting new partnerships between land and water agencies, land trusts and watershed groups, brownfields and economic development organizations, regional planning agencies and park commissions, and others may help bring about new programs that effectively achieve a variety of common goals and address the land use/water quality connection. Public/private partnerships are important for leveraging additional sources of funding.

Maryland's Smart Growth Program

The State of Maryland has taken the lead in establishing and implementing a comprehensive smart growth program, which can result in significant water protection benefits. Maryland's Smart Growth initiative, established in 1997, has three simple goals:

1. Supporting and revitalizing existing communities by targeting state resources to those that are already developed.
2. Preserving critical farmland and natural resources.
3. Saving taxpayers millions of dollars in the unnecessary cost of building the infrastructure required to support sprawl.

For more information, visit www.smartgrowth.state.md.us.

Clean Ohio Program

The Clean Ohio Program, based on a constitutional amendment approved by voters, uses half of its $400 million state bond fund for brownfields site cleanups and redevelopment and half for open space preservation. This program was the first in the country to link funds for brownfields redevelopment and open space preservation.

Contact Wilma Yoder, Clean Ohio Program, (614) 233-4175.

Tree Ordinances

Tree ordinances are one of the more effective tools for conserving and improving the urban forest. Tree ordinances range in complexity from simple tree replacement standards to more comprehensive ordinances addressing natural resource issues. It is very important that the tree ordinance meet the needs of the community. One of the best reference materials on writing tree ordinances is the publication "Tree Conservation Ordinances" written by Chris Duerksen and distributed by the American Planning Association.

For more information, visit www.planning.org.

Integration of Water Quality Goals in Local Zoning Ordinances

BARRIER

Local zoning codes often do not adequately account for development impacts on water quality, nor provide incentives for (or even allow) low impact development techniques and other smart growth practices.

SOLUTIONS

✓ Revise local ordinances. For example:

- Allow conservation subdivision zoning or cluster development. Under this approach, a certain percentage of land in a development project remains as open space and natural habitat by clustering development in concentrated areas. Also, consider revised design standards that allow and promote site planning that reduces impervious surface area (for example, narrower streets), stormwater runoff, and pollutant loads.

- Encourage compact, infill development on brownfields and other locations where development has already taken place. This type of development reduces development on pristine greenfields. Incorporate water quality evaluations and mitigation measures as needed in such projects to ensure water resource protection.

- Prohibit leapfrog development that disrupts and fragments habitat. Large tracts of continuous development allow the preservation of more natural habitats (U.S. EPA, 2001 (a)).

- Limit the amount and type of development allowed on prime agricultural land.

- Establish overlay zoning (*e.g.*, aquifer or stream protection districts) to protect specific water resources.

- Designate growth areas. For example, restrict certain land uses in areas that could negatively impact water resources, and encourage development in other, less sensitive areas.

✓ State/local legislation can be changed to allow more authority and flexibility in zoning, including incentives for smart growth (*e.g.*, tax reductions for low impact development and other best management practices), and disincentives for sprawling growth (*e.g.*, impact fees for development outside designated growth areas). For example, the Town of Skaneateles, New York revised its

zoning laws to incorporate review of building permits, subdivision activities, and other zoning actions by the Syracuse Water Department to help ensure compliance with the Department's Watershed Rules and Regulations. This action was initiated by town residents concerned with maintaining the high water quality of Skaneateles Lake, which is the primary drinking water supply for municipalities in the Syracuse, NY area. (*See New York Lake Watershed District Ordinance, Code of the Town of Skaneateles, Chapter 148, Article V.*)

Connecting Infrastructure Decisions to Land Use Planning

BARRIER

Infrastructure planning and approvals by state and local officials frequently are not connected with the land use planning process, often putting smart growth plans and infrastructure construction in conflict. In addition, state infrastructure officials are unable to direct decisions in a smart growth fashion if localities have not established clear growth plans and preferences. Moreover, local development plans and decisions often are not based on the availability or adequacy of nearby water and sewer infrastructure.

SOLUTIONS

- ✓ Require local comprehensive land use plans that consider the availability of existing and planned infrastructure, as well as the protection of water quality and quantity. Use adequate public facility ordinances to require that infrastructure (as well as other public services) be available or planned prior to development. In some communities, urban service boundaries have been established, beyond which new sewer and water infrastructure are not favored or allowed. Once local growth plans are established, tie state infrastructure funding and decisions to designated growth areas and away from designated open space protection areas. This approach was championed by the State of Maryland, where state infrastructure funding is not available for development that takes place outside of designated growth zones, which are based on locally established development areas and existing infrastructure.

- ✓ Encourage infrastructure funding decisions that are integrated with state and local smart growth initiatives, and adopt funding preferences that favor smart growth strategies that protect water resources. For example, require consideration of the impacts of development as part of state and local environmental and infrastructure review processes; provide "points" for smart growth strategies in deciding which projects to fund; offer financial incentives for projects that address growth impacts; and limit the amount of assistance that goes towards new development versus the maintenance of existing infrastructure. When funding a water collection system project, Massachusetts has chosen to allow 25 percent of the monies to be used for new development; 75 percent must be used for flows that existed as of April 1995.

- ✓ Localities should have the option to use adequate public facilities ordinances and other tools under state and local law to refuse extensions of sewer and water infrastructure to development that is proposed outside of urban growth and service boundaries.

The Drinking Water State Revolving Fund

The Environmental Protection Agency's Interim Final Rule on drinking water state revolving funds (40 CFR Parts 9 and 35) states that projects that serve extensive future population growth are ineligible for assistance from the DWSRF Fund. Projects must be sized only to accommodate a reasonable amount of population growth expected to occur over the useful life of the facility (35.3520(e)(5)).

For more information, visit
www.epa.gov/safewater/dwsrf/docs/guidetoc.html.

Measuring the Water Quality Results of Smart Growth Approaches

BARRIER

It is often difficult to measure the benefits of smart growth practices on water quality, compared to traditional infrastructure and pollution controls.

SOLUTIONS

- ✓ EPA should develop new models, or modify existing models, to estimate the water quality benefits of land conservation, brownfields cleanup, low impact development, urban and community forestry, and other watershed best management practices. EPA's Development, Community, and Environment Division is leading the way with the development of a model to measure the water quality impacts associated with different development scenarios.

- ✓ American Forests has developed a new computer software tool, CITYgreen, that measures the effect of urban tree cover and impervious surface on stormwater. This tool can help communities meet their stormwater and other water quality goals.

- ✓ Continue the research and development of a GIS based urban forest hydrology model. The model is being developed and field tested by the North Eastern Research Station, USDA Forest Service in cooperation with the State University of New York Environmental Sciences and Forestry (ESF) program. While most urban hydrology models are oriented towards hardscape and drainage infrastructure, traditional forest hydrology models do not take the built environment into consideration. New GIS forestry models will help overcome these challenges.

- ✓ EPA should act as a clearinghouse for information on measuring water quality benefits associated with smart growth practices. A number of local and state governments have measured some benefits, but the information is scattered and difficult to access. The clearinghouse should include information on impervious surface models and methodologies for prioritizing natural areas.

Measuring Benefits

Measuring the benefits of smart growth is not easy. It may take years to see the water quality benefits of these smart growth tools.
During these early years, success may need to be defined in terms of better land use. Consider the following alternatives:

- ✓ Measure for water quality changes in the tributaries rather than the main stem of a stream, since tributaries show water quality changes first.

- ✓ Use pollutant ratios rather than concentrations of pollutants.

Environmental models can sometimes be used as partial, less expensive substitutes for water quality monitoring (Stigall, 2002).

Providing Adequate Resources to Implement Smart Growth for Clean Water Tools

BARRIER

Preserving land, revitalizing brownfields, and pursuing low impact development cost money and often require innovative solutions, but most funding programs and resources are geared toward conventional development and infrastructure practices. Smart growth for clean water tools are efficient and cost effective, as these tools often provide multi-purpose objectives (for example, rain gardens control stormwater and may re-introduce natural habitat). Moreover, smart growth approaches are often less costly than conventional infrastructure and development practices. More resources are needed for these innovative approaches.

SOLUTIONS

- ✓ States and localities should conduct cost of service studies and fiscal impact analyses to determine how growth will affect the fiscal health and viability of the community. Such studies have consistently shown the economic value of conservation, brownfields revitalization, and smart growth approaches.

- ✓ Where sprawling development projects do not cover the costs and impacts associated with this new growth, localities should consider the use of development impact fees to help ensure that new residential growth is responsible for its share of infrastructure and government services.

- ✓ Localities should pursue local initiatives for protection of land and water resources. While raising local taxes or other local revenues may not be the only or best solution, the fact is that residents are often willing to pay for such environmental protection. In 2002, 75 percent (141 of 189) of parks and open space ballot measures passed in communities across America—up from 70 percent in 2001. The 141 successful measures will generate over $10 billion in 28 states, including an estimated $5.7 billion specifically for land acquisition, preservation, and protection (Trust for Public Land and Land Trust Alliance, 2003).

- ✓ Local funds almost always attract and leverage state, federal, or private sector funds. Communities should identify and create local programs to leverage available funds/resources

(loans, grants, donations, technical assistance) to attract additional funds from other sources.

- ✓ Many kinds of new, innovative partnerships can help increase resources for combined land and water resource protection. For example, Utah's Salt Lake City Public Utilities partnered with a land trust with specific expertise in real estate negotiations and land acquisition tax issues. This partnership facilitated the utility's purchase of 1,000 acres of watershed land, which it funded through a monthly fee of $0.25 per water connection, providing $1,154,000 for the land purchase.

- ✓ Increased funding for federal conservation and revitalization programs can be a major benefit for communities seeking smart growth for clean water solutions, including programs such as the Land and Water Conservation Fund, Army Corps of Engineers water resources funds, the Urban Parks Restoration and Recovery program, the EPA Brownfields grant program, the EPA watershed grant programs, and the NOAA Coastal and Estuarine Land Preservation Program.

- ✓ Clean Water and Drinking Water State Revolving Funds can be used to finance smart growth for clean water projects. States should consider providing "points" for smart growth strategies in SRF "priority ranking systems."

- ✓ Increase federal farm bill funding for land conservation practices which protect water quality, and expand state farmland preservation programs to target watershed protection goals as well.

- ✓ Use transportation funding to install "green infrastructure" such as vegetated buffers and bioswales alongside new and existing roads. For example, the City of Chicago now requires the establishment of green infrastructure, whenever new road projects are built, in order to protect Lake Michigan and other valued water resources.

- ✓ Use non-monetary measures to encourage smart growth, including development incentives such as streamlined permitting, density credits and transfer of development rights, regulatory credits, and watershed trading for smart growth projects.

Developing New Technologies and Innovations

- ✓ Provide education and outreach for local governments and developers on state-of-the-art watershed-based land use planning and water protection techniques from federal and state agencies and knowledgeable private groups. Initiatives by groups like the Center for Watershed Protection and Nonpoint Education for Municipal Officials should be encouraged and enhanced.

- ✓ Federal and state agencies should provide technical assistance on GIS, remote sensing, and other useful planning tools. The federal government should continue to research and develop low impact development technologies and other smart growth tools. For example, on May 1, 2003, U.S. EPA announced the launch of a new "Construction Industry Compliance Assistance Center." The new web-based CICAcenter, found at *www.cicacenter.org*, was funded by EPA and developed by the National Center for Manufacturing Sciences in partnership with the Associated General Contractors of America, the National Association of Home Builders, the American Road and Transportation Builders Association, and the Golf Course Builders Association of America. With this new compliance tool, users can find plain-language explanations of applicable stormwater and water protection regulations, as well as links to state and local regulatory agencies. EPA should use this and other tools to promote smart growth for clean water and low impact development approaches by the construction industry.

- ✓ Additional training opportunities are needed for developers and local/regional government officials on best management practices, low impact development, changes in zoning and building codes, and other smart growth strategies.

- ✓ Promote the use of software available for use on Personal Digital Assistants, such as Palm Pilots, for mobile commu-

nity tree inventories. This software can be downloaded from *www.umass.edu/urbantree/projects.shtml*. This freeware was developed at the Northeastern Center for Urban and Community Forestry, USDA Forest Service.

- ✓ Encourage the continued research into other GIS tools that will help localities proactively use trees to reduce the impacts of development and improve water quality.

- ✓ In partnership with U.S. EPA, Region 5 and Purdue University, the Local Government Environmental Assistance Network (LGEAN) recently launched an online tool to help local government planners measure the water quality impacts of land use changes. Specifically, local governments provide information about their location, the proposed land use change, and the area's soil type. Based on community-specific climate data, the Long-Term Hydrologic Impact Assessment (L-THIA) model estimates changes in recharge, runoff, and nonpoint source pollution resulting from proposed development. L-THIA is available for free on the LGEAN website, and users only need an Internet browser to use the tool. A downloadable GIS extension is also available for local government officials with ArcView software. To use L-THIA, visit LGEAN's Tools and Resources page at *www.lgean.org/html/exchange.cfm* and select the "Land Use Impacts on Water Quality Model."

Geographic Information Systems

Geographic Information Systems technology is an important tool to measure the value of tree cover and model the effect of land cover on air quality and stormwater movement. This high-resolution multispectral aerial imagery produces a "green infrastucture" data layer for use in community planning and development.

Increasing Public Awareness and Support

BARRIER

Residents and community organizations may not understand the threats to water quality and quantity in their community, or the connections between sprawling growth, individual behaviors, and water pollution.

SOLUTIONS

- ✓ Develop a citizens training program to complement the EPA Development, Community, and Environment Division's tool to measure the water quality impacts associated with particular development patterns. While the tool was developed for the technical planner or water quality specialist, the EPA could develop a simplified version for the public.

- ✓ Develop partnerships among local governments and private/nonprofit groups to organize smart growth-clean water community awareness events, such as river festivals, stream cleanup days, and tree planting. Make connections and set joint goals between local land trusts and watershed associations.

- ✓ Expand outreach efforts to the public on the connections between development and water resources and the potential impacts, such as contamination of drinking water supplies and recreational waters. Use local utility bill mailings to remind people where their drinking water comes from and what they can do to protect it.

Encouraging Smart Growth

Using smart growth to achieve clean water goals will require local governments to work with the development community. Local governments may consider the following incentives as a way to encourage smart growth in their community:

Provide tax incentives, such as tax reductions, tax credits, or tax deferrals, for land conservation, brownfields redevelopment, infill development, and low impact development.
Identify designated growth areas and direct funding to those places.
Establish a streamlined permit approval process to developers who locate in designated growth areas and use smart growth for clean water techniques.
Provide density credits and reduced fees or interest rates to developers who reduce the water quality impacts of impervious surface.
Use Clean Water State Revolving Funds to provide loans for land acquisition, purchase or transfer of development rights, and brownfields redevelopment.

Providing Flexible Regulatory Requirements

BARRIER

Regulatory requirements favor the building of expensive structural solutions.

SOLUTIONS

- ✓ EPA and the states should provide credit or a reduction in regulatory requirements for smart growth approaches that have demonstrated reduced pollutant levels. States and EPA should reward local governments that incorporate smart growth in TMDL and stormwater plans with regulatory credit. EPA is beginning to work in partnership with states and localities to provide clean water credit for smart growth actions. For example, localities can now get credit for smart growth and urban forestry projects in the stormwater management plans required under the Phase II stormwater rule. Likewise, smart growth practices have the potential to fulfill pollution reduction requirements at impaired waters where TMDL plans are necessary. The ability for communities to take credit for their smart growth efforts is truly groundbreaking and the wave of the future.

- ✓ EPA should continue to implement the Water Quality Trading Policy. Water quality trading is a market-based approach to improve and preserve water quality. Trading can provide greater efficiency in achieving water quality goals in watersheds by allowing one source to meet its regulatory obligations by using pollutant reductions created by another source that has lower pollution control costs. EPA's policy endorses trading as an economic incentive for voluntary pollutant reductions from point and nonpoint sources of pollution and as a way to achieve ancillary environmental benefits, such as creation of habitat.

- ✓ EPA should continue to provide training and assistance to local governments and watershed organizations interested in using smart growth for clean water tools as a way to comply with regulatory requirements.

Top 10 Actions for Advancing Smart Growth for Clean Water In Your Community

What actions can local officials take to promote smart growth for clean water in their communities?

1. Connect the Issues of Land and Water

Encourage joint planning, resource allocation, and program implementation of water and wastewater, watershed management, land use planning, and economic development by local government. Establish an inter-office commission to address smart growth for clean water.

2. Establish a Greenprint and a Blueprint for Your Community

Working with citizens and community organizations, establish a long-term vision and plan for those lands that should be protected because of their special natural, scenic, agricultural, historic, or cultural value. Connect this "greenprint" to a "blueprint" of rivers, lakes, and other water bodies and use this plan to prioritize land protection.

3. Think and Act Like a Region

Sprawling growth and water pollution do not respect local boundaries. Solving these problems means that your locality needs to coordinate with neighboring communities in the watershed to establish common goals for directing growth patterns and protecting the quality of local waters. Places to start include metropolitan councils of government and regional planning or economic development councils.

4. Revitalize Brownfields

Cleaning up and redeveloping brownfields will not only reduce toxic runoff from these sites, but also reduce the pressure of sprawling growth on the fringe of your community. Resources are available at the state and federal level to identify, assess, cleanup, and redevelop brownfields.

5. Expand Urban and Community Forestry

Develop local plans for the management of trees in urban areas to maintain a healthy green infrastructure that contributes to stormwater management. Community forest activities, such as engaging residents in tree planting and care, have been proven to reduce water pollution and runoff into rivers, streams, and lakes. Work with your state forester to target forestry resources to waterfront and riverine habitat areas.

6. Provide Incentives to Developers

Local zoning, subdivision, and building codes can include incentives to developers who adopt low impact development and other smart growth approaches in residential and commercial development projects. Localities can encourage approaches such as: the dedication of open space to preservation; cluster/conservation zoning or density bonuses; overlay zones to protect water resources; minimum tree planting requirements; and incentives for the use of rain gardens, rooftop gardens, and other stormwater reduction techniques.

7. Use GIS Technology

GIS mapping offers some of the best tools for integrating water and land use planning. Communities can use GIS to project community build-out patterns and plans, predict the future impacts on water quality from current and proposed growth patterns, and identify water resources that need the most protection.

8. Partner with State Programs

State officials can be partners with local boards on the water pollution and sprawl challenges facing specific regions and communities. States should be encouraged to direct state resources and programs toward the land-water connection.

9. Leverage New Resources

Be creative about using new resources to promote smart growth for clean water, such as Clean Water and Drinking Water State Revolving Funds, Transportation Funds, and other non-traditional sources.

10. Use Watershed Management Approaches to Protect Land and Water Quality

In times of tight budgets, it is critical to make the most of what you have. The watershed management approach is highly efficient since its comprehensive framework allows local governments to simultaneously improve water quality by managing land use. One key to effective watershed management is building strong partnerships with a broad range of people and organizations interested in or responsible for these issues.

Smart Growth for Clean Water Resources

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http://dep.state.ct.us/rec/opensp31.htm

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Brownfields
- www.epa.gov/swerosps/bf/index.html

Funding
- Catalog of Federal Funding Sources for Watershed Protection: www.epa.gov/owow/watershed/wacademy/fund.html

Potential Roles for Clean Water State Revolving Fund Programs in Smart Growth Initiatives
- www.epa.gov/owm/pdfs/smartgro.pdf

Low Impact Development
- www.epa.gov/owow/nps/lid
- Model Ordinances to Protect Local Resources: www.epa.gov/owow/nps/ordinance

Smart Growth
- www.epa.gov/livability/

Water
- Eight tools of Water Protection in Developing Areas: www.epa.gov/owow/watershed/wacademy/acad2000/protection
- www.epa.gov/owow/watershed/
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www.fs.fed.us/spf/coop/ucf_general.htm

Leadership in Energy and Environmental Design (LEED)
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www.nemw.org
Financing Brownfield Cleanup and Redevelopment:
- www.nemw.org/brownfin.htm

Smart Growth and the Clean Water Act:
- www.nemw.org/SGCleanWater.pdf

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"I believe water is the biggest environmental challenge we face in the 21st century in terms of both quantity and quality. As we celebrate the 30th anniversary of the Clean Water Act, I commend NALGEP and the Trust for Public Land for showcasing some of the innovative clean water partnerships across America that will help us meet that challenge."

Governor Christine Todd Whitman
Administrator, Environmental Protection Agency

"The land-water connection is the key to health and quality of life in our local communities, and cities like Charlotte are eager to pursue new approaches to smart growth and clean water together with NALGEP, the Trust for Public Land, and our local, state, and federal partners."

Mayor Patrick McCrory
City of Charlotte, North Carolina

"Smart Growth and land conservation tools such as brownfields redevelopment, community and urban forestry, low impact development, and watershed management require strong partnerships to be successful. The case studies in this report illustrate the clean water successes attained through partnerships of all levels of government, the business community, and the non-profit sector."

Will Rogers
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