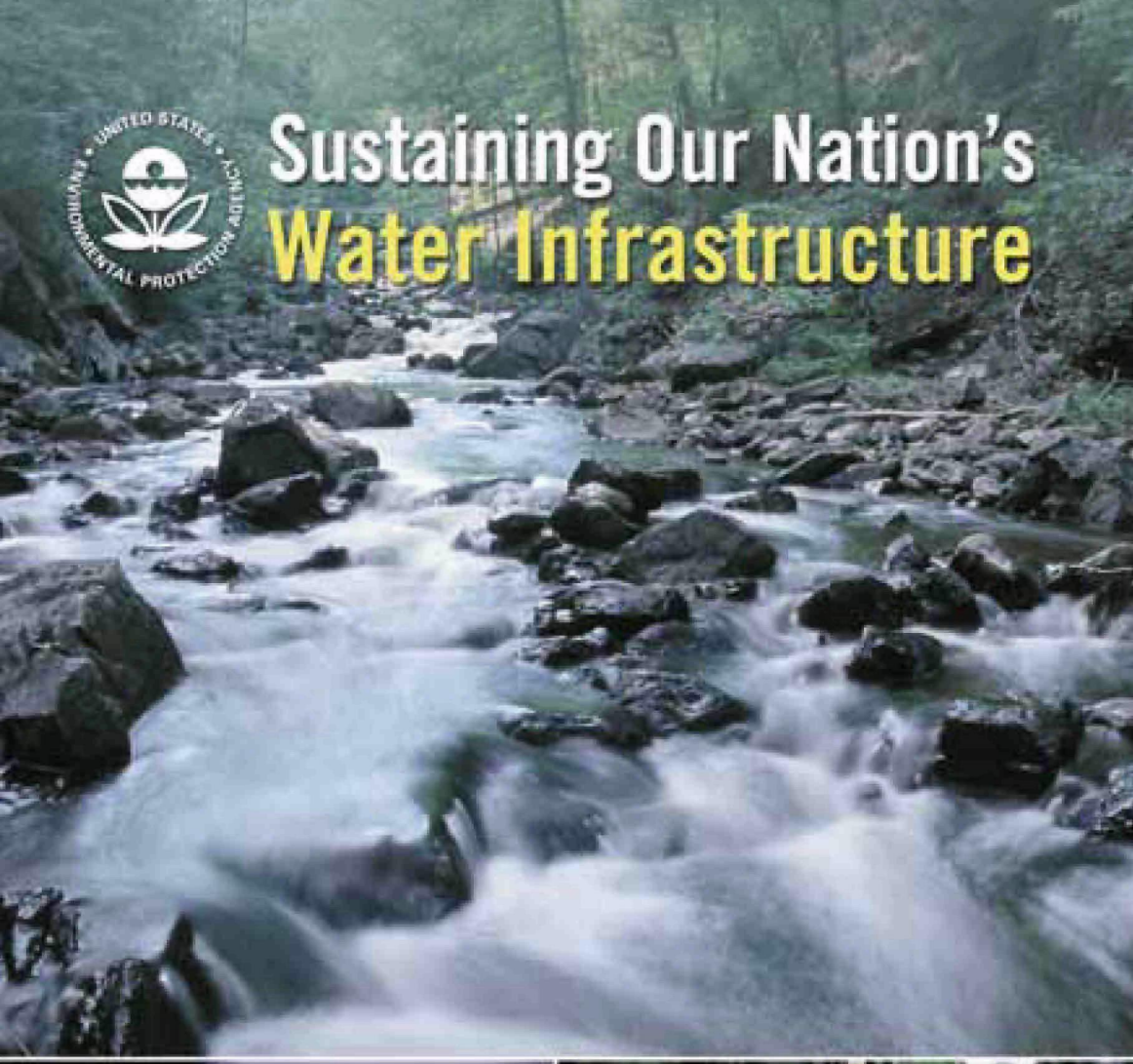
Sustaining Our Nation's Water Infrastructure



"Ensuring the sustainability of our nation's water and wastewater infrastructure is not just an EPA challenge—it is everyone's challenge. By supporting collaborations over conflicts and results over methods, we are working with our utility and private sector partners to develop the solutions for managing and sustaining our shared infrastructure assets."

Stephen L. Johnson

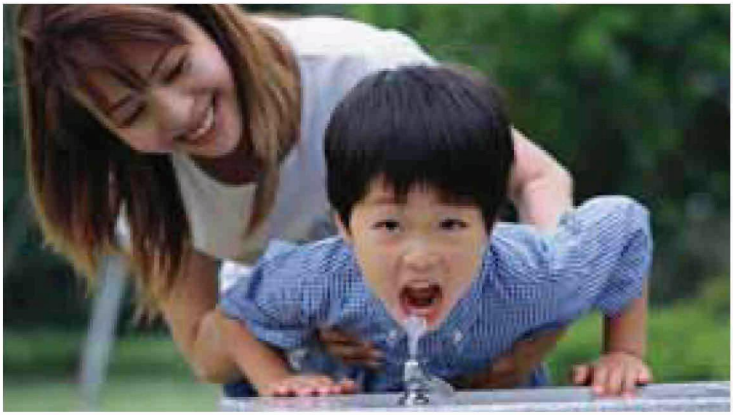
Administrator, U.S. Environmental Protection Agency

Never Take It For Granted

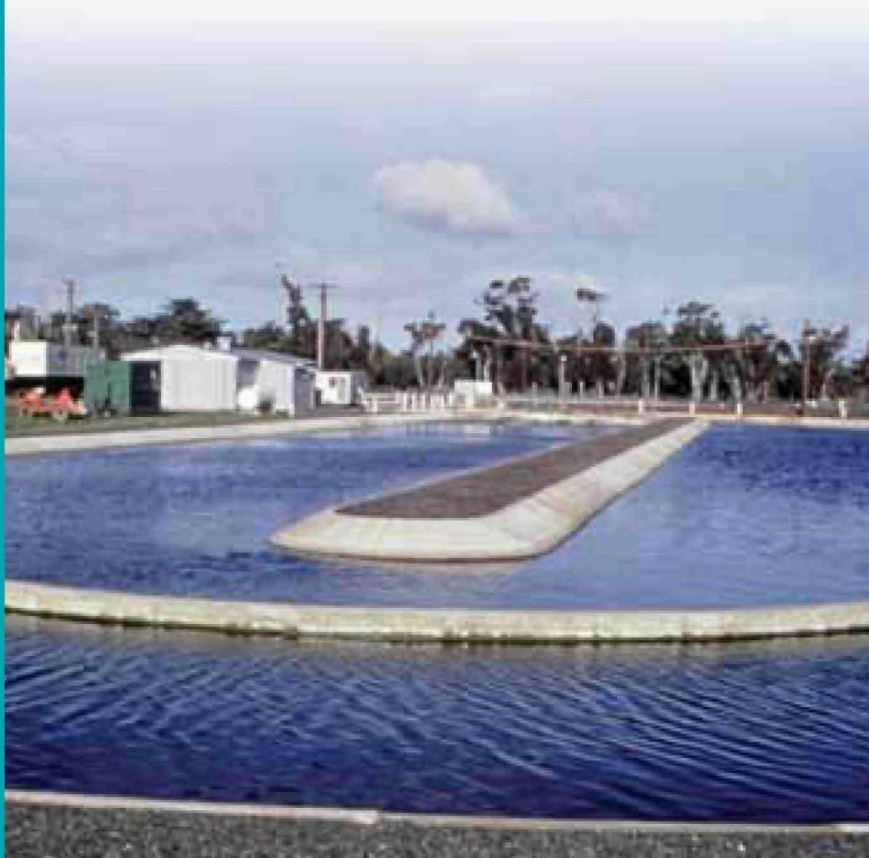
Every day we benefit from the environmental, public health, social, and economic benefits that clean and safe water provide. One of the most critical challenges facing the nation is how to sustain our water and wastewater infrastructure to ensure that the public can continue to enjoy these benefits in the future.

Our wastewater and drinking water systems are aging, with some system components older than 100 years. Our growing and shifting population requires investment for new infrastructure and maintenance of existing infrastructure. Current treatment strategies, technologies, and management approaches may not be adequate to address emerging issues; investment in research and development has declined; and the prospects for continued large federal investment are limited.

In the last 20 years, communities across the country spent approximately $1 trillion on drinking water treatment and supply and wastewater treatment and disposal. While this spending is significant, it may not be sufficient to ensure the delivery of sustainable drinking water and wastewater services in the decades ahead.



EPA's *Clean Water and Drinking Water Infrastructure Gap Analysis* (2002) estimated that if capital investment and operations and maintenance remained at current levels, the potential funding shortfall for drinking water and wastewater infrastructure could exceed $500 billion by 2020. This report also pointed out that drinking water and wastewater systems will need to use a combination of increased investment and innovative management practices and technologies to close this gap. Finally, the study noted that the funding gap would shrink dramatically if investment by utilities were to increase at a real growth rate of three percent per year.



Facing the Challenge

The U.S. Environmental Protection Agency (EPA), led by the Office of Water, has launched the *Sustainable Water Infrastructure* (SI) initiative. EPA is collaborating with drinking water and wastewater utility managers, trade associations, local watershed protection organizations, and state and local officials to help ensure that our nation's precious water infrastructure is sustainable in the future. Working as an advocate and sharing information on best practices, tools, innovative technologies, and research and development break-throughs, EPA is working with many partners to fundamentally change the way the nation views and manages its water infrastructure. To learn about the most recent developments, visit <www.epa.gov/water/infrastructure>.

In addition to supporting adoption of state-of-the-art management approaches by utilities, including management of decentralized facilities, we are promoting research and development for promising new technologies and techniques to increase effectiveness and reduce drinking water distribution and wastewater conveyance system costs. We also will explore new design concepts for future systems.

EPA is only one partner in this effort. Throughout this initiative, we will continue to focus heavily on providing information and

tools to our state partners, third party assistance providers, and associations who serve as the primary deliverers of assistance to local utility managers.

Our SI activities are organized around the following four priority areas, or pillars.

1. Better Management—to shift the utility management model beyond compliance to sustainability and improved performance by focusing on utility management systems, such as environmental management systems (EMS) and asset management, capacity development for smaller utilities, and selection of innovative, cost-effective technologies.

2. Full Cost Pricing—to help utilities recognize their full costs for providing service over the long-term and to implement pricing structures that effectively recover costs and promote environmentally sound decisions by customers.

3. Water Efficiency—to promote water efficiency in the residential and commercial sector through WaterSense℠, a new market enhancement program for water efficient products and services. Under this pillar, EPA also is facilitating the establishment of an independent, national collaborative organization committed to improving water efficiency, promoting improved building and landscaping practices, and recognizing leadership in water efficiency.

4. The Watershed Approach—to encourage the adoption of watershed management principles and tools into utility planning and management practices, so that key decision makers consider watershed-based, cost effective alternatives along with traditional treatment technology investment choices. Watershed management approaches include, but are not limited to, source water protection, water quality trading, centralized management of decentralized systems, and smart growth approaches to stormwater and wastewater management.

Overview of the Four Pillars

Better Management

Effective utility management is key to achieving sustainable water infrastructure. Effective management can help utilities enhance the stewardship of their infrastructure, improve performance in many critical areas, better control costs, and respond to other challenges. EPA's goal is that, by 2020, utilities will have adopted, or be in the process of adopting, sustainable management systems and practices and cost-effective technologies. EPA is focusing on the following areas:

Utility Management Systems—We have signed a major agreement with six national water and wastewater associations to promote more effective utility management practices through the use of environmental management systems and other innovative approaches like asset management. In addition, we will continue to directly support training and information sharing on proven management tools like EMS, asset management, and others.

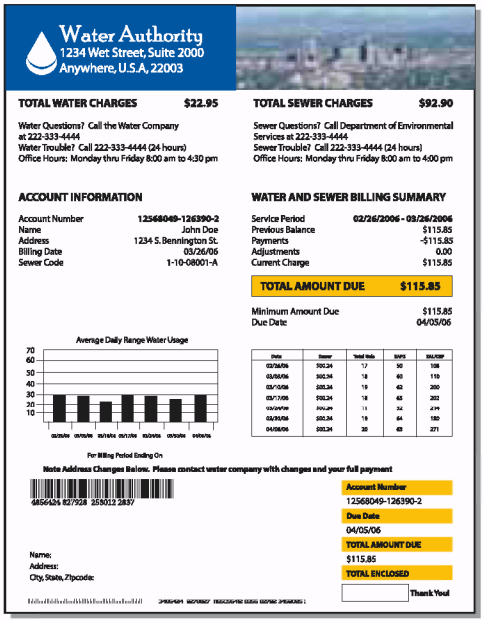
Capacity Development and Assistance for Small Systems—Working closely with states and other technical assistance providers, we are supporting small and disadvantaged communities with technical, managerial, and financial assistance to help improve their capacity to meet regulatory requirements, enhance performance, and promote long-term sustainability.

Cost-Effective Technology Selection—We are sharing technical information to help utilities evaluate, select, and operate technologies for optimal performance and minimal life-cycle costs.

Full Cost Pricing

On average, each person in the United States uses 100 gallons of water a day and pays $1.30 per day for water and wastewater services. The Full Cost Pricing pillar is helping utilities recognize the full cost of providing efficient and environmentally sound service and to implement a pricing structure designed to recover costs and promote water efficiency. We are focusing on the following areas:

Techniques for Recognizing and Implementing the Full Cost of Providing Service—Full cost pricing is generally interpreted to mean factoring all costs—past, present, and future operations, maintenance, and capital costs—into prices and rate structures. We are initiating a campaign to educate and assist utilities, government leaders, and the public on the importance of full cost recognition. We have convened an expert workgroup to fully develop a conceptual model and have published case studies and a guide on full cost pricing for small drinking water utilities.


Water Authority
1234 Wet Street, Suite 2000
Anywhere, U.S.A, 22003

TOTAL WATER CHARGES $22.95

Water Questions? Call the Water Company at 222-333-4444
Water Trouble? Call 222-333-4444 (24 hours)
Office Hours: Monday thru Friday 8:00 am to 4:30 pm

TOTAL SEWER CHARGES $92.90

Sewer Questions? Call Department of Environmental Services at 222-333-4444
Sewer Trouble? Call 222-333-4444 (24 hours)
Office Hours: Monday thru Friday 8:00 am to 4:00 pm

ACCOUNT INFORMATION

Account Number	12568049-126390-2
Name	John Doe
Address	1234 S. Bennington St.
Billing Date	03/26/06
Sewer Code	1-10-08001-A

WATER AND SEWER BILLING SUMMARY

Service Period	02/26/2006 - 03/26/2006
Previous Balance	$115.85
Payments	-$115.85
Adjustments	0.00
Current Charge	$115.85
TOTAL AMOUNT DUE	$115.85
Minimum Amount Due	$115.85
Due Date	04/05/06

Date	Sewer	Total Gals	SAFE	SAL/CAP
02/26/06	$00.24	17	50	108
03/06/06	$00.24	18	60	110
03/10/06	$00.24	19	62	200
03/17/06	$00.24	18	63	202
03/24/06	$00.24	11	52	219
03/31/06	$00.24	19	64	180
04/08/06	$00.24	20	63	271

Note Address Changes Below. Please contact water company with changes and your full payment

4856424 827928 253012 2837

Account Number
12568049-126390-2
Due Date
04/05/06
TOTAL AMOUNT DUE
$115.85
TOTAL ENCLOSED

Name:
Address:
City, State, Zipcode:

Thank You!

Options for Achieving Greater Cost Efficiency—Some systems are concerned about the willingness of their customers to pay the full cost of service. We will continue to work with these systems and state agencies to help them engage their customers in a dynamic discussion regarding the level of service and performance customers expect and the cost at which that level of service can be delivered.

Water Efficiency

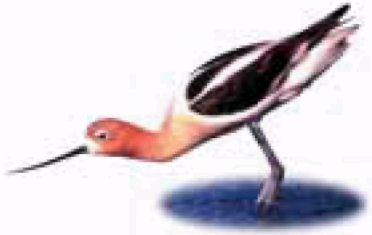
Improved water efficiency can reduce the strain on aging water and wastewater utilities and can sometimes delay or even eliminate the need for costly new construction to expand system capacity. We are working to foster a national ethic of water efficiency, so that water is valued as a limited resource that should be used wisely. To accomplish this, we are focusing on the following areas:

WaterSense℠ Market Enhancement Program— We have launched WaterSense℠, an innovative partnership program to promote water-efficient products and services. The *WaterSense* label will identify products that have undergone third-party testing to ensure both their performance and water efficiency. The program also includes a public outreach campaign.

National Organization to Foster Water Efficiency—We are supporting the formation of the **Alliance for Water Efficiency (AWE).** This new national organization will promote product improvements and support research into new technologies for saving water.

Water Efficiency Leaders—The **Water Efficiency Leaders** program recognizes organizations and individuals who are providing leadership and innovation in the efficient use of water. Intended to inspire and motivate others, this awards program will enable EPA to document best practices, share information, and create a network of water efficiency leaders.

Water Efficiency in Buildings and Landscapes—We are working with stakeholders in the home building industry to establish guidelines for the construction of water-efficient new homes. We are also working to incorporate water-efficiency elements into building rating systems, such as the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) Green Building Rating System®.



Watershed Approach

Utilities and other decision makers need to evaluate a broad array of traditional and other watershed-based tools as they make key water infrastructure decisions. EPA is striving for a more integrated approach to watershed planning that helps reduce future infrastructure costs or, in certain cases, provides alternatives to traditional infrastructure approaches. Examples of our current focus areas include:

Source Water Protection—Watershed approaches can reduce pollutant loadings and contamination of drinking water sources, thereby reducing the need for expensive treatment systems. Watershed approaches can also be used to ensure adequate water supplies.

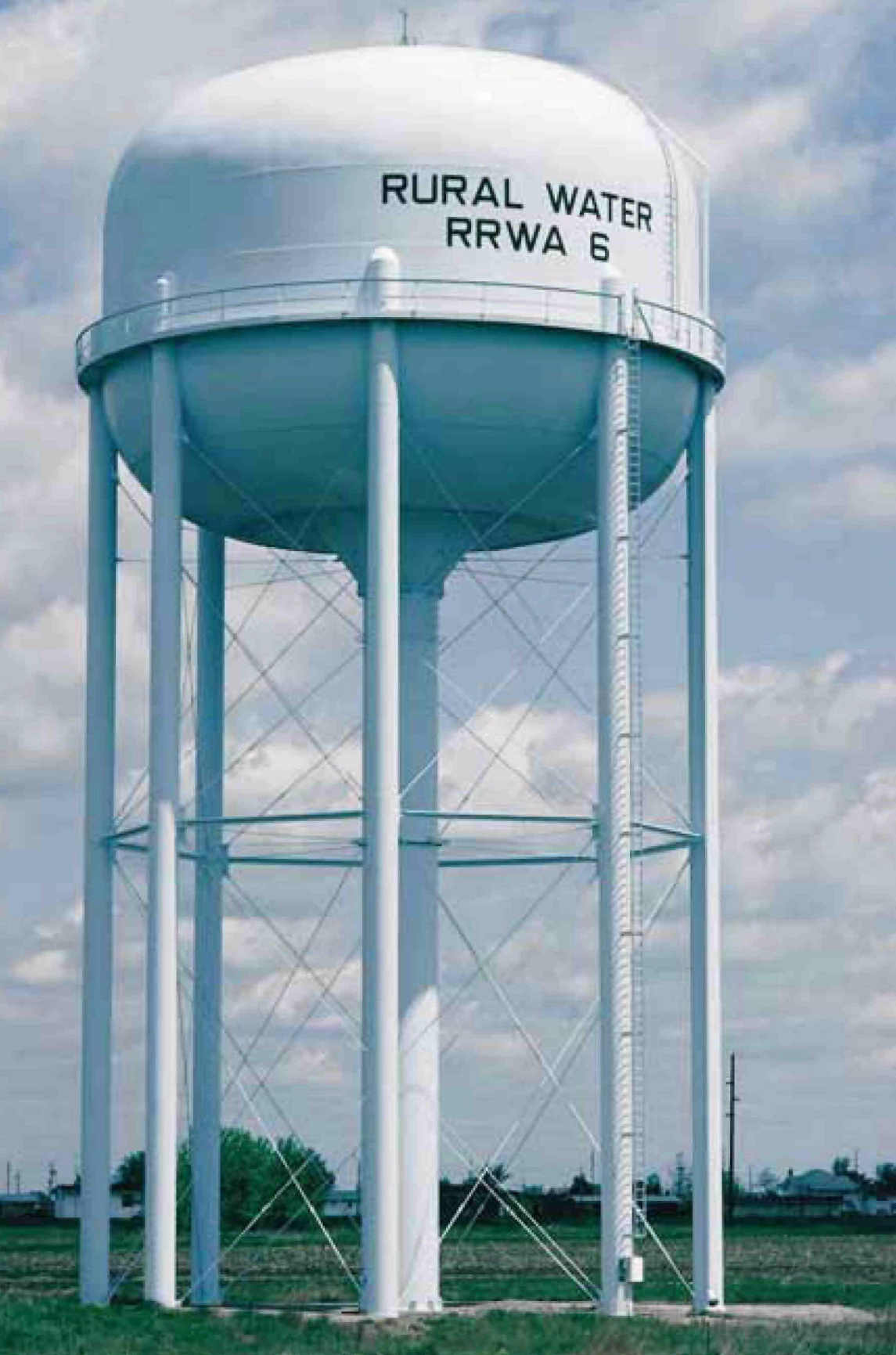
Water Quality Trading—We are working closely with states and offering guidance on how to promote innovative trading approaches to maximize the benefits of actions within a watershed where they realize the highest gains.

Decentralized Onsite Infrastructure Management—Decentralized onsite approaches can be used to cost-effectively manage wastewater and stormwater systems. Many communities are successfully using management strategies in combination with conventional infrastructure solutions.

Watershed Approaches to NPDES Permitting—EPA is providing guidance on how utilities can incorporate a watershed approach to NDPES permits to maximize the benefits of a coordinated basin-wide approach.

Sustainable Watershed Financing—The Office of Water is working closely with EPA's Environmental Finance Advisory Board and Environmental Finance Centers to develop tools, case studies, and demonstration projects to implement innovative watershed-based financing strategies.

Watershed Approaches to Restoring Impaired Waters—We are developing case studies, models and other tools to help states and local governments restore impaired waters using the watershed approach. We have published the Draft Handbook for *Developing Watershed Plans to Restore and Protect Our Waters* and will provide training and workshops on watershed planning techniques and approaches.


RURAL WATER
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United States Environmental Protection Agency
Office of Water (4204M)
August 2006
www.epa.gov/water/infrastructure

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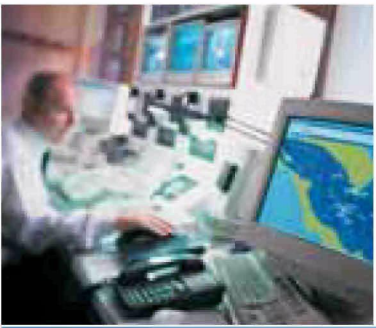
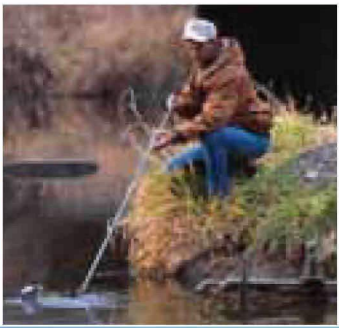
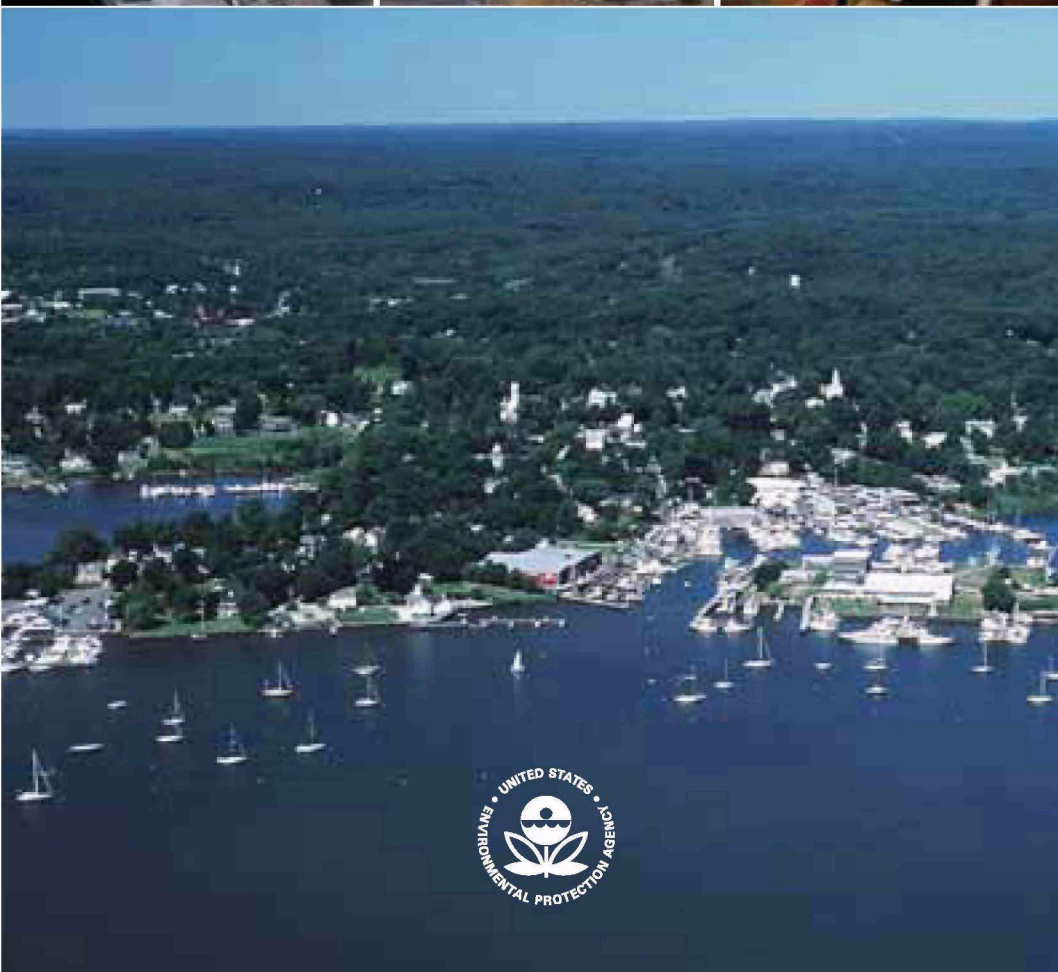
Sustainable Water Infrastructure

Tools & Resources







UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

There are a many tools and other resources to help educate utilities, states, and the public on various aspects of sustainable infrastructure. The list below identifies some of the most important. To learn more about this important topic we encourage you to obtain copies of these tools and to consult EPA's sustainable infrastructure Web site at <www.epa.gov/water/infrastructure>.

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United States Environmental Protection Agency
Office of Water (4204M)
EPA-832-F-06-026
August 2006
www.epa.gov/water/infrastructure

Better Management

"Attributes of Sustainably Managed Utilities" List and Utility Profiles

In July 2005, EPA hosted a meeting with a number of leading utilities to discuss ways to encourage other utilities to adopt sustainable management approaches. A major output of that meeting was a list of "Attributes of Sustainably Managed Utilities" and a series of profiles of several leading utilities. A summary of this meeting along with the Attributes and Utility Profiles is available at <www.epa.gov/water/infrastructure>.

An Environmental Management Systems Handbook for Wastewater Utilities

The EMS Wastewater Handbook provides a step-by-step guide for wastewater utilities to use when developing an environmental management system (EMS) for their operations. The handbook provides case examples, data, sample documentation and other tips from several wastewater utilities that have successfully implemented EMSs. Access the handbook at <www.epa.gov/ow/ems/>, the Office of Water Resource Center at <www.epa.gov/OGWDW/resource/>, or the Public Entity Environmental Management System Resource (PEER) Center at <www.peercenter.net>.

PEER EMS Local Resource Centers

Eleven PEER EMS Local Resource Centers are operating around the country that can help water and wastewater utilities, as well as other local government operations implement environmental management systems for their facilities. These centers offer a range of training and other forms of technical assistance. A full description of the PEER Resource Centers can be found at <www.peercenter.net/whocanhelp/lrc.cfm>.

Asset Management: A Handbook for Small Water Systems (EPA 816-R-03-016, September 2003)

EPA has developed a "Simple Tools for Effective Performance" (STEP) Guide that emphasizes how effective asset management is a key element of small system sustainability. Various sample worksheets are provided to help small systems organize data and determine the best approach to maintenance and replacement of major physical assets. An electronic copy of the document can be found by at <www.epa.gov/safewater/smallsys/pdfs/guide_smallsystems_asset_mgmnt.pdf>.

Taking Stock of Your Water System: A Simple Asset Inventory Guide for Very Small Drinking Water Systems (EPA 816-K-03-002, October 2004)

EPA has developed a STEP Guide to assist very small systems in conducting a simple inventory of infrastructure for capital planning purposes. This STEP

Guide can help these types of water systems run properly and ensure that the drinking water they produce is reliable, safe and affordable. An electronic copy of the document can be found at <www.epa.gov/safewater/smallsys/pdfs/final_asset_inventory_for_small_systems.pdf>.

Strategic Planning: A Handbook for Small Water Systems (EPA 816-R-03-015, September 2003)

EPA has developed a STEP Guide to assist small systems in strategic planning. The guide provides worksheets and related tools to help systems organize data and systematically assess their strengths, weaknesses, challenges, and opportunities. This guide is based on the strategic planning workshops held around the country in 2000. An electronic copy of the document can be found at <www.epa.gov/safewater/smallsys/pdfs/guide_smallsystems_stratplan.pdf>.

Sources of Technical and Financial Assistance for Small Drinking Water Systems (EPA 816-K-02-005, July 2002)

EPA has developed a guide that identifies major sources of technical and financial assistance specifically targeted at small drinking water systems. Each listing describes the source's mission and types of assistance that can be provided, and lists contact information. An electronic version of the document can be found at <www.epa.gov/safewater/smallsys/pdfs/tfa_sdws.pdf>.

TEAMS (Total Electronic Asset Management System) Asset Management Software for Small Utilities

Developed by the Maryland Center for Environmental Training (MCET), this software is targeted for small wastewater utilities and is accompanied by a training tool kit which includes training modules on a range of asset management topics. The software can be obtained by visiting the MCET Web site and submitting an e-mail request at <www.mcet.org/Technical/environment/teamsAM.html>.

U.S. EPA Advanced Asset Management Training Workshops

The Office of Water is collaborating with partner organizations, hosts, and co-sponsors to provide training on best practice in Advanced Asset Management. The workshops are primarily designed to meet the Advanced Asset Management training needs of water and wastewater utility CEOs, and senior level personnel. For more information and a list of upcoming sessions, go to <www.epa.gov/owm/assetmanage/index.htm> and click on "Training Workshops."

WERF's Sustainable Infrastructure Management Program Learning Environment (SIMPLE)

EPA has collaborated on the development of an intuitive and interactive Web-based asset management strategy tool, SIMPLE, which has been developed

under the aegis of a Water Environment Research Foundation (WERF) research project (03-CTS-14). SIMPLE contains a set of user-friendly online processes and practice guidelines, templates, and decision support tools that utilities and wastewater industry professionals can apply to asset management. For more information, visit <www.werf.us/> and click on "interactive tools."

NACWA's Managing Public Infrastructure Assets to Minimize Cost and Maximize Performance

This handbook, funded by EPA, establishes an understanding of asset management principles and program benefits and assists public water and wastewater utilities with the development of asset management programs. To obtain a copy, visit <www.amsa-cleanwater.org/pubs/index.cfm>.

IPWEA's International Infrastructure Management Manual (2006 Edition)

Published by the Institute of Public Works Engineering Australia, the 2006 edition of the *International Infrastructure Management Manual* is the premier handbook on asset management practices and provides a detailed road map for preparing an asset management plan. The manual contains extensive information on benchmarking, condition grading, valuations, asset hierarchy structures, and information systems. It presents simple economic evaluation tools and other techniques for project decision-making and prioritization. To obtain a copy of the manual, visit <www.ipwea.org.au/news/169.html>.

Full Cost Pricing

Setting Small Drinking Water System Rates for A Sustainable Future (EPA 816-R-05-006, January 2006)

This document helps water utilities consider whether their rate structures sufficiently address the costs of ensuring safe and clean water. Written for owners and operators of small community drinking water systems serving 3,300 or fewer persons, this guide explains the full costs of providing a safe and adequate supply of drinking water to customers, and how to set water rates that will support these costs. Systems that will find this guide useful are small publicly or privately owned entities whose primary business is providing drinking water, as well as homeowner associations and manufactured housing communities. An electronic version of the document can be found at <www.epa.gov/water/infrastructure/pdf/final_ratesetting_guide.pdf> and <www.epa.gov/safewater/smallsys/pdfs/guide_smallsystems_final_ratesetting_guide.pdf>.

Consolidated Water Rates: Issues and Practices in Single-Tariff Pricing (EPA 1999)

This report addresses the full cost pricing pillar by providing an overview and a discussion of the complex trade-offs involved in implementing consolidated ratemaking. Jointly published by EPA and the National Association of Regulatory Utility Commissioners (NARUC), this report can be accessed at <www.epa.gov/safewater/utilities/stptitle.pdf>.

Case Studies of Sustainable Water and Wastewater Pricing (EPA 816-R-05-007, December 2005)

Communities all across the country, both rural and urban, are making efforts towards sustainable pricing for drinking water and wastewater systems. This document provides real-world examples of how eight drinking water systems made decisions on determining and establishing appropriate rates that will help them to better recover the costs of running their systems. Access these studies at <www.epa.gov/water/infrastructure/pdf/FullCost_Pricing_casestudies_finalversion.pdf>.

Water Efficiency

American Water Works Association's (AWWA) WaterWiser interactive Web site

<www.waterwiser.org>

This water efficiency clearinghouse was developed and launched under a cooperative agreement with EPA and provides information about water conservation, efficiency, and demand management to utilities, water managers, and the public.

California Urban Water Conservation Council's (CUWCC) H2OUSE Water Saver Home Web Site

<www.h2ouse.org/>

This Web site was developed under an EPA cooperative agreement for homeowners and other consumers to learn about water saving opportunities.

Guidelines for Water Reuse (EPA 625/R-04/108, September 2004)

These guidelines present and summarize water reuse for utilities and regulatory agencies. The guidelines cover water reclamation for non-potable urban, industrial, and agricultural reuse, as well as augmentation of potable water supplies through indirect reuse. Technical, regulatory, legal, funding, and public involvement issues related to water reuse are discussed. These guidelines are available at <www.epa.gov/ORD/NRMRL/pubs/625r04108/625r04108.htm>.

Water Conservation Plan Guidelines (EPA-832-D-98-001, August 1998)

These guidelines provide information to water systems planners to help them develop local and statewide water conservation plans. These voluntary guidelines provide information on water conservation planning, criteria, guidelines and measures, as well as how to incorporate water conservation into infrastructure planning. These guidelines are available at <www.epa.gov/OW-OWM.html/water-efficiency/wecongid.htm>.

Watershed Approach

Watershed-based NPDES Permitting Implementation and Technical Guidance (EPA 833-B-03-004, December 2003)

This implementation guidance describes the concept of and the process for watershed-based permitting under the National Pollutant Discharge Elimination System (NPDES) permit program. This document can be found at <www.epa.gov/npdes/pubs/watershedpermitting_finalguidance.pdf>.

Implementing Water Quality Trading through NPDES Permitting

This document is currently in draft form and has not yet been published. It will describe the concept of water quality trading and illustrate several options for incorporating trading into NPDES permits. The guidance will show a step-by-step process starting with the decision by stakeholders that a trade is feasible and a trading framework is in place, to the final permit. It will also include an appendix of 16 actual trades that illustrate the options.

Additional Web Resources

Sustainable Water Infrastructure for the 21st Century

<www.epa.gov/water/infrastructure/>

This site explains EPA's "Four Pillars of Sustainable Infrastructure" encompassing initiatives to promote sustainable water infrastructure. It also posts relevant laws and regulations, funding and grant announcements, new initiatives, research and development activities, success stories, new tools and resources, and upcoming meetings and conferences.

Clean Water and Drinking Water Infrastructure Gap Analysis

<www.epa.gov/OW-OWM.html/gapreport.pdf>

The *Clean Water and Drinking Water Infrastructure Gap Analysis* estimates the funding gap from 2000 to 2019 for drinking water and wastewater systems. The report considers both capital investment and maintenance and explains how the projections are calculated. Approximately 54,000 community water systems and 21,4100 noncommunity water systems are covered, as well as 16,000 publicly owned water treatment works.

New Development: Smart Growth

<www.epa.gov/smartgrowth>

The Smart Growth initiative addresses how and where new development should be accommodated based on the economy, the environment, and the community. Healthy communities, economic development, and jobs, strong neighborhoods, and good transportation choices are priorities.

Drinking Water Capacity Development Web Site

<www.epa.gov/safewater/smallsys/capdev.htm>

States and water systems work together through capacity development to ensure that safe drinking water can be provided consistently, reliably, and cost-effectively. The collaboration also works to achieve the health objectives of the 1996 Safe Drinking Water Act. Using capacity development, states can target the technical, financial and managerial needs of the many small systems that account for the majority of public water systems.

EPA's Water Efficiency Web Site

<www.epa.gov/owm/water-efficiency/index.htm>

This site provides information on the benefits of water efficiency and strategies for the long-term conservation of water resources through the employment of water saving technologies.

Effective Water Sector Utility Management Statement

<www.epa.gov/owm/assetmanage/pdfs/utility_management.pdf>

EPA and several partners issued a statement to explain the efforts they will make to promote effective utility management in order to sustain the Nation's water and wastewater infrastructure. The partners include both government and industry representatives.

Dawn of the Replacement Era: Reinvesting in Drinking Water Infrastructure

<www.win-water.org/win_reports/infrastructure.pdf>

This report discusses the findings of a study conducted by the American Waterworks Association on best practices for replacing and maintaining the infrastructure.

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