The Director’s Perspective

Sanjay Saxena
National Drinking Water Clearinghouse Director

From time to time, we publish “theme issues” of On Tap. In the past, we’ve explored topics such as conservation, the Safe Drinking Water Act, and community self-help. Obviously, this sort of endeavor requires a great deal of foresight and planning.

Other times, though, a theme emerges as the stories come together. That’s exactly what happened with this issue. The idea of “smart growth” can not only be found in the cover story, but as a concept—either implicit or explicit—in several other articles as well. Water rights and water as a valuable resource are also topics that appear in more than one article.

I’m pleased to welcome two new graphic designers to the National Environmental Services Center team. Chris Metzgar joined us at the beginning of September. His technical drawings complement the latest Tech Brief, found in the center of this magazine. Chris will work primarily with the National Environmental Training Center for Small Communities, one of our partner organizations.

This is actually the second issue of On Tap featuring design and artwork by Julie Black. Julie started work here in May and will work on National Drinking Water Clearinghouse publications. A warm welcome to both Chris and Julie.

On a sad note: The terrible events of September 11, 2001, occurred while we were finishing this issue of On Tap. The assault on our country’s great cities takes its place among the darkest days in U.S. history. While we are all touched by this catastrophe, we want to express deep regret and sincere sympathy to those who lost family, friends or co-workers in this national tragedy.

To help communities protect their water systems from terrorism and sabotage, we have placed a number of useful documents and links on our Web site (www.ndwc.wvu.edu). And, the Winter 2001-02 On Tap will be a special counter-terrorism issue.

If you have any comments or suggestions, feel free to call me at (800) 624-8301 or send an e-mail to ssaxena@wvu.edu. I enjoy hearing your ideas and look forward to learning ways that we may serve you better.

Sanjay Saxena
National Drinking Water Clearinghouse Director
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## Tech Brief

**Drinking Water Storage Facilities**  
After water leaves the treatment plant but before it reaches the customer, it must be adequately and safely stored. This Tech Brief explores the various aspects of water storage.
Cost of Water Is Up in Selected Countries

A survey conducted by a private energy and telecommunications consulting firm found the average price for water in the world increased by 3.8 percent over the past year. The survey, conducted by NUS Consulting Group, found the world price for water averaged 76.4 cents per cubic meter (264 gallons). The survey polls various local water prices in 14 countries located in North America, Europe, Africa, and Australia.

According to the survey, Germany led all nations with an average price of $1.52 and South Africa had the lowest price at 34 cents. Every country reported increased costs for water with the exception of the Netherlands who showed a decrease of 0.8 percent in pricing over the past year.

The U.S. was 10th on the survey with an average price of 52 cents per cubic meter, according to the report. “We are finding that water pricing around the world is increasing at a steady rate and all indications are that even larger increases are on the horizon,” says Richard Soultanian, NUS co-president. “Issues, such as scarcity of supply and improving water quality, are coming to the forefront in most countries, and as such, prices are bound to dramatically increase to meet these challenges.”

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<th>Countries surveyed and their average water price (in U.S. dollars), per cubic meter included:</th>
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<tr>
<td>1. Germany, $1.52</td>
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<td>2. Denmark, $1.46</td>
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<td>3. United Kingdom, $1.11</td>
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<td>4. The Netherlands, $0.98</td>
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<td>5. France, $0.93</td>
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<td>6. Belgium, $0.75</td>
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<td>7. Italy, $0.62</td>
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<td>8. Spain, $0.58</td>
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<td>12. Australia, $0.48</td>
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<td>13. Canada, $0.37</td>
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<td>14. South Africa, $0.34</td>
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For more information about this survey, write to NUS Consulting Group, International Reports and Survey Division, One Maynard Drive, Park Ridge, NJ.

EPA Releases Capacity Development Reports

Are you interested in what other states have done toward implementing the capacity development provisions of the 1996 Safe Drinking Water Act (SDWA) Amendments? If so, you’ll want to read two new reports issued by the U.S. Environmental Protection Agency (EPA).

The first, titled State Programs to Ensure Demonstration of Technical, Managerial, and Financial Capacity of New Water Systems, provides a detailed summary of each state’s program, as well as appendix tables designed to help compare the various approaches different states have taken.

The second, titled State Strategies to Assist Public Water Systems in Acquiring and Maintaining Technical, Managerial, and Financial Capacity, provides a synopsis of each state’s strategy and the major elements of their strategy designs.

“I believe that these reports will be of great use to the states in better understanding the range of approaches taken by their peers,” says William Diamond, director of EPA’s Drinking Water Protection Division. “As these reports document, states have done much good work to date in the area of capacity development. Our future challenge is one of continuous improvement and further enhancement of strategies to achieve the public health protection objectives of the SDWA.”

To order copies of these reports, write to the National Service Center for Environmental Publications, PO Box 42419, Cincinnati, OH, 45242-2419 or call (800) 490-9198. Information is also available on EPA’s Web site at www.epa.gov.
November 2001

2001 State Revolving Fund Workshop
Council of Infrastructure Financing Authorities (CIFA)
The Seelbach Hilton
Louisville, KY
November 11–13
Richard Farrell
(202) 371-9694
(202) 371-6601
www.cifanet.org

SC Rural Water Association 25th Annual Conference
South Carolina Rural Water Association (SCRWA)
Kingston Plantation
Myrtle Beach, SC
November 11–14
(864) 833-5566
Mitzi Lawson
www.scrwa.org

Water Quality Technology Conference
American Water Works Association (AWWA)
Opryland Hotel
Nashville, TN
November 11–14
(303) 347-6194
Clare Hass Clavea
www.awwa.org

2001 American Water Resources Association Annual Water Resources Conference
Hyatt Regency Albuquerque
Albuquerque, NM
November 12 –15
(505) 687-8390
Pat Reid
www.awra.org

22nd Annual Governor’s Water Conference
Oklahoma Water Resources Board
Renaissance Hotel
Oklahoma City, OK
November 14
(405) 530-8800
(405) 530-8900
Barry Fogerty
www.oklaosf.state.ok.us/~owrb/

Today’s Technology Protecting Tomorrow’s Groundwater 2001 Conference
Groundwater Foundation
Hilton Pittsburgh and Towers
Pittsburgh, PA
November 14 –16
(800) 858-4844
(402) 434-2740
(402) 424-2742
Cindy Kreifels
www.groundwater.org

Treatment Optimization
American Water Works Association (AWWA)
Fort Worth, TX
November 28
(800) 926-7337 ext. 4
M. Larson
www.awwa.org

Association of California Water Agencies 2001 Fall Conference
San Diego, CA
November 28–30
(888) 666-2292

Treatment Optimization
American Water Works Association (AWWA)
Alpharetta, GA
November 30
(800) 926-7337 ext. 4
M. Larson
www.awwa.org

December 2001

2nd National Conference on Science, Policy and the Environment
Smithsonian National Museum of Natural History
Washington, DC
December 6–7
(202) 530-5810
www.ncseonline.org

2001 National Ground Water Exposition
Nashville, TN
December 7–9
(800) 551-7379 ext. 554
Julie Shaw
www.ngwa.org

World of Water Conference 2001
Las Vegas Hilton
Las Vegas, NV
December 10–12
(918) 832-9305
(918) 831-9875
www.worldofwaterexpo.com

March 2002

Water Quality Association Conference & Exposition
Ernest N. Morial Convention Center
New Orleans, LA
March 4–10
www.wqa.org

June 2002

AWWA Annual Conference & Exposition
Ernest N. Morial Convention Center
New Orleans, LA
June 16–20
www.awwa.org

If you are sponsoring a water-related event and would like to have it listed in this calendar, please send information to Lori Jennings, NDWC administrative associate, National Drinking Water Clearinghouse, West Virginia University, P.O. Box 6064, Morgantown, WV 26506-6064. You may also call Lori at (800) 624-8301 or (304) 293-4191 extension 5522 or by e-mail ljennings@wvu.edu.
NESC Adds Services

The National Environmental Services Center (NESC)—the umbrella organization that oversees the National Drinking Water Clearinghouse, the National Small Flows Clearinghouse, the National Environmental Training Center for Small Communities, and the National Onsite Demonstration Program—recently added two new services: the Healthy Communities Program and the National Tribal Environmental Network.

The Healthy Communities Program will help small communities who want to solve infrastructure problems by providing engineering assessments before the community hires a firm. “NESC will provide communities with an objective engineering opinion and shepherd them through the analysis process until a design and plan of action are established,” says John Mori, NESC director.

The National Tribal Environmental Network (NTEN) offers no-cost Web site hosting for tribes and tribal environmental organizations. “If a tribe has a Web site ready—or wants to develop a Web site—we can help you host it at no cost,” says Mori. “For tribes needing assistance developing a site, NTEN has a template that can be used to develop a Web presence at low cost.”

NESC serves as a national repository for small community water, wastewater, and environmental training information. The center offers toll-free assistance hotlines, free magazine and newsletter subscriptions, Web sites, online discussion groups and listservs, free and low-cost products, databases, and training curricula.

For more information about the Healthy Communities Program, visit the NESC Web site at www.nesc.wvu.edu. For more information about the National Tribal Environmental Network, visit www.nten-nesc.org. To learn more about either of these programs, write to the National Environmental Services Center, West Virginia University, PO Box 6064, Morgantown, WV, 26506-6064 or call toll-free (800) 624-8301.

RUS Poverty Rate Unchanged; Others Decrease

Interest rates for Rural Utilities Service (RUS) water and wastewater loans have been announced. The poverty rate is unchanged, while the intermediate and market rates decreased.

RUS interest rates are issued quarterly at three different levels: the poverty line rate, the intermediate rate, and the market rate. The rate applied to a particular project depends upon community income and the type of project being funded.

To qualify for the poverty line rate, two criteria must be met. First, the loan must primarily be used for facilities required to meet health and sanitary standards. Second, the median household income of the area being served must be below 80 percent of the state’s non-metropolitan median income or fall below the federal poverty level. As of April 1, 2001, the federal poverty level was $17,650 for a family of four.

To qualify for the intermediate rate, the service area’s median household income cannot exceed 100 percent of the state’s non-metropolitan median income.

The market rate is applied to projects that don’t qualify for either the poverty or intermediate rates.

The market rate is based on the average of the Bond Buyer index.

The rates for the third quarter of fiscal year 2001, which apply to all loans issued between October 1 and December 31, 2001, are:

- poverty line: 4.5 percent (unchanged from the previous quarter);
- intermediate: 4.75 percent (down 0.125 percent from the previous quarter); and
- market: 5.00 percent (down 0.25 percent from the previous quarter).

RUS loans are administered through state Rural Development offices, which can provide specific information concerning RUS loan requirements and applications procedures.

For the phone number of your state Rural Development office, contact the National Drinking Water Clearinghouse at (800) 624-8301 or (304) 293-4191. The list is also available on the RUS Web site at www.usda.gov/rus/water/states/usamap.htm.
Tribes, MTAC Partner for Water Education

Many Great Plains Native American communities have established regulatory expertise, experienced staff, and public support in complying with Clean Water Act regulations. But, many tribes are just beginning to develop programs related to Safe Drinking Water Act mandates. Tribal communities haven’t always had access to any significant training resources.

At the same time, primary and secondary school teachers in these communities want to include water conservation and ecology lessons in their science curricula, but say they often feel ill-prepared to do so. In the last two years, the Midwest Technology Assistance Center (MTAC) at the University of Illinois helped to overcome some of these stumbling blocks.

MTAC worked with the University of Nebraska-Lincoln to help the Haskell Indian Nations University and four other Midwest tribal colleges expand their extension service outreach programs for drinking water technical assistance and education in their surrounding communities.

During 1999 and 2000, the extension staffs of the partner colleges completed 11 educational projects. Workshops for drinking water personnel included lab technician training for operators, training needs assessments for tribal utilities, microbiological treatment techniques and pesticide contamination in water, and drinking water regulations for Native American nations.

To help tribal communities learn about drinking water issues, the partner colleges held six different educational activities and workshops for teachers and community members. Project WET (Water Education for Teachers) training helped participating teachers gain confidence about drinking water issues to take back to the classroom.

Through the “World of Water in Winnebago” in December 2000, children who attended learned about water sources, treatment and distribution, contamination and monitoring for quality, and they learned about job opportunities in the drinking water field.

Copies of the final report Technical Assistance and Education for the Native American Nations in Kansas, Nebraska, and South Dakota may be obtained by writing MTAC, 2204 Griffith Drive, Champaign, IL 61820-7495 or by calling (217) 333-9321.

Apply for an Innovation in Government Award

Applications are now being accepted for the 2002 Innovations in American Government Awards competition. The awards are sponsored by the Institute for Government Innovation at the John F. Kennedy School of Government at Harvard University.

Over the last 15 years, water and wastewater projects have been among the award winners, including a water pollution control program in Fort Worth, Texas; a groundwater management code for the state of Arizona; and a wetland wastewater treatment project in Arcata, California.

For more information, and to receive an application, log onto www.innovations.harvard.edu or call (800) 722-0074.
USGS Launches Water Site

This summer, the U.S. Geological Survey (USGS) launched the National Water Information System, a Web site that allows users to access several hundred million pieces of archival and real-time data.

“Users can now gain easy access to more than 100 years of water information, all with the click of a mouse,” says Robert Hirsch, USGS associate director for water. “This not only saves time, money, and effort for the user, but also allows our hydrologists and technicians to concentrate on collecting data and processing the information derived from it.”

According to Hirsch, water system professionals, engineers, scientists, emergency managers, and recreational water users may use these data to:

- evaluate current water supplies and plan for future supplies;
- forecast floods and droughts;
- operate reservoirs for hydropower, flood control, or water supplies;
- evaluate and control water quality;
- navigate rivers and streams; and,
- safely fish, canoe, kayak, or raft.

A nationwide network of more than 1.5 million USGS surface and groundwater sites supply data for the site. Instruments at the sites record water characteristics, including water level, flow, pH, temperature, dissolved oxygen, and percent dissolved-oxygen saturation.

“We have been providing real-time streamflow and historical streamflow data on the Web for several years now,” says Hirsch. “What this new system does is to improve that service and integrate it with many other types of water data including historical water-quality data from rivers and aquifers, historical groundwater level data, and real-time water quality, precipitation, and groundwater levels.”

The USGS National Water Information System Web site is located at water.usgs.gov/nwis/.
Operator Training Is Available on Web and CD

The Montana University System Water Center has developed an Internet training program for water system personnel. A version of the training will also be available on CD-ROM in December 2001.

Titled “Operator Basics,” the training is designed to help operators and managers enhance the skills they need to operate a water system and is targeted specifically to small public systems. Topics covered include groundwater basics, introduction to public water supplies, and treatment of groundwater. Also included are activities, such as a glossary game and a math quiz.

In order to run the CD-ROM, users will need to meet the following minimum system requirements: Pentium 133, Windows 95, 16-bit color, 800x600 resolution, 32MB RAM, CD-ROM drive, and Macromedia Flash 5.0 plugin (included on the CD). The final version will work on Macintosh computers, too.

Established in 1964, the Montana University System Water Center seeks to promote problem-solving partnerships among university, government and private sector participants; support, prioritize and distribute results of water-related research; provide training and education for water professionals; and serve as a switchboard for Montana water information.

For more information, write to the Montana Water Center, 101 Huffman Building, Montana State University, Bozeman, MT, 59717 or call (406) 994-7738. The “Operator Basics” training series is available on the Web at water.montana.edu/training.

Scientific American Water Article Is Online

The February 2001 issue of Scientific American features a series of articles about water and is available on their Web site. “Obtaining an adequate supply of freshwater has been the focus of human ingenuity and passions throughout history,” write Scientific American editors. “Even in the century ahead, impressive gains in technological capabilities to find, transport, and conserve freshwater may not be able to accommodate increasing demand, particularly in the developing world.”

Articles in the series include “Making Every Drop Count,” by Peter Gleick of the Pacific Institute for Studies in Development, Environment, and Security and “Growing More Food With Less Water,” by Sandra Postel of the Global Water Policy Project. Also included are specific examples of how to use water more efficiently, how to redistribute supply, and how to decrease demand.

To read these water articles online, go to www.scientificamerican.com/2001/0201issue/0201intro.html

NDWC Databases Are Online

The National Drinking Water Clearinghouse (NDWC) maintains two databases on the Internet.

RESULTS [Registry of Equipment Suppliers of Treatment Technologies for Small Systems] is a searchable public reference database containing information about technologies used by small water systems across the country.

RESULTS version 3.0 includes information from more than 1,000 sites located in the U.S. and Canada. The database also lists more than 250 vendors who provide drinking water treatment technologies and equipment.

The Literature Database contains more than 700 article abstracts from trade and scientific journals, research papers, and government documents. Topics include wellhead protection, drinking water regulations, water conservation, treatment technologies, and operating and maintaining water treatment systems.

The NDWC also has an Organizational Database that contains contact information for approximately 150 drinking water-related organizations that help small communities through research, regulations, technical assistance, finance, and training. This database is not yet available online. However, if you’d like information about drinking water organizations, call the NDWC staff at the number below.

For more information about these databases, visit the NDWC Web site at www.ndwc.wvu.edu or call (800) 624-8301 and ask to speak with a technical assistance specialist.
Ask the Experts

“For those working with water distribution systems, water hammer is a very serious problem. What steps does your system take to prevent water hammer from occurring?”

Editor’s Note: Water hammer refers to pressure fluctuations caused by a sudden increase or decrease in flow velocity. These pressure fluctuations can be severe enough to rupture a water main. This topic will be covered in greater depth in an upcoming Tech Brief.

Bigger Systems Mean More Troubles

What we are seeing is the trend toward bigger and bigger water distribution systems. It’s becoming easier to find a good source or treatment process and then pipe the water long distances, than to deal with multiple water treatment plants. However as these rural water systems grow, they tend to use more pipe and higher pressures in order to effectively reach the ends of their distribution grid. This definitely opens the door for water hammer problems.

One way to prevent (or lessen) water hammer is to start and stop high service pumps in such a manner that it does not become an issue. Either Variable Frequency Drives (VFDs) or “soft starts” allow the RPMs [revolutions per minute] of the motor to slowly increase (on start) and decrease (on stop). This prevents that rapid change in energy inside the distribution system, which results in water hammer. With the increased use of solid state circuitry and SCADA [supervisory control and data acquisition] systems, operators are becoming more familiar (comfortable) with this type of technology; thus opening the door for the increased use of VFDs. Another potential benefit of this technology may be the longer life of pump motors and reduced overall electrical costs.

Pressure Reducing Valves Are a Solution

To reduce the possibility of water hammer, the City of Auburn, New York, uses pressure reducing valves in the sections of the city’s distribution system that typically experience pressures above 115 psi [pounds per square inch]. In the past, we’ve had problems with people using hydrants and shutting them down improperly. Now, the Fire Department receives training in the proper use and operation of hydrants. We have also established regulations that forbid the use of hydrants without permission. If permission is granted, the operator of the hydrants is given a brief lesson in the operation of the hydrant so as not to cause a “hammer” in the system. These regulations also allow us to have better control over backflow or cross-connection problems, as we do not allow the hydrant to be used without a backflow preventer and meter attachment.

Rodney L. Coker
Tribal Utility Consultant
Indian Health Service

Frank J. DeOrio
Director of Municipal Utilities
City of Auburn, New York

Got a Question?

Do you have a question you would like our experts to answer? If so, please contact Kathy Jesperson at kjespers@wvu.edu or Mark Kemp-Rye at mkemp@wvu.edu. You also may call (800) 624-8301 or (304) 293-4191.
Fire Hydrants Can Be a Problem

The city of Greeley, Colorado, is very fortunate in that the topography of our service area allows for the majority of the water to be fed by gravity. The system has two water treatment plants. The main plant at Bellvue runs year-round, and feeds the city some 37 miles away through three transmission lines—completely by gravity. These lines do have 25 two-way air relief valves that allow us to take the lines out of service and refill them, without any distribution system problems due to entrapped air. The second treatment plant at Boyd Lake is a peaking plant. This pumped line goes directly to a 15 million gallon storage reservoir that acts as its own surge-suppressor. There is also a surge-suppression tank located at the pump station. The pumps all have soft-start motors and discharge valves that open slowly through solenoid controls, to prevent hammering the pipeline when the pumps are called for. The biggest problem our system faces with water hammer is firefighters and contractors closing fire hydrant valves too quickly. Unfortunately, that you cannot protect against completely.

Sudden Closure Is the Main Culprit

Sudden closure of a control valve or stopping of a pump produces excess pressure in a pipeline. Water hammer, or hydraulic transient, refers to pressure fluctuations caused by a sudden increase or decrease in flow velocity.

According to the Washington State Water System Design Manual, “There are a variety of ways to provide surge control. Methods include: open surge tanks, pressurized surge tanks, surge anticipator valves, vacuum relief valves, regulated air release valves, optimizing main size and alignment, electric soft start/stop and variable speed drives for pumps, electric interlocks to prevent more than one pump from starting at the same time, slow opening and closing valves, and increasing the polar moment inertia of the rotating pump/motor assembly. A combination of methods may be necessary and care must be taken in the design so that the addition of a protection device does not cause a secondary water hammer equal to or worse than the original design could cause.”

Reliability of the surge protection facility is also important. Where appropriate, redundancy should be provided for essential equipment, such as vacuum relief valves. Adequate alarms should be provided on surge valves and similar components to give operators early warnings. Consideration should be given to preventing the pumping system from operating if the surge protection facilities are not operable.

In Washington State, transmission mains designed to operate at velocities greater than 10 feet per second must include a hydraulic transient analysis in conjunction with a hydraulic analysis. Many of the computer programs designed to perform hydraulic analysis are capable of performing transient analyses.

The Peninsula Light Company owns and/or manages very small water systems. Most of these systems are groundwater wells with hydropneumatic (i.e., pressure) tanks that are not only sized to reduce the frequency of pumps cycling on and off, but act as surge protectors.

Surge control valves can also be installed between the pump discharge flange and the check valve. The surge control valve is fully open when the pump is started and passes sufficient flow in the fully open position. Once the pump is running at full speed, the surge control valve slowly closes while the hydraulic head slowly increases. Likewise, it slowly opens prior to the pump stopping. Any new pump that is installed with greater than 15 horse power is required to have a soft-start not only for control of water hammer, but less electrical load impact.

In a few of our systems that have storage tanks, the booster pumps are controlled by float switches rather than a surge suppressor. We also have a few systems with fire hydrants. Staff are trained in how to properly open and shut these valves. Unfortunately, we still have occasional “unauthorized” use of fire hydrants. We are placing signs on the hydrants in the hopes of deterring non-fire related use. Although, we’ve been mostly concerned about the potential of cross-connections.

Lisa Raysby
Water Department Manager
Peninsula [Washington] Light Company
A thousand years from now, when historians look back at the turn of the 21st century, they may refer to this period as “the time when the United States ran out of room.” Oh, there’s still plenty of open space, to be sure. But, for the first time, concerted efforts are underway to fight the mindless expansion of our cities and towns, the loss of valuable farmlands, and what Donella Meadows, director of the Sustainability Institute at Dartmouth College calls “landscapes of stunning ugliness.”

The movement is known as “smart growth” and it’s gaining popularity across the U.S. “It is a way of organizing a community and a style of growth that safeguards quality of life, economic prosperity, and the environment,” says Joel Hirschhorn, policy studies director with the National Governors Association. “It does not mean no growth or slow growth.”

In many ways, smart growth is synonymous with land-use planning; certainly both seek to answer the fundamental question “what’s the most appropriate use of this land?” But smart growth takes land-use planning to the next level.

“In communities across the nation, there is a growing concern that current development patterns—dominated by what some call ‘sprawl’—are no longer in the long-term interest of our cities, existing suburbs, small towns, rural communities, or wilderness areas,” writes Geoff Anderson in Why Smart Growth: A Primer published by the International City/County Management Association. “Though supportive of growth, communities are questioning the economic costs of abandoning infrastructure in the city, only to rebuild it further out. They are questioning the social costs of the mismatch between new employment locations in the suburbs and the available work force in the city. They are questioning the wisdom of abandoning “brownfields” in older communities, eating up the open space and prime agricultural lands at the suburban fringe, and polluting the air of an entire region by driving farther to get places. Spurring the smart growth movement are demographic shifts, a strong environmental ethic, increased fiscal concerns, and more nuanced views of growth. The result is both a new demand and a new opportunity for smart growth.”

One can hardly think of a more dramatic about-face from the legacy of Manifest Destiny or the willy-nilly expansion that has typified growth in the U.S. for hundreds of years.
Implications for the Water Industry

Smart growth ideas are appealing to those in the water and wastewater industries because unchecked growth means extending distribution lines. And the extensions mean substantial investments by towns and water districts.

“The result of low density sprawl is that the total miles of water and wastewater infrastructure needed to serve the same number of people is doubled, tripled, quadrupled, and more,” says Jim Woods, Morgantown, West Virginia’s city planner. “And who pays? You and I do, through our taxes. Compact urban forms with growth boundaries are much more efficient in terms of the number of miles of infrastructure per consumer.”

Meadows agrees. “It costs us dollars—bucks straight out of our pockets—in the form of higher local taxes. That’s because our pattern of municipal growth consistently costs more in public services that it pays in taxes.”

While the price of providing infrastructure to new areas can be high, the growth itself adds costs to treatment. By increasing what experts call “impervious cover” (e.g., buildings, paved roads, and parking lots), water quality is affected, which means more treatment.

“As towns and cities continue to grow, and more land is developed, the impervious cover increases,” says Javier Vélez-Arocho of the U.S. Environmental Protection Agency’s (EPA) Office of Policy, Economics, and Innovation Development. “How and where the development occurs will have an important impact on water quality, an impact that will impair the treatment facilities ability to treat water efficiently. However, smart growth can result in economic benefits for those working in the water and wastewater industries. Why? When new growth is managed in a watershed context, homes and businesses can be located and designed to have the smallest possible impact on streams, lakes, wetlands, and estuaries. For a manager or operator of a filtration plant or wastewater treatment facility, this means less pollution to treat at the plant—in other words less treatment requirements and better economy.

“Some studies indicate the cost of treating the quality and quantity of stormwater runoff ranges from $2,000 to $50,000 per impervious acre,” continues Vélez-Arocho. “A great example to explain why smart growth is good to the water quality in any given watershed or locality occurred in the Northeast. The City of New York acquired land and easements in its upstate watershed at a cost of $1.5 billion in order to protect source water supplies. They did this in lieu of expanding their water treatment systems to accommodate necessary repairs and the increase in demand for water. The estimated cost to expand water treatment systems was $8 billion.”

Smart Growth and Rural America

Until recently, when talk of sprawl came up, it was in reference to the country’s largest cities. And, certainly, metropolitan areas in the U.S. have been impacted by unregulated growth. Chicago, for example, had a population increase of four percent between 1970 and 1990. Census data show, but its developed land area grew by 46 percent. During this same time, Los Angeles mushroomed by 45 percent; its settled area a whopping 300 percent. Even cities like Pittsburgh, which actually lost population, saw its urbanized land areas expand by 43 percent between 1982 and 1997. (See the sidebar about “Boomburbs” on page 14.)

But sprawl is increasingly a concern for small towns and rural areas, too. According to the American Planning Association (APA), West Virginia—a predominantly rural state—leads the nation in sprawl. A report prepared by the APA found that, as of 1997, only seven percent of the land in West Virginia had been developed for human use, compared to 40 percent in New Jersey, the most densely populated state. However, on a per capita basis, construction of new subdivisions, shopping centers, office buildings, and roads is proceeding faster in West Virginia than anywhere else. All this development, however, hasn’t been because of an influx of new residents: West Virginia’s population declined significantly over the 15 years the study examined.

“In West Virginia, the sprawl phenomenon in rural areas is a result of the counties lacking the political courage to step up to the plate and implement sensible land-use controls,” charges Woods.

Are counties in other parts of the country reluctant or unable to combat sprawl? That’s one of the

After examining 113 nonmetropolitan counties identified as having “potential sprawl problems,” the authors focused on eight counties from different parts of the country: Citrus, Florida; Elbert, Colorado; Gilmer, Georgia; Lamoille, Vermont; Lyon, Nevada; Mason, Washington; Monroe, Pennsylvania; and Wise, Texas.

With respect to water and wastewater, the authors found that infrastructure capacity was “overstrained” in half of the counties and that another three were “playing catch-up” to meet growing needs. They found that water pollution was a problem in coastal areas and that in at least one county the cost of onsite home wastewater systems “is so high that the cost of new housing is becoming prohibitive.”

Most of the counties had some sort of zoning on the books, although their quality was a mixed bag. The authors single out Florida and Washington as being states with strict growth management laws and, hence, manageable growth. Two counties had no zoning or growth control measures.

“[Growth areas] initially attract commuters or retirees, and only later do private services and other industries follow. The result is that most of these rural sprawl places complained of insufficient tax revenues to pay for school and infrastructure improvements. Several officials noted that the only way to break out of this conundrum would be for their state to help out by paying more of the infrastructure costs.”

In addition to the fiscal costs of treatment and infrastructure mentioned above, communities pay other prices for sprawl in terms of their quality of life. “[The] conversion of rural areas to soul-less subdivisions and strip-shopping centers is the single biggest threat to small town character and identity,” says Woods.

“For small towns and rural areas, the challenge is to have growth that does not destroy the rural or small town character of the original place,” says Hirschhorn. “The solution is use of new community design principles to build mixed-use places within or very close to the older, original towns.”

Data from the 2000 Census show that several suburban areas in the West and Southwest are now more populated than some established urban centers. Dubbed “boomburbs,” these suburbs now account for one-fourth of the big cities (i.e., places with a population between 100,000 and 400,000) in the U.S.

Mesa, Arizona, a suburb of Phoenix, leads the pack with a population of 396,375. Other “boomburbs” with populations exceeding 300,000 include Santa Ana and Anaheim, California, and Arlington, Texas. These suburbs are now larger than older cities such as Cincinnati, Ohio; Miami, Florida; and St. Louis, Missouri.

Robert Lang, co-author of Boomburbs: The Emergence of Large, Fast-Growing Suburban Cities in the United States says “Boomburbs may be the ultimate symbol of a new, sprawling post-war metropolis.” Founded during the 1970s and 80s, these cities epitomize what smart growth advocates are working against: office parks, “big box” retailers such as Home Depot, strip developments, and subdivisions made up of large, single-family homes. “They have now coalesced into suburban super cities that have all the functions of a traditional city,” says Lang, “but are built for a drive-through society.”

The entire text of Lang’s article is available on the Fannie Mae Foundation’s Web site at www.fanniemaefoundation.org/census_notes_6.shtml.
Does anyone want “dumb growth”?

“In some ways, the very term [smart growth] itself is unfortunate,” says Woods. “Ask anyone if they’re in favor of smart growth and they’ll say ‘sure.’ After all, what’s the alternative—dumb growth?” While it would be difficult to find an advocate for dumb growth, there are those who criticize smart growth and planning.

The most obvious opposition comes from what is loosely defined as “the development industry”: realtors, roadbuilders, and conventional homebuilders and developers. It is, obviously, much easier and cheaper to build in rural areas with no land-use restrictions. There are literally millions of dollars to be made and developers are, they say, merely responding to market conditions.

There are also those who criticize the assumptions on which smart growth and planning are predicated. They claim that public transit is unpopular in the U.S., that farmland is not being lost but has remained constant for 50 years, and that increasing population in urban areas actually contributes to pollution.

The Competitive Enterprise Institute, a group “dedicated to the principles of free enterprise and limited government” advances the following counter-arguments:

- Smart growth promotes densification, which means that urban open spaces are developed (including parkland), crowding the few parks that remain. In Portland, [Oregon], which proponents of smart growth hail as a model of smart growth, the amount of parkland per 1,000 residents has declined from 21 acres to 19 acres this decade alone.
- From 1945 to 1992, the amount of cropland remained constant at 24 percent, according to the U.S. Department of Agriculture. In fact, the federal government spends billions of dollars each year paying farmers to idle their land, suggesting there is a surplus of farmland, not a shortage.
- While increased population density may reduce development pressures in rural areas, increased urban density correlates with increased traffic congestion and air pollution. According to the EPA’s own data, smog worsens as densities increase.
- Mass transit ridership has been falling for decades and shows no sign of reversing, despite substantial government subsidies. From 1990 to 1995, the number of public transport boardings dropped 5.5 percent nationwide. Public transit fails to provide the speed, flexibility, and comfort that today’s commuters demand, so they use their cars instead.

“The deliberate goal of anti-sprawl activists is to promote policies that exacerbate traffic congestion and force people to live in crowded cities,” writes John Carlisle, author of The Campaign Against Urban Sprawl: Declaring War on the American Dream published by the National Center for Public Policy Research. “Since high density urban areas almost always have the worst air pollution, the likely result of a federally-financed campaign to restrict growth to less healthy urban areas in the name of protecting undeveloped open space would be to worsen the quality of the nation’s environment.”

In a very real sense, the backlash against smart growth ideals goes deeper than specific arguments about open space and population density. The sanctity of rural areas and the corresponding demonization of cities has been an almost constant theme since the founding of the U.S. itself. Thomas Jefferson, for example, was a strong proponent of rural life and viewed yeoman farmers as the backbone of democracy. During Reconstruction, the notion of “40 acres and a mule” was advanced as fitting reparation to freed slaves. After World
War II, the GI Bill and the development of the Interstate highway system allowed hundreds of thousands of Americans to recreate their own little rural places in what came to be known as “suburbia.”

David Ellwood, professor of public policy at Harvard University, identifies four basic themes that define fundamental American values: autonomy of the individual, virtue of work, primacy of the family, and desire for and sense of community. With respect to ideas such as smart growth or community planning, there is a built-in tension in these values. “The autonomy of the individual and primacy of the family tend to push people in individualistic and often isolating directions,” says Ellwood. “But the desire for community remains strong in everything from religion to neighborhoods.” Americans long to be part of a community, it seems, yet we want our own piece of land and we’ll be damned if anyone tries to tell us what to do with that land.

Where are smart growth principles being used?
A funny thing happened in Loudoun County, Virginia. With cheap land and an hour-and-a-half commute to Washington D.C., 5,000-square-foot homes were becoming a common feature of the landscape. Elected officials there—the third-fastest-growing county in the U.S.—had been planning to add 40,000 houses over the next five years. Had been, that is, until eight anti-sprawl candidates were elected to the Loudoun County Board of Commissioners.

“It was an astounding victory,” Joe Maio, director of Voters to Stop Sprawl, says in an article by Linda Baker in the May/June 2000 issue of E Magazine. “It was a complete repudiation of the way business is done around here.”

The large houses on large lots in Loudoun County are cited by Eben Fodor in a book titled Better Not Bigger. A new house on a five-acre lot costs the community $2232 per year to a town budget (over and above the property tax collected), says Fodor. A new house on a five-acre lot adds just over $700 per year.
up new ones and invite citizens to participate in planning decisions through town hall-style meetings.”

Involving the public is extremely important if smart growth initiatives are to succeed, experts report. It’s advice that residents of Littleton took to heart. (See the sidebar on page 13 for ways to foster smart growth.)

Working together on community issues has, by all accounts, reinvigorated the town. Plans are being finalized for an affordable housing development, for continued aesthetic improvements in the historic downtown, and for recreation trails on both sides of the Ammonoosuc River. Littleton’s efforts were rewarded in 1999 when it was named New Hampshire’s Main Street Community of the Year.

The Future of Smart Growth

The smart growth movement faces some formidable obstacles: entrenched political ideals, long-standing societal beliefs about homes and lands, and a maze of cross-jurisdictional laws and policies governing land-use planning, to name just a few. Nevertheless, anti-sprawl proponents remain optimistic about the future.

“Smart growth is probably the strongest grassroots-driven movement in the U.S.,” says Hirschhorn. “It is relatively young and is still growing as more Americans suffer more declines in quality of life, like traffic congestion, and as more elected officials realize that ensuring economic growth requires smart growth strategies.”

So far, most smart growth efforts are at the local and state levels. In 1999, for example, voters passed more than 70 percent of 2,400 local ballot initiatives preserving open spaces and creating more than $7.5 billion in funds for land conservation. At the state level, more than 1,000 land-use reform bills were introduced in legislatures in 1999, with more than 200 enacted into law. Eleven states have some sort of smart growth strategy and several more are considering such measures.

Although the federal government has historically taken a hands-off approach to land and growth issues, there are signs that this is changing. Both houses of Congress, for example, have Smart Growth Task Forces. Toward the end of their administration, Bill Clinton and Al Gore launched a “Livability Agenda” designed to curb urban sprawl.

EPA, too, has been exploring ways to encourage smart growth efforts. Citing a number of environmental, fiscal, and quality-of-life issues, their report Potential Roles for the Clean Water State Revolving Fund Programs in Smart Growth Initiatives explains how loans can be used to support growth management.

Ultimately, though, it’s up to informed residents to decide how their communities should grow or not grow. “Don’t believe the myth that all growth is good,” cautions Meadows. “Ask hard questions. Who will benefit from the next development scheme, and who will pay? Are there better options, including undeveloped, protected land? How much growth can our roads, our land, our waters and air, our neighborhoods, schools and community support? Since we can’t grow forever, where should we stop?” The answers to these questions will become more and more urgent as demands on land increase—even if the U.S. never literally runs out of room.

More Information About Smart Growth

Numerous groups are involved with issues relating to smart growth, urban sprawl, healthy communities, and sustainable growth. Although by no means exhaustive, the following six organizations provide excellent information on these issues, as well as additional sources.

The National Neighborhood Coalition
1030 15th St. NW, Suite 325 Washington, DC 20005
Phone: (202) 408-8553
E-mail: nncco@erols.com
Web: www.neighborhoodcoalition.org

The Smart Growth Network
777 North Capitol St., N.E., Suite 500 Washington, DC 20002-4201
Phone: (202) 289-4262
E-mail: info@smartgrowth.org
Web: www.smartgrowth.org

The National Governors Association
Hall of States
444 N. Capitol St.
Washington, DC 20001-1512
Phone: (202) 624-5300
E-mail: webmaster@nga.org
Web: www.nga.org

The Brookings Institution’s Center for Urban and Metropolitan Policy
1775 Massachusetts Ave., N.W.
Washington, DC 20036
Phone: (202) 797-6139
E-mail: krommer@brookings.edu
Web: www.brookings.edu/es/urban/urban.htm

The National Association of Local Government Environmental Professionals
1350 New York Avenue, N.W., Suite 1100 Washington, DC 20005
Phone: (202) 393-2866
E-mail: nalgep@spiegmcd.com
Web: www.nalgep.org

The Congress for the New Urbanism
The Hearst Building
5 Third Street, Suite 725
San Francisco, CA 94103
Phone: (415) 495-2255
E-mail: cnucinfo@cnu.org
Web: www.cnu.org
Tighter restrictions, permits, and case law dictate when, where, and how much water a user can take for consumption. Home and landowners aren’t the only ones limited to water usage through permitting. Small and large municipalities alike also must go through the often-complicated water rights processes to secure enough flow to meet consumers’ needs.

**What is a water right?**

A water right is a legal authorization to use a certain amount of public water for specific beneficial purposes. Water flowing in creeks, rivers, and bays is usually state water. This surface water is public property; however, states give individuals, organizations, and municipalities the right to pump water from a stream, creek, pond, or lake, or to impound water in a lake or pond.

In many states, laws require certain public water users to receive approval from the state prior to using the water. In almost all cases, surface waters may be used only with explicit permission of the state. Water for livestock and household uses is sometimes exempted from this requirement, so long as people who live adjacent to a stream or river divert the water. Landowners with water flowing past, through, or under their property do not automatically have the right to use that water without a permit in some states.

Often, county and rural community fire departments and other similar services are allowed to divert and use state water from streams and reservoirs for emergency use without first obtaining a permit.

Understanding who gets to use water is often a confusing process because no national water rights system exists. In its absence, state water laws have evolved with different traditions and conditions. Each state’s water allocation system—which defines the type and quantity of use—is based on the state’s individual approach to water rights.

Ralph Edwards, an attorney who works with water rights law in California, says that the complexity of water rights law often overwhelms his clients. “You just can’t divert water from a stream without following the prescribed legal process for using the water,” he says. “California is very specific in how a user can gain access to a water right. It can be complicated for those unfamiliar with the process. There’s no doubt about it.”
Western states follow variations on the prior appropriation doctrine, which basically means that one gets the water right by simply having used the water in the past. Eastern states generally use riparian rules and state permits for use. Riparian rights give water preferences to those who own property adjacent to the riparian or water zone from which the water is drawn. Under the riparian doctrine, only landowners with water flowing through or adjacent to their property have claims to the water.

**States Handle Rights Differently**

Some state water laws rely on common law doctrines and court decisions over time that resolved private disputes. In other states, the legislature developed statutory and administrative arrangements that determined water rights.

Water rights laws and statutes in various states are peppered with the term “beneficial use.” Beneficial uses include domestic use, irrigation, stock watering, manufacturing, mining, hydro power, municipal use, aquaculture, recreation, and fish and wildlife. The amount of the water right is the amount of water put to beneficial use. Due to the beneficial use requirement, a water right (or a portion of a water right) may be lost if it is not used in a certain period of time in most states.

In Texas, state law requires a water right document for all other surface water uses, aside from household needs or for irrigating a yard or home garden. Residents may impound up to 200 acre-feet of water in stock tanks for domestic and livestock use. Texas’ various water right documents—including certificates of adjudication, permits, term permits, and temporary permits—do not guarantee that water will always be available. But some of them provide more certainty than others do. Each such document has a priority date assigned to it.

Under Oregon law, all water is publicly owned. With some exceptions, cities, towns, farmers, factory owners, and other users must obtain a permit or water right from the state’s Water Resources Department to use water from any source, whether it is underground, or from lakes or streams.

Oregon’s water laws, like many states, are based on the principle of prior appropriation. Usually the first person to obtain a water right on a stream is the last to be shut off in times of low stream flow. In water-short times, the water right holder with the oldest date of priority can demand the water specified in their water right regardless of the needs of junior users.

If there is a surplus beyond the needs of the senior right holder, the person with the next oldest priority date can take as much as necessary to satisfy needs under their right and so on down the line until there is no surplus. The date of application for a permit to use water usually becomes the priority date of the right.

The appropriation doctrine has been law since 1909 in Oregon when passage of the first unified water code introduced state control over the right to use water. Before then, water users had to depend on themselves or local courts to defend their rights to water.

Edwards says that in California, there are two general classes of rights to surface water: riparian and appropriative. “Within the appropriative category, there are four main subgroups of rights: pre-1914 rights, small domestic use, small stock ponds constructed prior to 1969, and general appropriative rights obtained through the application, permit, and license process,” he says. “In order to have a right to divert and/or store water, whether it be for domestic use or for commercial use, the person or group using the water must generally have either a riparian right or one of the types of appropriative rights. There are also certain miscellaneous water rights, including prescriptive rights and rights to a spring. Each type of right has its own nuances and required documentation.”

**How is a water right established?**

Because water rights laws vary so widely from state to state, the process for obtaining rights is also different. In Idaho, there were two ways a surface water right could be established prior to May 1971, according to the Idaho Department of Water Resources’ Web site, the agency that oversees water rights in the state. The first way was to simply divert water and apply it to a beneficial use. These water rights are called “beneficial use,” “historic use,” or “constitutional” water rights. The priority date for a water right established by this method is the date that water was first put to beneficial use.

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**Riparianism vs Prior Appropriation**

There are many factors that must be considered in allocating water to users. The first is the traditional water law doctrine that has developed in the U.S.: the older riparian principles of the eastern states and the doctrine of prior appropriation in the arid western states.

Riparianism starts with the assumption that water is plentiful and available to all riparian and littoral property owners. Under this doctrine, all water uses are allowed as long as they do not unreasonably interfere with other uses. This means that water uses that have been in place for a long period of time and any new users have equal rights and entitlement to the water. This doctrine works well as long as water is plentiful and available to all riparian and littoral property owners. The appropriation doctrine has operated on the “first in time, first in right” principle. The first or prior user’s rights are superior to later-arising uses, regardless of scarcity or social benefits. Users typically acquire rights from the state to withdraw and consume water and even in times of drought may continue to do so at the expense of subsequent users.

Prior Appropriation operates on the “first in time, first in right” principle. The first or prior user’s rights are superior to later-arising uses, regardless of scarcity or social benefits. Users typically acquire rights from the state to withdraw and consume water and even in times of drought may continue to do so at the expense of subsequent users.

There is also a relative new-comer to the water rights law that is being embraced by a growing number of eastern states, that of a hybridized version of the riparian and prior appropriation doctrines.
The second way to establish a surface water right was to comply with the statutory method in effect at the time the water right was established. The current statutory method is an application/permit/license procedure. The priority date for a water right established by this method is the date that a person files an application with the state.

Prior to 1903, Idaho used a "posted notice" statute, which allowed water users to post notice at the point of diversion and record the notice at the county recorder’s office. The user then had to actually divert and use the water, among other things. If the statutory requirements were met then the priority date for a water right established under the posted notice statute was the date of posting the notice. Water rights established under the old statutory method are called "posted notice" water rights, but are considered beneficial use rights because they are not confirmed by a permit, license, or decree.

In May 1971, the state changed its procedures, resulting in only one way to establish a right to water, which is to follow the application/permit/license procedure the state put into effect. The one exception to this rule is for water rights used solely for watering domestic livestock instream.

The process for gaining a groundwater right closely resembles the surface water procedure in Idaho. There is one exception to this rule. A "beneficial use" right to groundwater may still be established for domestic purposes. "Domestic purposes" is defined by statute as "water for household use or livestock all other purposes, including irrigation of up to one-half acre of land in connection with said household where total use is not in excess of thirteen thousand (13,000) gallons per day."

The state limits the "domestic purpose" statute by not including water for multiple ownership subdivisions, mobile home parks, and commercial or business establishments. Idaho interprets the rule of domestic exception for single-family domestic purposes only.

In California, Edwards says anyone wanting to establish a water right for small domestic use must do two things. "First, the appropriator must register with the state’s water board. Second, the appropriator must apply the water to reasonable and beneficial use with due diligence," he says. "It is important to remember that both requirements must be satisfied. A small domestic use right cannot be acquired simply by using the water; you must also register with the Water Board. Similarly, a registration alone does not give the registrant a water right. The registrant must also make reasonable and beneficial use of the water in a timely fashion."

"Once an appropriator acquires a right to appropriate water for small domestic use, the appropriator must comply with the conditions established by the Water Board in order to maintain that right," Edwards notes. "The Water Board is required to give registrants a written document setting forth the conditions. An appropriator must also renew his or her registration prior to the expiration of each five-year period following the completed registration. If the registration is not timely renewed, the Water Board may revoke the registration."

**Federal Rights Complicate Matters**

Not only do landowners and other groups wanting water need to understand state water rights doctrine, but in some cases, they must also follow specific federal laws. Federal reserved water rights are based on the U.S. government’s case law, presidential executive order, or an act of Congress. In some cases, the federal government exerts its role in water rights to protect native fish and wildlife on the threatened or endangered species list.

Native American’s claims to water rights have customarily been granted through federal laws, notably through a 1908 Supreme Court decision that gave Native American reservations enough water at the time they were created to meet the needs of the reservation.

Based on the western states’ prior appropriation doctrine, Native American water rights are generally senior to rights held by non-Indian users because Native Americans were often the first inhabitants of an area.

Until recent years, states and courts have made little effort to determine the quantity of water reserved for Native Americans. As a result, Indian water rights still remain largely unused and unquantified. Because these rights are not quantified, non-Indian water users with junior water rights face considerable uncertainty when planning their long-term water use. Settling or adjudicating Indian water rights can help both Indian and non-Indian water users to plan future water resources development.

But tribes have multiple interests in water. Water development is important for tribal economic development on reservations. Conversely, tribes also strongly support the protection methods of instream flows for fish and wildlife resources downstream.

Indian rights could have a significant effect on water rights established under state law. Disputes occasionally arise regarding whether the state or a Tribe (or both) have jurisdiction over non-Indian use of water on Indian reservations. Case law is mixed on this issue; so more case law may be necessary over time to provide clarity. State, tribal, and federal negotiations over water rights are currently underway on numerous reservations.
Growing Needs Cause Disputes

As population growth hits various regions of the country, local community leaders must strive to maintain adequate water supplies. Couple human and industrial growth with drought conditions and you’ve got the makings of a large-scale problem. And that’s exactly what happened in the southeastern states of Georgia, Alabama, and Florida.

The so-called “tri-state water war” between the three states kicked off in 1990 when Atlanta sought a permit from the U.S. Army Corps of Engineers to create reservoirs on the Chattahoochee, Flint, and Coosa Rivers. City leaders cited anticipated growth and future water needs as the reason to increase its withdrawals of up to 50 percent from the Chattahoochee and Flint Rivers by 2010.

The proposal set off a dispute between Georgia and its downstream neighbors, Alabama and Florida. Alabama saw the plan as a threat to its own water supply, possibly stunting industrial and population growth in the state and resulting in degraded water quality due to the decrease in water flow.

Alabama argued that the downstream flow already brings with it Atlanta’s pollution and that a decrease in the water flow would mean more pollutants that would not get diluted. Florida joined the dispute contending that the plan to siphon off more water from the Chattahoochee and Flint rivers would deplete the flow into Florida’s Apalachicola Bay and would critically injure the state’s $70 million oyster industry.

Unable to convince Atlanta to halt its plans, Alabama filed a lawsuit in federal court to prevent the Corps from implementing the siphoning plan. Florida later joined the suit. In 1992, the lawsuit was suspended pending a comprehensive study of the future water needs of the three states.

Worried about what the study results might show, the three states entered into two interstate water compacts that would allow the governors of each state and one federal appointee to analyze the study’s findings and divide the water supplies accordingly.

The compacts cover two separate river systems: the Alabama-Coosa-Tallapoosa river basin and the Apalachicola-Chattahoochee-Flint river basin. The two river systems serve a wide variety of municipal, industrial, and recreational uses, and support a complex natural ecosystem.

The two compacts are the first of their kind in the southeast. While water compacts are commonplace in the water-scarce west, prior to this dispute only one other compact was in place outside the western region.

Is the water being stolen?

While various permits, laws, and court decisions dictate how water should be delegated in a given area, the reality is that not everyone follows the rules. Water being used without a permit becomes a growing problem in times of drought and low stream or river flows.

In Texas, the honor system governs compliance with water rights, according to the Texas Natural Resource Conservation Commission’s (TNRCC) Web site. However, when rainfall is low, some users may not realize that the river conditions do not allow them to divert the water flowing past their property. For example, the flow may represent stored water that has been released for downstream users or to satisfy environmental flow requirements for wildlife, or the flow may need to pass because downstream users have senior rights and need the water.

During 1996’s dry summer, some users complained to the TNRCC that stored water from upstream reservoirs released to supply downstream

Water Rights Glossary

**Appropriative rights**
Rights to or ownership of a supply of water which is appropriated, independent of land ownership, and put to beneficial use. Appropriative rights are allocated based on priority of use, and are subject to loss by non-use or abandonment.

**Beneficial use**
Beneficial use is the use of a reasonable amount of water necessary to accomplish the purpose of the appropriation, without waste. Some common types of beneficial use are domestic use, irrigation, municipal, wildlife, recreation, and mining.

**Correlative rights**
Water rights where all users of water on an irrigation canal or an acequia have the same priority date of use and there is only one point of diversion for a common ditch or canal.

**Prior appropriation**
A doctrine of water law which allocates the right to use water on a first-come, first-served basis. The doctrine was developed out of the system of administrative disposition of land grant. Disputes were settled in favor of the party with the oldest grant.

**Priority date**
The priority date is the official time a claim or right to water is recognized by the state. This is used to determine which users with claims have senior and junior water rights for a given river, stream, or aquifer. The older the priority date, the more senior rights a user has.

**Water right permit**
This represents permission given to a water right applicant by the state to develop a water right. Water rights are considered “developed” when applicants follow provisions outlined in their permits. A developed water right permit remains in effect until a water right certificate is issued.

**Water right certificates**
These certify that water users have authority to use a specific amount of water under certain conditions. The certificate is linked to the land, not the individual, and is subject to relinquishment for lack of use (“use it or lose it”). Certificates are legal documents recorded at county offices.

**Water appropriation**
A water appropriation is an authorization granted by the state to make a private, beneficial use of the state’s water resources. An approved appropriation authorizes use of either ground or surface water and is issued as either a water right permit for a new water use or as a vested water right for an existing water use pre-dating a certain time (depending on the state in question).
buyers had been diverted by other users. Because of low rainfall, pumping demands had increased. To satisfy downstream purchasers, river authorities, water districts, and other water suppliers had released substantial amounts of stored water from reservoirs. In some cases, those downstream users complained that the water they had purchased never reached the intended destination.

In response to complaints, the TNRCC set up a temporary water rights protection program. The agency increased its streamflow monitoring in the river basins to detect unauthorized diversions. In addition, the TNRCC stopped granting temporary water use permits in several key river basins. Where low streamflows rendered normal pumping sites high and dry, the agency also allowed water right holders to amend their permits temporarily to change diversion points in order to gain better access to their water. These amendments did not adversely affect other water right holders.

In Oregon, state law allows Water Resources Department personnel to enter private land to inspect well and water diversion systems to ensure that water laws are obeyed. “Watermasters” and well inspectors—who are employees of the Department—usually conduct inspections. The Department’s groundwater geologists also make inspections.

The state’s watermasters respond to complaints from water users and determine in a time of water shortage who has the right to use water. They may shut down junior users in periods of shortage. Watermasters work with all of the water users on a given water system to ensure that the users voluntarily comply with the needs of more senior users.

Occasionally, Oregon’s watermasters take more formal actions to force compliance of unlawful water users or those who are engaged in practices which “waste” water, or continually use more water than needed to satisfy the specific beneficial use for which the right was granted.

### Oregon’s Permit Application Process

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<thead>
<tr>
<th>Initial Review</th>
<th>Department Review</th>
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<tbody>
<tr>
<td>The Department reviews the application to determine if water is available during the time requested and the proposed use is allowed.</td>
<td></td>
</tr>
<tr>
<td>This explains the findings and outlines what the Department plans to do about the permit.</td>
<td></td>
</tr>
<tr>
<td>This becomes the permit to use water. Now the applicant must begin to put the water to beneficial use.</td>
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</tbody>
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<tr>
<th>Applicant/Public Involvement</th>
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<tbody>
<tr>
<td>This is sent to the applicant</td>
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<tr>
<td>A weekly listing is sent to interested parties.</td>
</tr>
<tr>
<td>If anyone opposes the proposed order, they may file a formal protest.</td>
</tr>
<tr>
<td>This is to judge legal disputes if the protest cannot be resolved.</td>
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</tbody>
</table>

### What does the future hold?

Some say that increasing population growth will put even more stress on water utilities to provide enough water for customers in the future. Critics of the current mish-mash of water rights laws from state to state say that without changes in policy, Americans could be short of water in the next 25 years.

Current regulations encourage inefficient agricultural water use. For example, the “use-it-or-lose-it” rule forces water rights holders to use their entire water allotment or risk forfeiting it. In some states, rules prohibit farmers from storing or selling water they have a right to, but is beyond their agricultural needs. While many cities search for water, critics say these regulations discourage farmers from practicing water conservation. As a result, in many areas, municipal water users suffer or will suffer chronic shortages, and governments react with severe water use restrictions.

For more information about water rights in your state, contact your state primacy agency. For the number and address of your state primacy agency, call the National Drinking Water Clearinghouse at (800) 624-8301 and ask to speak with a drinking water technical assistant.

### Oregon Water Resource Department

The Department reviews the application to determine if water is available during the time requested and the proposed use is allowed.

This explains the findings and outlines what the Department plans to do about the permit.

This becomes the permit to use water. Now the applicant must begin to put the water to beneficial use.

**Applicant/Public Involvement**

This is sent to the applicant.

A weekly listing is sent to interested parties.

If anyone opposes the proposed order, they may file a formal protest.

This is to judge legal disputes if the protest cannot be resolved.

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Living in West Virginia where water is plentiful, the only war Jamie Knotts has battled is keeping his football field-sized garden watered during drought conditions. E-mail him at jknotts@wvu.edu.

Behind the scenes, On Tap Graphic Designer Julie Black fuels her ideas for layout with her newly found passion for West Virginia’s untamed rivers. If you have a graphic idea e-mail her at jblack@mail.nesc.wvu.edu.

Source: Oregon Water Resource Department
**Finances**

The West Virginia Infrastructure and Jobs Development Council

**Funding Water Projects in the Mountain State**

by Mark Kemp-Rye  
*On Tap* Managing Editor

For many small communities, the maze of paperwork required for water and wastewater project funding can be overwhelming. Each government agency has its own forms and its own information needs. Couple this situation with limited resources, and it’s easy to see why town officials become frustrated.

In West Virginia, help is available for both the process of applying for funds and additional funding. The West Virginia Infrastructure and Jobs Development Council (WVIJDC) funds water, wastewater, and economic development projects and coordinates project funding with other federal and state agencies.

The state’s legislature created the WVIJDC in 1994 to oversee a $300 million-bond issue that voters passed. However, a court challenge kept the WVIJDC from funding projects until 1996. The 11-member council consists of four private citizens appointed by the governor, and seven other members from agencies, including the Bureau of Public Health, the Public Service Commission, Department of Environmental Protection, Development Office, Economic Development Office, Housing Development Fund, and the Water Development Authority. The WVIJDC has four main committees: consolidation, funding, sewer technical review, and water technical review.

Working with numerous other agencies—notably the U.S. Department of Agriculture’s Rural Development Office and the U.S. Environmental Protection Agency’s revolving loan funds—the WVIJDC has successfully leveraged the initial $300 million bond into projects estimated at more than $1.1 billion.

“We’re really proud of that,” says James Williams, one of the citizen members of the council and currently its chairman, in a February 19, 2001, *Charleston Daily Mail* article. “I don’t believe there’s a comparable four-and-a-half year period in the state’s history when those kinds of dollars have been spent on economic development and health programs.”

**How does the council operate?**

One of the key roles that the WVIJDC plays is that of state funding clearinghouse. “We provide a central source for a community seeking funds for water, wastewater, and economic development projects,” says Katy Mallory, WVIJDC executive director. “The council helps identify available private, public, local, state, and federal funding to assure that maximum financing is identified for each project.”

Projects that the WVIJDC funds are measured by criteria specified in the 1994 Infrastructure and Jobs Development Act. These criteria include:

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**Infrastructure Councils on the Web**

Several states maintain Web sites related to water and wastewater infrastructure projects.

The **California Financing Coordinating Committee** seeks to “foster cooperation among the various organizations that administer [water and wastewater] programs at the state and local level.” Visit their site at www.swrcb.ca.gov/cwphome/mss/cfccfr.htm.

The **Louisiana Infrastructure Information Center** provides an online database that (1) provides a means for sharing public information about infrastructure projects, (2) aids the decision-making process for participating agencies, and (3) provides users with a “one-stop shop” for infrastructure funds. Visit their site at wwwsrch2.doa.state.la.us/infra/.

The **Ohio Small Communities Environmental Infrastructure Group** coordinates, through a Finance Committee, the “financial resources administered by state and federal agencies to address environmental infrastructure needs of small communities.” Visit their site at www.cpmra.muohio.edu/sceig/.
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• public health benefits,
• economic development benefits,
• compliance with state and federal regulations (Clean Water Act and Safe Drinking Water Act),
• degree to which project encourages effective and efficient consolidation of systems,
• cost effectiveness,
• availability of alternative funding sources,
• operation and maintenance needs,
• state or regional planning goals, and
• readiness to proceed.

All requests must include:
• a completed WVJIDC application form,
• an engineering report, and
• a Public Service Commission report.

The Council meets each month with representatives from various funding sources to review applications. First, a technical review committee considers the request. If the project is technically feasible and the most cost effective alternative, they recommend it to the funding committee. The funding committee provides a recommendation to the Council, which has the final approval. According to Mallory, the entire process is typically completed in 30 days.

“Everything with our project has gone according to schedule,” says Joe Haldeman, mayor of Rivesville, West Virginia, whose town received $1.5 million in WVJIDC loans and grants. The funding will be used to replace water mains and provide service to new customers when the work is completed in early 2003. “They had all the answers,” Haldeman says of the Council, “and we’re really pleased with how things have gone so far.”

Small Staff Makes Big Impact

Given the amount of funding that the WVJIDC has leveraged and the number of applications they receive, it might seem easy, as though they have a large staff spread around the state. The reality, however, is just the opposite. Two people—Mallory and Rose Cantrell, a part-time secretary—handle the day-to-day work from a modest office in Charleston, the state capital.

“We get a great deal of help from the various funding and regulatory agencies involved, and our citizen members who also are very active,” says Mallory. “So, we’re not really trying to expand our staff. If we had a bigger staff, it would just mean less money for the projects.”

A brief summary of WVJIDC activities gives an idea how their work impacts the Mountain State:

• more than $1.1 billion funded,
• $987 million for water and sewer projects,
• $207 million in federal monies leveraged,
• 28,000 new customers receiving water service,
• 23,000 new customers receiving sewer service,
• more than 250,000 existing customers receiving improved service, and
• compliance and environmental issues have been resolved.

More than 260 water and wastewater projects were funded between 1994 and 2000.

West Virginia’s Needs Are Great

The WVJIDC estimates that more than 25 percent of West Virginia’s population still need access to safe drinking water and that 45 percent have inadequate sewer systems. “In order
to meet the current drinking water and wastewater needs of the state and improve the overall quality of life,” a council statement reads, “a minimum of $878 million is needed for community water systems, and at least $1.9 billion is required for central sewer systems throughout the state.”

To achieve the nearly $3 billion goal, the Infrastructure Council needs $300 million in additional money, which will enable additional revenue bonds to be issued, according to WVI-JDC projections.

Public works projects have clearly improved the quality of water in West Virginia. However, notes Mallory, much remains to be done. “The needs are great, but we remain hopeful that by 2010, most of them will be met,” she says. “Loans are being repaid and we are now able to issue revenue bonds against these repayments. And, in the most recent [2001] legislative session, monies were earmarked for more infrastructure funding.”

**What goes on in other states?**

The need for improved infrastructure is a growing concern for every state. And, with a limited amount of federal funding available, more states are relying on their own resources to fund projects.

Oregon is one such state. The state’s Economic and Community Development Department combines funding from the state bond bank with proceeds from the state lottery to finance infrastructure projects, including drinking water and wastewater activities. According to Tom Meek, Oregon Bond Bank financial analyst, the eligibility criteria for a loan are simple. Systems must prove that they are “creditworthy” and seek a loan of at least $250,000.

Under the Oregon regulations, a community that doesn’t receive an “A” rating on its own isn’t eligible for bond bank funds. However, they may still be able to get help. “Small loans and loans to systems that are less creditworthy are financed solely from the lottery,” says Meek.

In North Dakota, the Municipal Bond Bank provides funding for a variety of needs. Unlike Oregon, the North Dakota Bank has no minimum loan amount and has issued many loans of less than $100,000, including one for just $25,000. The interest that communities pay on these loans is the same rate that the bank receives for the bonds it sells. (See the Spring 1997 Water Sense for more information about bonds.)

States across the country also are finding it advantageous to make the search for funds easier on communities. The process typically works like this:

1. the community develops a proposal for an infrastructure project;
2. the community presents the proposal to a coordinating council, such as the WVIJDC;
3. the agency, which meets on a regular basis (often monthly), ranks the proposed projects by need and lines up funding from different sources for eligible proposals; and
4. the community is informed about how the project will proceed.

In the past, the community needed to submit a different, often complex, application to each federal or state agency. A streamlined process means less duplication and less waiting for projects to take shape.

*For more information about the WVIJDC, call (304) 558-4607 or write to 300 Summers St., Suite 980, Charleston, WV 25301. Information also is available on their Web site at www.wvinfrastructure.com. More information about the Oregon Economic and Community Development Department (OECDD) and their infrastructure loans may be found at www.econ.state.or.us. You may also write to OECDD at 775 Summer St., Suite 200, Salem, OR 97301 or call toll-free (800) 233-3306.*

*The North Dakota Municipal Bond Bank (NDMBB) has a Web site at www.state.nd.us/bond-bank/. Check the details of the Capital Financing Program to learn more about infrastructure loans in that state. You may also write the NDMBB at 418 East Broadway, Suite 246, Bismarck, ND 58501. You may also call toll-free at (800) 526-3509.*

“I don’t believe there’s a comparable four-and-a-half year period in the state’s history when those kinds of dollars have been spent on economic development and health programs.”

James Williams, chairman, West Virginia Infrastructure and Jobs Development Council
If the CCC Built It, It’s Probably Still There

by Kathy Jesperson
On Tap Associate Editor

On October 29, 1929, the stock market crashed. Once prosperous Americans were instantly bankrupt. All of the free-spending of the “Roaring ’20s” suddenly seemed like the distant past.

Shantytowns—to be forever known as Hoovervilles—sprang up everywhere. “Orphan trains” carried children from town to town in search of even the slightest chance at life. Soup and bread lines became a common sight.

By 1931, severe drought hit the Midwest and southern Great Plains. Crops died and the “Black Blizzards” began. For the next decade, out of work, hungry, frightened Americans would live through the Great Depression.

The 1932 presidential election, however, was about to bring some welcome relief. With a landslide of confidence, Americans placed their hopes with Franklin Delano Roosevelt. They would not be disappointed.

During the new president’s first “Hundred Days,” he promised Americans a “New Deal” and revitalized the faith of a desperate nation.

On March 9, 1933, Roosevelt called the 73rd Congress into emergency session to seek authorization for Emergency Conservation Work (ECW). Roosevelt told Congress, “we can take a vast army of the unemployed out into healthful surroundings. We can eliminate, to some extent at least, the threat that enforced idleness brings to spiritual and moral stability.”

He proposed to recruit thousands of young men, enroll them into a peacetime army, and send them to battle against the destruction of the nation’s natural resources.

**CCC Gets Off to a Fast Start**

Congress authorized the ECW under Public Act No. 5. Roosevelt approved the act known as the Reforestation and Relief Bill on March 31, 1933. The name was officially changed to the Civilian Conservation Corps (CCC) on June 28, 1937. Roosevelt appointed Robert Fechner as the director of the program.

With the Act in place, Roosevelt promised to have 250,000 men in camps by the end of July 1933. By April 6, 1933, the CCC enrolled its first 25,000 young men.

The first camp, called “Roosevelt,” was established on April 17, 1933, in George Washington National Forest near Luray, Virginia. Less than three months later, approximately 300,000 men from all over the country were settled in close to 1,500 camps. According to Fechner, “it was the most rapid large-scale mobilization of men the country had ever witnessed.”

The CCC was a youth group. Initially, young men between 18 and 25 years old enrolled in the corps for six-month service stretches. They could re-enlist for another six-month period, if they wished, for a maximum of two years. The enrollees received $30 per month. If they had families, they received $5 on payday and $25 was sent home.

“I had to quit school when I was 17,” says Dominic Cuda, who served in the CCC in Somerset, Pennsylvania. “My family only had $3 a week. I could give them the $25, and I would have $5 spending money. We never saw these Civilian Conservation Corps enrollees of Company 2123, Camp BR-7, Deaver, Wyoming, dig a ditch for a water line.

“We were an army with shovels instead of guns.”

Angelo Nocera, president, New Castle, Pennsylvania 125th CCC Alumni Association.
the $25. It was sent straight home. Roosevelt took people off the streets and off Relief. He knew what he was doing."

In 1937, the government lowered the minimum enrollment age to 17 and raised the maximum age to 28. The government also expanded the program to include World War I veterans, Native Americans, Eskimos, and local experienced men who served as trades supervisors. At its peak in 1935, the CCC employed 505,782 young men scattered throughout 2,652 camps.

**You're in the CCC Now**

Four different federal agencies administered the CCC. The War Department took charge of the camps, while the Departments of Agriculture, Interior, and Labor, took charge of the actual works projects and enrolling the young men into the program.

“When we were in the camp, the Army was in charge of us,” says Perry L. Cavaricci, who served two years in the CCC in Washington and New Mexico. “When we were out in the woods, we belonged to Forestry.”

Ray Hoyt notes in *We Can Take It. A Short Story of the CCC*, that the War Department was the only government agency organized enough to enroll, clothe, feed, and supervise several hundred thousand men in camps on short notice.

Although there was some question about Roosevelt’s choice of the Army to manage the camps, most thought it was a good choice.

“Sometimes they were compared to the Hitler Youth, or the compulsory military training programs of Europe,” says Larry Sypolt, historian with West Virginia University’s Institute for the History of Technology and Industrial Archaeology. “The only connection to the military was in running the camps. The reason the Army was placed in charge was because they already had experience in training and managing people.”

“I think that, unknowingly, we prepared for World War II,” he continues. “Although they did end up doing some national defense projects, it was a conservation program for unemployed youths.”

“But the CCC was strictly a civilian group,” he says. “There were a number of things that were like the Army. They had reveille in the morning, followed by roll call, they ate in a mess hall, and had taps at night. All the enrollees were trained in sort of a mini boot camp, which was a two-week conditioning course to become physically fit. If they weren’t deemed physically fit, they were sent home. They had to pass all the physicals and take all the shots just like when a young man joined the Army. But no one had to stay. They could leave if they really wanted.

“Sometimes the boys would go AWOL [absent without leave],” says Sypolt. “They usually tried to send the enrollees out of the state that they lived in to avoid desertions. If the enrollee was stationed too close to home, he may just take off and go marry his high school sweetheart and not come back. So being away from home helped the enrollees to become more worldly.”

**Conservation Work Pays Off**

Sypolt notes that the CCC did its most good for the young men who were a part of it, but the conservation work that they performed has not been surpassed to this day.

“Prior to the inauguration of the CCC, conservation of resources was allied with the weather, in that there was plenty of talk about both and not much done about either,” noted Fechner.

“It wasn’t that people weren’t concerned about the environment. They just didn’t know what to do about it,” says Sypolt. “What the Depression did was give the president a means of addressing environmental concerns.”

Roosevelt had long been concerned about the country’s national resources and wanted to find a way to reclaim and preserve them. The Depression furnished idle manpower. Roosevelt seized the opportunity to put the two together, and the CCC left the nation with a vastly improved environment.

People familiar with the CCC most often associate it with the beautifully crafted stone and log structures within state and national forests and parks. Many have said that long before there was an Earth Day, there was a CCC. In fact, the CCC may have been the first environmental organization in the country. But they did much more than that.

Under the full impact of the Dust Bowl in mid-1934, Roosevelt envisioned a greater role for the CCC to counteract the devastation of the drought. He asked Congress for another $50 million to employ young men to work on soil erosion prevention and irrigation projects. So the “CCC boys” set out to plant more than 2.3 billion tree seedlings.

The erosion control work that they did meant that farm production could increase. The trees that they planted meant that 2.5 million acres...
of bare, unproductive land could now produce timber for future use, be turned into a habitat for wildlife, provide shelter and protection, and prevent the soil from washing away.

Tree Army Plants More Than Trees

Besides planting trees, the CCC worked on numerous water projects, bringing water to places that lacked it before. According to the Civilian Conservation Corps Continental United States and Outlying Possessions Total Work Completed During the Period April 1933-June 30, 1942 report, they also:

- dug 8,065 wells;
- installed 1,865 drinking fountains;
- assembled 5,082 water control structures;
- constructed 5,935 sewage and waste disposal systems; and
- cleared land for 9,805 reservoirs.

“We were an army with shovels instead of guns,” says Angelo Nocera, president of the New Castle, Pennsylvania, 125th CCC Alumni Association and an enrollee from 1938 to 1939 in Virginia. “They called us ‘Roosevelt’s Tree Army.’”

“We saved the nation’s environment,” he says. “But most of the ‘Cs’ didn’t know they were saving the environment. They just knew they had a job and were making money to help their families.”

Ohio Was First in Line

When word got out that the CCC was forming, a number of communities scrambled to be first in line.

“The Muskingum Watershed Conservancy District in Ohio was the first organization to approach Fechner about setting up CCC camps,” says Sypolt. “Some said Muskingum officials were waiting in Fechner’s office the first day he came to work. Because they were first, they got more camps in their area and more work done.

“It was a real advantage to have a CCC camp located near your town,” Sypolt continues. “The camps were like small communities, and they would buy all of their supplies locally—lumber, food, whatever was needed—and that brought money into the community. Also, the men would go into town on payday weekends and spend their money. Plus, they were doing a lot of good work for the environment.

“In West Virginia, CCC camps built almost all the state’s parks,” he says. “Prior to the CCC, few states had state parks, if any parks at all.

“CCC enrollees dug water lines for fountains, built public toilets, and built trails,” he explains. “We can thank the CCC for the things they made available for recreation. Then people didn’t travel like they do today. No one had recreational vehicles to go camping.”

Water Projects Remedy Drought

Many areas of the country experienced acute water deficiencies during the Depression because of a severe drought. To remedy the situation, CCC workers built supplemental storage facilities. In addition, they cleared areas of timber and debris to prepare for new dam construction. They built new feeder canals to bring additional water to existing reservoirs and took on flood control projects. The CCC worked on many projects for the Bureau of Reclamation. The following list names only a few of the reclamation projects:

Camp Topock in Arizona built the Parker Dam for the Metropolitan Water District of Southern California so that water could be stored for Los Angeles, and it provided flood control. It also served as water storage for the

“My family only had $3 a week. I could give them the $25, and I would have $5 spending money. We never saw the $25. It was sent straight home. Roosevelt took people off the streets and off Relief. He knew what he was doing.”

Dominic Cuda, CCC alumnus

Photos by Kay Nocera and Kathy Jesperson

Many Civilian Conservation Corps (CCC) alumni still gather every month to continue the work they started when they were young men. These men of the New Castle, Pennsylvania, 125th CCC Alumni Association work hard to place identification markers on CCC-constructed sites around Pennsylvania.
Colorado River Indian Reservation and the Parker-Gila Project.

**Camp Island Park** in Idaho cleared a reservoir site for Island Park Dam. The camp’s enrollees cleared 150 acres of land for the reservoir and 2.5 miles of road.

**Camps BR [Bureau of Reclamation] 34 and 35** rehabilitated an irrigation and drainage project for the Newlands Project, which was one of the first reclamation projects.

**Camp Reno** rehabilitated the distribution system of the Truckee Storage Project for irrigation projects and water storage.

**Camp Deer Creek** worked on the Provo River Project to provide supplemental water supply for farmlands and to enhance municipal water supplies.

**Texas CCC** water projects included the dam at Meridian and the water storage facility at Palmetto.

The projects that the CCC enrollees worked on helped them to gain job skills. But being a CCC enrollee had other advantages. Enrollees could gain life skills that they wouldn’t have otherwise.

### CCC Aided Social Development

“Social conditions in the 1930s were much different than they are today,” says Sypolt. “We were a stagnant society. We think, ‘Well, it’s always been this way.’ But usually there’s some reason that it’s ‘the way it is.’

“Prior to the Depression, people didn’t migrate more than 10 miles away from home.” Sypolt continues. “Most times, a young man would work on the family farm. He’d get up in the morning, work in the field, maybe all day, then come home for dinner. Then maybe he’d go back to the field to work until it was time to go to bed—often sleeping in the clothes he’d had on all day—maybe all week.

“The CCC taught these young men how to take care of themselves,” he says. “They got cleaned up everyday. They changed their clothes. They got on a regular schedule. They had three square meals a day. They learned how to interact with other people. They learned social, leadership, and employment skills they never had the opportunity to learn before.”

### We Finally Get To Eat

When the average young man entered the CCC, he weighed about 147 pounds. His average weight gain in the first month was 11.5 pounds.

“It made a man out me,” says Cavaricci. “And we were treated really good. We made lots of friends and we all became very close. It was a good experience for me. I hope what the ‘Cs’ did for me could be done for young people today.”

Tommy Rossi, who worked for the CCC in Virginia, agrees: "It was a great experience. It was the best program that the president ever made. They trained us to preserve the country. We need something like it now. Back then it wasn’t like it is today. Everybody was poor at the same time, so we helped each other. No one had to steal anything to survive.”

### What’s the legacy?

The CCC’s legacy is the enduring quality of the work that they did. Many of the high quality structures that they built are still standing. More than 2.5 million men had been
enrollees in the 4,500 camps that existed sometime during the CCC’s nine-year life span. And the country had an environmental makeover that’s still evident today.

Many CCC alumni now recognize the significance of what they did. But at the time they were just happy to have a meal.

“I went in to eat,” says Wally Baskeyfield, who was in the CCC from 1938 to 1939. “I went in for six months and then came home. My mother told me, ‘It isn’t any better,’ so I had to go back. But once you got out, you had to wait six months to go back in. Seemed like I was never home then.”

Baskeyfield, like many of his CCC buddies, enlisted when he was under age. He was only 15 when he joined. “I lied,” he says. “My family needed the money.”

Stan Babick also supported his family. “I had to support my mother because I didn’t have a father. But the food they fed us was delicious. We ate like kings.”

Edward Janus remembers tough times: “I had to go to the ‘Cs.’ My father wasn’t working, but he finally got a job for the WPA [Works Progress Administration]. At first we got $5 a month, and then the next time you joined you got $8.”

Amiel Attisano says that survival during the Depression often depended on your ingenuity. “I would work in the garden in my bare feet so I could save my shoes for walking down the road. But we had food from the garden. I joined the ‘Cs’ because my family came first. Somebody had to help them.”

Many CCC enrollees still get together to talk about old times, but also to participate in conservation projects around their community. The CCC alumni of New Castle, Pennsylvania, meet once a month to discuss new and old projects. They still have much pride in the work that they did, but they also continue to use their CCC skills. They post markers around their state to commemorate sites that the CCC developed or built. They also take on Adopt-a-Highway projects, plant trees in the state’s parks, and help members who can’t get around like they used to.

Of all the New Deal efforts, the CCC was one of the most touted programs of Roosevelt’s “alphabet soup.” It was officially shut down on June 30, 1942. Unemployment was no longer an issue, and the nation’s attention shifted toward the war effort. Most of the “CCC boys” were now mature, responsible adults and many were shipped out to fight in WWII.

“Not all the ‘Cs’ served in WWII, but they all served their country in one way or another,” concludes Nocera.

For more information about the CCC, contact the Civilian Conservation Corps Alumni Headquarters, 16 Hancock Ave., St. Louis, MO 63125 or P.O. Box 16429, St. Louis, MO 63125. You also may call them at (314) 487-8666. Or visit their Web site at www.cccalumni.org/NACCCA.

You may contact Sypolt at the Institute for the History of Technology and Industrial Archaeology, West Virginia University, P.O. Box 6305, 1535 Mileground—Bicentennial House, Morgantown, WV 26506-6305. You also may call him at (304) 293-3704, or email him at lsypolt@wvu.edu.

References:
Civilian Conservation Corps Alumni Headquarters 16 Hancock Ave., St. Louis, MO 63125 or P.O. Box 16429, St. Louis, MO 63125. (314) 487-8666. www.cccalumni.org/NACCCA.

Civilian Conservation Corps Continental United States and Outlying Possessions Total Work Completed During the Period April 1933–June 30, 1942 Report.


The New Deal Network. newdeal.fert.org/


South Carolina Department of Archives and Public Programs Document, Packet No. 4. The Civilian Conservation Corps in South Carolina 1933–1942.

Texas Parks & Wildlife, 4200 Smith School Road, Austin, TX 78744 (800) 792-1112 www.tpwd.state.tx.us/cgi-bin/imagemap/butnpark?29,27.


Associate Editor Kathy Jesperson enjoys writing articles that have an historical slant. If you have an article idea for her, please e-mail her at kjespers@wvu.edu.
How in the world does EPA make them?

by Jamie Knotts
On Tap Assistant Editor

Ask any drinking water operator or utility manager what’s the hardest part of their job and it’s likely that one of their top answers would be “understanding and complying with ever-changing federal regulations.” But ask them how the U.S. Environmental Protection Agency (EPA) sets new requirements they have to put into place at their treatment plant and you’ll probably be met with a blank stare.

Understanding some of the regulations is hard enough, let alone knowing the complicated procedure EPA uses to develop new rules. The regulation process involves Congress, the President, scientists, lobbyists working for special interest groups, agency bureaucrats and technical experts (specializing in engineering, science, public health, economics, and statistics), and the general public. As part of the technical evaluation and analysis that goes into developing drinking water rules, EPA must consider data and research on contaminant occurrence, chronic and acute health effects, sensitive sub-populations, available control technologies as well as readily available analytical methods. And even though the process allows for input from many different groups, EPA has been severely criticized at times for how it does set its regulations.

Giving EPA Authority

The landmark piece of legislation that gives EPA power in developing and overseeing drinking water regulations is the Safe Drinking Water Act (SDWA). Originally passed by Congress in 1974 to protect public health by regulating the nation’s public water supply, the law was amended in 1986 and 1996, and requires many actions to protect drinking water and its sources—rivers, lakes, reservoirs, springs, and groundwater wells. (See the Winter 1996 and Winter 1999 issues of On Tap for more information about the SDWA.) The SDWA authorizes EPA to set national health-based standards for drinking water to protect against both naturally-occurring and man-made contaminants that may be found in drinking water. EPA, states, and water systems then work together to make sure that these standards are met.

EPA also gets directives from Congress, Presidential initiatives, and priorities set by the agency’s administrator. In addition to introducing a bill in Congress, another way a representative or senator can influence the rule-making process is by attaching riders—an amendment added to a piece of legislation—to a related or non-related bill making its way through Congress.

For instance, an influential senator may have a local or state water concern that he or she wants EPA to address through a new or updated regulation. By adding a directive to EPA onto an appropriation bill, it’s less likely that the President will veto the legislation outright due to one of many riders that’s been attached to the larger piece of legislation that he wants to sign.

The recently contested arsenic standard is an example of a congressional rider that is making its way through the legislative process. In this example, the House of Representatives added a rider stipulating that the EPA immediately adopt the Clinton Administration’s standard of 10 parts per billion (later rescinded by the Bush Administration). The U.S. Senate’s rider to a piece of its legislation simply said that EPA was to immediately set a new standard for arsenic that provides for appropriate health protection.

Because the two riders differ, a conference committee made up of members of both the House and Senate will negotiate the final wording before it is sent to the President for either a signature or a veto, assuming the rider makes it out of the conference committee. Some riders are removed through negotiations before bills ever reach the President.
Presidential Powers Enter the Mix

But Congress isn’t the only player in the process. The President wields considerable power in how EPA carries out its oversight and regulatory functions. From an administrative and political point of view, the President’s selection of EPA Administrator is often seen as a barometer of how the agency will operate. Administrators set priorities within the agency, which often dictate how the agency will approach a regulation’s development.

As occurred with the change from the Clinton Administration to the Bush Administration in January, the President can also exert his influence over regulations passed by a previous administration. President Bush directed that all federal agencies had 60 days to review any standards passed in the waning days of the Clinton Administration. President Bush disagreed with the Arsenic Standard as developed by EPA and put it on hold through the 60-day review. Once EPA promulgates a regulation (publishes a final rule in the Federal Register), 180 days must pass before the regulation goes into effect. The President’s hold on regulations fell within this 180-day wait period. The House and Senate’s riders arose as a direct response. Once the conference committee completes final negotiations, we’ll know what shape the final Arsenic Standard will take.

SDWA Steers EPA

Under the SDWA, Congress requires EPA to review existing regulation to see if any regulations need to be updated, which is often referred to as the six-year review process. Congress also requires EPA to develop regulations for a specific list of contaminants, including microbial disinfection products, radon, arsenic, and the groundwater rule. And finally congress requires EPA to address new contaminants through a risk-based analysis of contaminants listed on EPA’s contaminant candidate list.

When EPA considers a contaminant as identified through legal requirement, court order, Presidential initiative, or administrator priority, the SDWA requires EPA to establish a primary drinking water standard. At its simplest, EPA does this through a three-step process.

First, EPA identifies contaminants for regulatory consideration. To do this, it must determine whether the contaminant may adversely affect public health, evaluate where the contaminant occurs in drinking water with the frequency levels of public health concern, and decide whether regulating a contaminant poses a meaningful opportunity to reduce risk. EPA identifies these contaminants for further study, and determines contaminants to potentially regulate.

Second, EPA determines a maximum contaminant level goal (MCLG) for contaminants it decides to regulate. This goal is the level of a contaminant in drinking water below which there is no known or expected risk to health. These goals allow for a margin of safety.

Third, EPA specifies a maximum contaminant level (MCL), the highest permissible level of a contaminant in drinking water delivered to any public water system user. These levels are enforceable standards, and are set as close to the MCLG as feasible. SDWA defines feasible as the level that may be achieved using the best technology, treatment techniques, and other means that EPA finds (after examining for efficiency under field conditions) are available, taking cost into consideration. When it is not economically or technically feasible to set an MCL, or when there is no reliable or economic method to detect contaminants in the water, EPA instead sets a required Treatment Technique, which specifies a way to treat the water to remove contaminants.

How EPA Develops Regulations

The process EPA uses to develop regulations becomes a little more complicated when you look at the specifics. The steps the agency uses include tiering, analytic blueprint, options development, options selection, and final agency review.

Under tiering, the EPA lead office responsible for the rule—the Office of Ground Water and Drinking Water for drinking water regulations—assigns the rule to one of three tiers. Tier 1 includes the rules that are the most visible and controversial, and of most interest to the agency’s administrator. Tier 2 includes rules with extensive cross-media issues or which require extensive cross-agency involvement. Tier 1 and 2 regulations require a cross-agency workgroup and early senior management direction. Tier 3 includes all rules not considered Tier 1 or 2. The Regulatory Steering Committee, which consists of representatives of EPA’s assistant administrators and is approved by the Administrator’s Office, receives the tier designation.

From there, the cross-agency workgroup coordinates the regulation’s development and, as a first step, prepares an analytic blueprint—the plan for the analyses, consultation, and other activities that support the regulation. The blueprint details how EPA will gather the

“A lot of [EPA’s] rules don’t apply to small communities. Small communities’ problem is a resource problem rather than a regulatory problem.”

Mike Keegan, analyst, National Rural Water Association
economic, scientific, technical, and intergovernmental information needed to make sound decisions, as well as the analyses required by law or Executive Order. It also addresses significant policy issues, including implementation issues, such as the need for real-time compliance assistance tools, as well as international factors like treaties, transboundary or global pollution, and other countries’ relevant experiences. Senior management in the program offices, and in some cases, the Administrator’s Office guides the blueprint development. It is then circulated for approval by workgroup program managers and, in the case of Tier 1 and 2 rules, senior management. A blueprint is required for Tier 1 and 2 regulations, and strongly recommended for Tier 3.

The next step is to develop options. To develop regulatory options, the lead program office consults with a broad range of stakeholders, which may include state, local, and tribal governments, industry, small businesses, public interest groups, and others. The workgroup conducts the analyses in the analytic blueprint and considers other issues such as disproportionate impacts on minority groups, children’s health issues, and innovative alternatives to the regulation.

Once the options are developed, EPA management considers the scientific findings, the relative benefits and costs, and the policy issues identified through the various analyses and consultations. If management selects a rulemaking option, the workgroup drafts the pre-amble to the rule, the proposed regulatory text, and supporting documents.

At the end of the process, the lead office prepares a final draft and circulates it to the workgroup for final review and approval. If the rule is in Tier 1 or 2, the Office of Policy, Economics and Innovation chairs a final agency review meeting to assure that all issues are resolved, that all requirements have been met, and that the rule is ready for Office of Management and Budget review (where required) or Federal Register publication.

**Stakeholders Get Involved**

The 1996 amendments to the SDWA greatly enhanced the general public and drinking water stakeholders—operators, utilities, water association members, environmental groups, and other drinking water professionals—input into the rule-making process. EPA takes comments through public meetings, presentations at conferences, and workgroup meetings.

Jerry Biberstine, a senior environmental engineer with the National Rural Water Association (NRWA), says EPA’s openness to others’ input has been helpful for small and rural drinking water utilities.

“Small and rural systems have special problems that are difficult to determine when you’re just looking at large systems when writing rules,” says Biberstine. “Such things as the cost of treatment and the scope of the rule are important to small systems, so we offer EPA that insight.

“We feel the impact on small systems—75 percent of all systems—is difficult for EPA to determine because they are most familiar with larger systems and the cost impacts to

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**EPA, States Enforce Regulations**

The Safe Drinking Water Act (SDWA) applies to every public water system in the U.S. More than 170,000 public water systems provide water to almost all Americans at some time in their lives. The responsibility for making sure these public water systems provide safe drinking water is divided among EPA, states, tribes, water systems, and the public.

EPA is expected to set national standards for drinking water based upon sound science that protects against health risks and considers available technology and costs. Each standard also includes requirements for water systems to test for contaminants in the water to make sure standards are achieved. In addition to setting these standards, EPA also offers guidance, assistance, and public information about drinking water, collects drinking water data, and oversees state drinking water programs.

While EPA is the regulatory program overseeing drinking water systems, state drinking water programs provide the most direct oversight. States may apply to EPA for “primacy,” the authority to implement SDWA within their jurisdictions, if they can show that they will adopt standards at least as stringent as EPA’s and make sure water systems meet these standards. All states and territories, except Wyoming and the District of Columbia, have received primacy. While no Indian tribe has yet applied for and received primacy, four tribes currently receive “treatment as a state” status, and are eligible for primacy.

States, or EPA acting as a primacy agent, make sure water systems test for contaminants, review plans for water system improvements, conduct onsite inspections and sanitary surveys, provide training and technical assistance, and take action against water systems not meeting standards.

To ensure that drinking water is safe, SDWA sets up multiple barriers against pollution. These barriers include: source water protection, treatment, distribution system integrity, and public information. As operators well know, water systems are responsible for ensuring that contaminants in tap water do not exceed the standards. Water systems treat the water, and must test their water frequently for specified contaminants and report the results to states. If a water system is not meeting these standards, it is the water supplier’s responsibility to notify its customers. Most water suppliers now are also required to prepare an annual Consumer Confidence Report for their customers.
them,” he says. “NRWA has been providing EPA with a sense of scope, cost, and other factors that represent a small or rural water utility’s perspective. We give them input that hopefully helps them make regulations that are both affordable and implementable for small water systems.

“We’ve been lucky to have someone sit in on almost every workgroup on rule-writing,” Biberstine says. “We’ve had members involved in committee meetings and public meetings, and Rural Water has also offered written comments to the agency. In addition we’re in contact with EPA personnel directly.”

The American Water Works Association (AWWA) also takes an active role in EPA’s rule making. Under the direction of the AWWA Water Utility Council (WUC) and AWWA Executive Committee, association volunteers serve on Technical Advisory Workgroups (TAW) to participate in developing new regulations, preparing comments on proposed regulations, and implementing projects under the Water Industry Technical Action Fund. AWWA’s Government Affairs Division supports the activities of the WUC and TAWs and periodically prepares status reports on upcoming regulations. In addition, AWWA members often offer testimony to Congress and EPA about proposed legislation and regulations.

Improving the Regulatory Process

It’s no secret that most groups that are regulated dislike being so. And they often disagree with the scope and impact that requirements place on them. The federal government recognized this, and in 1996, President Clinton issued an Executive Order instructing agencies to adhere to 12 “principles of regulation.” These principles, which provide a series of guideposts for agencies to follow in developing more focused, effective, efficient, and less burdensome rules, were grouped into six broad themes that call on agencies to:

1. properly identify problems and risks to be addressed, and tailor the regulatory approach narrowly to address them;
2. develop alternative approaches to traditional command-and-control regulation, such as using performance standards (telling people what goals to meet, not how to meet them), relying on market incentives, or issuing non-binding guidance in lieu of rules;
3. develop rules that, according to sound analysis, are cost-effective and have benefits that justify their costs;
4. consult with those affected by the regulation, especially state, local, and tribal governments;
5. ensure that agency rules are well coordinated with rules or policies of other agencies; and
6. streamline, simplify, and reduce the burden of federal regulation.

EPA Is Criticized

But just because a federal agency says it is being more accountable and less burdensome to the community it regulates doesn’t always sit well with those facing compliance issues with new or more stringent regulations. Aside from those stakeholders being regulated, EPA officials have also criticized the agency.

In 1996, David Lewis a researcher with the EPA National Exposure Research Laboratory in Athens, Georgia, wrote a commentary in the Athens Banner-Herald that the EPA’s environmental policies were misguided. Lewis’ guest column read, in part, that “federal regulators assume that everything humans do will ultimately harm the environment. Therefore, they promulgate regulations aimed at making it extraordinarily difficult and expensive to do anything that changes the environment in any way.”

EPA investigated Lewis for alleged ethics violations as a result of the commentary. Investigators looked into whether an editor’s note in Lewis’ column violated a rule because it overemphasized his position with the agency.

In June 2000, David Paris testified before Congress where he offered a number of criticisms of EPA’s work in implementing the 1996 SDWA amendments. Paris, a water supply administrator with the Manchester Water Treatment Plant in Manchester, New Hampshire, spoke on behalf of the AWWA.

While complimenting EPA’s Office of Groundwater and Drinking Water for involving the public in developing regulations, he noted that, “AWWA does have a major concern that EPA is not conducting essential
research and developing new data to support drinking water regulations as expected in the 1996 SDWA Amendments.

“There is also a long-term concern that the authorizations for the new drinking water state revolving fund will not be adequate to address the needs identified to comply with SDWA regulations and upgrade drinking water infrastructure to ensure that high quality safe drinking water is provided to the American people.”

NRWA’s Jerry Biberstine says one of the biggest problems EPA has with rulemaking is the amount of time it has to consider sound science that shows the benefits and the cost of the rules. “It’s the time frame that is the problem,” he says. “Congress forces EPA to address all the concerns of a proposed regulation in a short amount of time. I fault the process rather than EPA. They are under considerable pressure.”

EPA Recognizes Problems

EPA itself recognized problems and that its regulatory process needed to be improved. In a June 2001 EPA Task Force Report titled Improving Regulations, the agency acknowledged problems and ways to improve the process, primarily the quality of supporting scientific, economic, and policy analysis.

The report said that EPA needed, “better science and economic analysis, broader consideration of policy options, and greater accountability.”

EPA acknowledged that, “It is absolutely essential that EPA leaders have the best possible scientific and economic information to consider when making decisions. But it’s important to note that science and economics are only two of the many factors that must be considered. Other factors might include implementation by states or local governments, disproportionate impacts on low income communities, the limitations of available technology, or whether a certain approach can actually be enforced. The role of science and economics is, therefore, to inform the decision making, not to dictate the final decision.”

Regulations Affect Small Systems

Mike Keegan, an analyst with the NRWA, says that small and rural water systems often face the brunt of regulations and may not have the resources to cope with them.

“We try to advocate for the small town’s best interest and help EPA look at the big picture,” he says. “A lot of their rules don’t apply to small communities. Small communities’ problem is a resource problem rather than a regulatory problem. EPA comes at it with a regulatory solution saying a system needs to meet a standard and then they fine you if you don’t comply with that standard. We’re saying small utilities need the resources to correct the problems, not a regulation—and usually we are not talking about water quality problems, but rather administrative problems.”

Keegan says that the current EPA rulemaking process also doesn’t allow for much leeway for locals to make decisions.

“The people who run the town’s water system and the local community should have some choice in the matter,” he says. “The SDWA is blind to nuances at the local level.

“Let’s say that when the new arsenic regulation is finalized it allows only 10 parts per billion and a certain town’s water tests at 10.5 parts per billion. In the gray area like this, I want the local community to have more control on the issue rather than the requirements be set in stone,” Keegan says. “They should have some say as to whether they want to install an expensive treatment process for 0.5 parts per billion. Scientists can’t claim that their water would be any safer having that small amount removed.

“If you went out and told them (small utilities) what they needed to do to improve their water and make it sensible, then they could take care of their problems much easier,” Keegan says. “Regulations just don’t fit. We try to get in there (the rule-making process) to hopefully make sure the rules don’t do any harm.

“I think one of the biggest problems has been the environmental groups constantly misleading the public on who is in control of their local water quality,” continues Keegan. “A local community has complete control over quality issues, however, big environmental groups promote the image of a sinister force attempting to harm your family. They should be educating the public on civics and how to empower locals to better make local decisions instead of always removing local authority and replacing it with federal authority.

“We have an open challenge to the green groups: If they can get the local votes to implement any of their policies we would back them 100 percent. However, the reality is that locals don’t back their agenda so they need to override the local will with EPA authority.”

For more information about EPA’s regulatory process, visit the Office of Ground Water and Drinking Water’s Web site at www.epa.gov/OGWDW/ or call the Safe Drinking Water Hotline at (800) 426-4791. For more information about NRWA, visit their site at www.nrwa.org or call them at (580) 252-0629.

“We feel the impact on small systems—75 percent of all systems—is difficult for EPA to determine because they are most familiar with larger systems and the cost impacts to them.”

Jerry Biberstine, senior environmental engineer, National Rural Water Association
The Odd Couple:

by Mark Kemp-Rye
On Tap Managing Editor

A red-shouldered hawk circles overhead as Mike Eaton puts his canoe in the Cosumnes River, in the heart of California’s Great Central Valley. Two or three times a month Eaton comes here to paddle for a few hours after work and soak up the solitude the river affords him. As he drifts past blue oak woodlands and cottonwood trees covered in wild grape vines—near an area known locally as the “Howard Ranch”—he watches a flock of sandhill cranes, searching the riverbank for their dinner.

This pastoral scene never ceases to amaze Eaton; partly because it’s a mere 20 miles from the hustle and bustle of Sacramento (the state capital and a city rapidly approaching two million population), but mostly because, not long ago, the area seemed destined for development. Thanks to the work of Eaton, director of the Nature Conservancy’s Cosumnes River Project, and a host of others including the U.S. Environmental Protection Agency (EPA), this pristine region will remain as it has for centuries.

“This really is a unique area,” says Eaton. “We’re only a few miles from Interstate 5 here, but, if you were to look around, you might guess you were in the middle of the Louisiana bayou. In places the river is nearly 300 yards wide, which kind of defies the stereotype of a California river.
“The Howard Ranch property is a combination of extensive woodlands of several native species, a productive rangeland, and vernal pools, one-of-a-kind springtime wetlands,” he continues. “And, it’s the only remaining free-flowing river coming out of the Sierra Nevada Mountains. Preserving these important watershed lands is absolutely essential to the environmental health of the river and this region.”

Tim Vendlinksi, a life scientist with EPA Region 9, agrees. “Pressures to subdivide and develop farms, ranches, and natural sites on the fringes of metropolitan areas—or to develop new towns entirely from scratch—threaten both the long-term security of our nation’s food supply and the ecological underpinnings of California’s way of life,” he says.

**The Cosumnes River Preserve**

The Nature Conservancy of California purchased the 12,362-acre Howard Ranch for $13.6 million in April 1999. Funding came from a combination of public and private sources (see below). This purchase is the latest in a series—dating back to 1984 with a modest stand of valley oaks—that brings the Cosumnes River Preserve to approximately 35,000 acres.

Begun in 1993, this plan calls for the Conservancy to incorporate working farmland into the preserve; to establish cooperative arrangements with neighboring landowners, as well as water and flood-control authorities; and to share ownership and management responsibility with the U.S. Bureau of Land Management, Ducks Unlimited, Sacramento County, and the California departments of Water Resources and Fish and Game.

The Nature Conservancy became interested in preserving the Howard Ranch as rangeland in order to mitigate two ongoing threats to the area: conversion to vineyards and future conversion to urban and suburban uses. According to the Nature Conservancy’s Web site, “much of the property to the west and south of the ranch has been converted to vineyards over the past three years, using a plowing process (known as “deep ripping”) which destroys the vernal pools and reduces the natural watershed values of the landscape. This in turn eases the way for major housing development in the area.”

In addition to preserving the natural habitat, the Preserve has important implications for the water industry. Drinking water for much of the San Francisco Bay area comes from the Mokelumne River, which joins the Cosumnes near Galt, California. The Nature Conservancy’s preservation efforts also mean that drinking water is protected from agricultural and other pollutants.

“The Howard Ranch purchase and the Cosumnes River Watershed Project will protect critical habitats, open spaces and water quality in one of the state’s most rapidly-growing areas, the Central Valley,” says Steve McCormick, former executive director of The Nature Conservancy of California and now the Conservancy’s national director. “Our partners’ commitment is critical to our California program. With their support, The Nature Conservancy can take lands that are wild by nature and preserve them by design.”

“Here, as elsewhere in California, explosive growth threatens our remaining natural landscapes,” he continues. “California’s population..."
is expected to increase by almost 50 percent over the next 25 years—that’s as if everyone in New York State were to move here by the year 2025.”

The Nature Conservancy eventually hopes to expand the Cosumnes River Preserve to include the entire Cosumnes watershed—from the river’s headwaters in the Sierra Nevada Mountains to its terminus near Galt—an area of some 800,000 acres in all.

How did this project happen?

“We knew that we couldn’t buy the Howard Ranch property on our own,” says Eaton. “So, we approached the State Water Resources Control Board (SWRCB) to see if they had any suggestions.” They did.

Bill Campbell, supervisor of the SWCRB Watershed Projects Support Section, suggested that the project might be eligible for a clean water state revolving fund (CWSRF) loan. Working with EPA’s Vendlinski, Eaton and the Nature Conservancy began to cobble together a plan which would become the largest land acquisition ever funded by the CWSRF, as well as being the first wetlands preservation project using this fund.

In all, the Howard Ranch purchase came to $13.6 million. Of this amount, the CWSRF supplied an $8 million loan. The remaining funds came from the federal Natural Resources Conservation Service, the State Wildlife Conservation Board, the North American Wetlands Conservation Council, the Packard Foundation, and the U.S. Fish and Wildlife Service and Bureau of Reclamation (Central Valley Project Improvement Act funds).

Congress created the CWSRF to aid virtually any type of water quality project, including nonpoint source, wetlands, estuary, and other watershed projects. Loans are issued at below market rates (some at zero percent) and may be paid back over as much as 20 years. Nonprofit groups, such as the Nature Conservancy, are eligible to apply for funds.

The Nature Conservancy will repay the CWSRF loan by

“In the Golden State, rivers are supposed to be meager, dusty little things,” writer David Wicinas observes in the September/October issue of the Nature Conservancy newsletter. “But this one—the Cosumnes—looks anything but small, or dry. It sprawls 300 yards wide. Water the color of café latte swirls waist deep between the oaks.”

“California’s population is expected to increase by almost 50 percent over the next 25 years—that’s as if everyone in New York State were to move here by the year 2025.”

Steve McCormick, national director, The Nature Conservancy
reselling portions of the Howard Ranch to a private rancher for grazing livestock. Through a strict agricultural easement, the rancher will guarantee that the ecosystem and water quality on the ranch will not be degraded.

**A Legacy for Future Generations**
Funding wetlands projects has been possible under the CWSRF since its inception in 1987. “Based on the serious threats to wetlands resources across the country, EPA would like to see the CWSRF become a major source of funding for wetlands protection,” EPA states in their brochure “Protecting Wetlands with the Clean Water State Revolving Fund.”

However, in spite of total loans of approximately $3 billion each year, wetlands projects, such as the Howard Ranch purchase, are a rarity. “This capacity has yet to be utilized,” EPA’s brochure continues. “We need to make better use of the CWSRF for important wetlands protection projects.”

“The vast scale of this [Howard Ranch] deal sends a clear message nationwide. By protecting ecosystems we are safeguarding water quality—and the state revolving fund is here to help,” says EPA’s Vendlinski.

“The Howard Ranch purchase fits the Conservancy’s master plan of smart science and savvy economics,” says Eaton. “It will protect water quality, maintain a wildlife-compatible agricultural enterprise, and keep the land on the tax roll—goals which we share with Sacramento County and our agency partners. Everyone wins—cattle ranchers, the public, and the myriad of species which depend on healthy natural systems like the vernal pools and blue oak woodlands of the Howard Ranch.”

In many ways, the work being done in California mirrors the growth and development of the Nature Conservancy organization.

“The Cosumnes River Preserve embodies The Nature Conservancy and the changes it’s going through,” says Rich Reiner, Nature Conservancy ecologist, in the September/October issue of their newsletter. “Starting with the

**What about EPA’s drinking water state revolving fund?**

The U.S. Environmental Protection Agency’s (EPA) clean water state revolving loan fund (CWSRF) was an integral part of the funding for The Nature Conservancy’s Howard Ranch purchase. Can EPA’s drinking water state revolving loan fund (DWSRF) be used for similar purposes?

According to Kimberley Roy, EPA environmental protection specialist, the DWSRF has different stipulations. “The 1996 Safe Drinking Water Act requires that loans for land acquisition or easements be made to public water systems,” she says. “Therefore, unlike the CWSRF, we do not have the flexibility in our program for states to make loans directly to organizations like The Nature Conservancy. The only thing that states can do is allow nonprofits to be partners in the loan agreements. Alternatively, water systems can make arrangements with nonprofits to help with monitoring or managing land use activities on the sites.”

One example of this type of arrangement is the Androscoggin Land Trust and the City of Auburn, Maine. To maintain the quality of Lake Auburn—the area’s primary water source—the water district devotes $100,000 annually toward purchasing land, conservation easements, and life estate interests around the lake.

With a DWSRF loan, the district recently purchased an additional 435 acres of shoreline land from a developer for $550,000. Auburn officials see this as a cost-effective alternative to a new filtration plant, estimated at $30 million with an additional $750,000 in yearly operating costs. The Androscoggin Land Trust shares overall easement monitoring responsibilities.

In all, the district now owns or controls more than 800 acres and 70 percent of Lake Auburn’s shoreline.

According to the California State Water Resources Control Board, the vernal pools found in the Cosumnes River Watershed “contain in themselves a uniquely diverse flora and fauna found nowhere else and, because of this fact, contribute to the preservation of the region’s biodiversity.”

vision of preserving a single community—an individual stand of oak trees—to today, when we’re working with entire landscapes and ecoregions, cooperating with local communities, experimenting with new techniques. This is the future of conservation.”

For more information about the Cosumnes River Preserve call (916) 684-2816 or visit their Web site at www.cosumnes.org or write to 13501 Franklin Blvd., Galt, CA, 95632.

To learn more about the Nature Conservancy, write to 4245 North Fairfax Dr., Suite 100, Arlington, VA, 22203-1606 or call toll-free (800) 628-6860 or visit their Web site at nature.org.

Information about the drinking water state revolving fund and the clean water state revolving fund may be found at the U.S. Environmental Protection Agency Web site at www.epa.gov or by writing to 1200 Pennsylvania Ave., NW Washington, DC 20460 or by calling (202) 260-7786.
Desalination is a process that removes dissolved minerals including salts from saline water and produces potable water.

Desalination is a natural and continuous process and a part of the natural water cycle. Seawater evaporates and returns to earth as desalinated rainwater.

What is desalination?

by Babu Srinivas Madabhushi
URS Corporation

Why desalinate?

Desalination has become increasingly important in the last four decades due to the tendency, in recent years, for the world’s swelling population to dwell in areas where supplies of high quality fresh water sources are less than adequate. Moreover, as there are a considerable number of saline sources available, desalination is becoming an attractive possibility. More than three quarters of the earth’s surface and more than 95 percent of the world’s water is either salty or brackish, and therefore not potable. Desalination increases the range of water resources available for use by communities.

According to Ron Linsky of the National Water Research Institute in California, “the country needs to improve the reliability of its supply. Water could be on the commodities market in the next century. We may ultimately face rationing or importing.”

Can I drink desalinated water?

Yes, desalinated water can be used for drinking purposes, groundwater recharge, and also for irrigation. During the Persian Gulf War, the U.S. Army used mobile units that could produce 3,000 gallons of potable water per hour from brackish water sources. If the desalinated water is to be used for domestic use, post treatment should be done to ensure that treated water meets the health and anti-corrosive standards.

How do I desalinate?

A number of technologies, such as the membrane process, distillation, and vacuum freezing, have been developed to perform desalination. Distillation and the membrane process are the techniques used the most. Nearly 60 percent of the world’s desalination systems use distillation, heating the salty water to produce water vapor that is then condensed to form fresh water.

What are the distillation techniques?

The most commonly used distillation methods are multistage flash distillation (MSF), multiple effect distillation (MED), and vapor compression (VC). In MSF, the raw water is heated and pressure is lowered, so that the water flashes into steam. This process is carried out in a number of stages, in which the pressure is gradually reduced. In the MED process, the raw water passes through a number of evaporators connected in a series. Interestingly, the vapor in the earlier stage is used to evaporate the water in the later stages. In the VC process, the raw water is evaporated, the vapor produced is compressed, and the compressed vapor is used again for heating the additional raw water. VC is generally used for small and medium scale desalination units.

Can RO be used to desalinate?

Yes, there are several membrane processes, such as reverse osmosis (RO) and electrodialysis, which can be used for efficient desalination. In RO, the water is pumped through semipermeable membranes to separate and remove the minerals from the saline water.
Before being pumped through the membranes, the water is pretreated to remove any particles that might clog membrane pores. Suspended solids in the raw water can be removed by using coagulation and filtration.

What is the desalinated water quality?
Distillation plants produce water with total dissolved solids (TDS) concentrations ranging from 1 to 50 milligrams per liter (mg/l) and RO plants produce water with TDS concentrations ranging from 10 to 500 mg/l. The quality of the treated water depends on the concentration of salts in the raw water, and, in the case of RO, the membranes selected and the pressure applied. In distillation, the quality depends upon the heating system, the pressures applied, etc. Quality of treated water can be improved by repumping the water through the membranes.

Why is pretreatment required?
Pretreatment is required to avoid substances that could interfere with the process and reduce desalination efficiency. Bacteria can grow in RO and distillation plants, hence disinfection may be required. Metals should be removed from the raw water as they may contribute to corrosion problems in distillation plants.

Comparison of Distillation and RO
According to some sources, the distillation process produces better quality water more economically than does RO. There is no break in operation for cleaning and replacement. Pretreatment requirements are fewer for distillation, as coagulation and filtration have to be carried out to prevent clogging of membrane pores in RO. Moreover, distillation plants do not produce secondary wastes from backwash of filters used for pretreatment.

But, in the case of RO, no heating is required, and hence, less energy is required. No corrosion problem is faced. Simultaneously, RO can remove other contaminants and requires less space for installation of the equipment.

Is any secondary waste produced?
Desalination plants produce liquid wastes with high concentrations of salts, metals, etc. Liquid wastes may be discharged in the ocean after making sure that they satisfy the discharge requirements. Otherwise, they have to be treated and disposed.

What is the energy requirement?
The desalination process uses mainly electricity and heat. The energy required depends on the raw water quality, temperature and the treated water quality, and on the process used.

How much does desalination cost?
For brackish water, the treatment costs may range from approximately $1 to $2.40 per 1,000 gallons. The cost for sea water desalting is estimated at $4 to $16 per 1,000 gallons.

References

Babu Srinivas Madabhushi
was previously a technical assistance specialist with the National Drinking Water Clearinghouse. This article was reprinted from the Winter 1998 On Tap.
Conventional water treatment systems include steps such as coagulation, flocculation, sedimentation, and filtration. In package water treatment plants, the same steps are combined in one unit. In these plants, the equipment is pre-designed, assembled in a factory, skid mounted, and transported fully assembled to the site, including the control system. At the site, the treatment unit requires only plumbing and electrical hook up to complete installation.

The popularity of package plants increased during the last decade. In 1990, there were approximately 650 to 700 such units in the U.S., according to the U.S. Environmental Protection Agency (EPA). As of 1998, there were more than 2,000 package units in service across the country.

**Package Plants Have Advantages**

For small communities, package plants offer four distinct advantages:
1. compact size,
2. cost effectiveness,
3. ease of use, and
4. unattended operation.

Because package plants offer savings in the engineering, design, installation, and operation and maintenance costs, they are economical for treating smaller volumes of water.

Package plants can effectively remove turbidity and bacteria from surface water with consistently low to moderate turbidity levels. Package plants can treat water with varying water quality, although such treatment may require more skilled operators and closer attention.

Small system managers typically prefer treatment protocols that require minimal operator skill and attention. Package systems fulfill these requirements. For example, a package system can have an automatic backwash operation in the absence of an operator and can have the filters returned to service on a pre-programmed basis.

**Types of Package Plants**

The three basic types of package plants are (1) conventional package plants, (2) tube-type clarification package plants, and (3) adsorption clarifier package plants.

Conventional package plants, as the name suggests, contain the conventional steps of coagulation, flocculation, sedimentation, and filtration. Package water treatment plants are available from several manufacturers in a wide range of capacities. Design criteria used for these modular units vary widely. Some manufacturers adhere closely to accepted conventional design practices, such as 20- to 30-minute flocculation detention time, a 2-hour sedimentation detention time, and rapid sand filters rated at 2 gpm/ft\(^2\).

In tube-type clarifier package plants, manufacturers have used new technology, including tube settlers and high-rate dual- and mixed-media filters to reduce the size of a plant and extend the capacity range of single factory-assembled units.

An adsorption-clarifier package plant features an up-flow filter with low density plastic bead media (called the adsorption clarifier), followed by a mixed media filter to complete the water treatment. The flocculation and sedimentation basins have been replaced by the adsorption clarifier bed, thus combining the two steps into one.

**Selecting a Package Plant System**

Package plant systems are most appropriate for treatment unit sizes ranging from 25,000 to 6 million gallons per day (95 to 23,000 cubic meters per day) of water treated.
Influent water quality is the most important consideration in determining the suitability of a package plant application. Complete influent water quality records should be examined to determine turbidity levels, seasonal temperature fluctuations, and color level expectations.

Both high turbidity and color may require coagulant dosages beyond many package plant design specifications. In cases of consistently high levels of turbidity and color, the package plant capacity must be down-rated or a larger model selected. Where turbidity exceeds 100 to 200 NTU, pre-sedimentation may be required as a pretreatment. Pilot tests may be necessary to select a package plant for more innovative designs using high flow rates and shorter detention time unit processes.

Highly variable influent water quality requires a high level of operational skill and attention, which tends to negate the package plant advantages of low cost and automation.

**Package Units Can Have Varying Applications**

Package units can be used to treat water supplies for communities as well as non-community water systems, such as those in factories, schools, recreational areas, state parks, construction camps, ski resorts, remote military installations, and other locations where potable water is not available from a municipal supply.

Several state agencies have mounted package units on trailers for emergency water treatment. Their compact size, low cost, minimal installation requirements, and ability to operate virtually unattended make them an attractive option during emergencies and in locations where revenues are not sufficient to pay for a full-time operator.

**Future Applications of Package Plants**

When installed correctly and maintained properly, package plants will operate sufficiently. These systems have the potential for helping small systems comply with treatment regulations and the needs of the communities they serve.

Over the years, manufacturers have incorporated new technologies into their designs. But, because many existing state design standards recognize only conventional treatment processes, package plants employing innovative technologies sometimes encounter regulatory barriers. Some states consider package plants to be an “alternative treatment,” which means that manufacturers need to put their equipment through lengthy pilot studies from state to state.

At the national level, at least two organizations are interested in package plants. EPA—in partnership with the NSF International—has initiated an Environmental Technology Verification program for verifying the effectiveness of these package plants. The Association of State Drinking Water Administrators has developed a protocol for approving package plants and treatment modules. With these national initiatives and the many advantages of the plants described above, the use of package plants will undoubtedly continue to increase.

**References:**

U.S. Environmental Protection Agency, Office of Drinking Water. 1990. Technologies for Upgrading Existing or Designing New Drinking Water Treatment Facilities. EPA/625/4-89/023. Cincinnati, OH.


### Products

Note: Call (800) 624-8301 or (304) 293-4191 to order products. Please allow three to four weeks for delivery. Actual shipping charges are added to each order. National Drinking Water Clearinghouse products also may be ordered via e-mail at ndwc_orders@mail.nesc.wvu.edu. Products are subject to availability. Please verify price when ordering.

#### Action Guide for Source Water Funding: Small Town and Rural County Strategies for Protecting Critical Water Supplies

This guide summarizes the drinking water protection responsibilities of local governments. It explains assistance available to local governments through the 1996 amendments to the Safe Drinking Water Act (SDWA) and identifies key points at which local, timely input can help determine state-based water priorities. (National Center for Small Communities)

**DDWWBBLLFFNN1122//BBooookklleett, 2277 pp. — 1997**

#### Alternative Funding Study: Water Quality Fees and Debt Financing Issues

This study evaluates specific revenue sources to increase capital investment in local drinking water and wastewater related projects. This document focuses on funding from federal, state, or local fees to supplement existing subsidies. It also looks at the expanded use of debt financing. (U.S. EPA)

**DWBKFN08/Book, 136 pp. — 1996**

#### Clean Water Action Plan: Restoring and Protecting America’s Waters

This action plan builds on the solid foundation of existing clean water programs and proposes new actions to strengthen efforts to restore and protect water resources. Under this plan, the federal government will support locally led partnerships, increase financial and technical assistance to states, and help restore and sustain the health of aquatic systems. (USDA and US EPA)

**DWBKPE80/Book, 101 pp. — 1998**

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**All About Water**

This activity book, designed for school children grades K through 3 is separated into five sections of activities and lab experiments. The sections cover topics such as the water cycle, fresh water on Earth, how humans use water, pollution and conservation. (California Department of Water Resources)

**DWBKPE107/Book, 119 pp. — year unknown**

**Manual of Water Well Construction Practices**

This manual provides information about well construction techniques and addresses the intended use of the water, required capacity of the well, intended drilling method, and how the construction costs will be paid. (U.S. EPA)

**DWBKDM01/Book, 169 pp. — 1975**

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**DRINKING WATER PRODUCTS**

Note: Call (800) 624-8301 or (304) 293-4191 to order products. Please allow three to four weeks for delivery. Actual shipping charges are added to each order. National Drinking Water Clearinghouse products also may be ordered via e-mail at ndwc_orders@mail.nesc.wvu.edu. Products are subject to availability. Please verify price when ordering.
Designing a Water Conservation Program: An Annotated Bibliography of Source Materials

Developed to be used as a starting point for designing a community water conservation program, this book provides an extensive list of resources on water conservation. Topics include public education projects, community water conservation programs, reducing water losses in distribution systems, economics of water conservation, agricultural water conservation, and a list of companies selling water conservation products. (U.S. EPA)

DWBKGN28/Book, 87 pp. — 1993

Drinking Water Glossary: A Dictionary of Technical and Legal Terms Related to Drinking Water

This glossary lists hundreds of drinking water and groundwater terms and their definitions. (U.S. EPA)

DWBLGN24/Book, 34 pp. — 1994

Environmental Planning for Small Communities: A Guide for Local Decision Makers

This guidebook presents ideas for developing a community environmental plan to protect the people and the environment. It addresses creating a planning team, determining needs, defining problems, reviewing regulations, developing strategies, and implementing the environmental plan. (U.S. EPA)

DWBKMG14/Book, 159 pp. — 1994

Bacteria and Water Wells

This document provides information and guidance about what steps should be taken if bacteria are present in a water well. It is intended for consumers using private wells as water source. It also gives the necessary background information about bacteria, treatment techniques, and well water protection strategies. A list of sources for additional information is included. (U.S. EPA)

DWPKPE78/Booklet, 19 pp. — 1997

Fact Sheet: Water Conservation Measures

This fact sheet explains various methods of water conservation, such as metering, accounting for water consumed, and detecting and repairing leaks in the distribution system. It also stresses that information and education help people understand the importance of water conservation. (NDWC)

DWBLPE74/Fact Sheet, 4 pp. — 1998

Give Water A Hand

This two-book set is aimed at making students more aware of what they can do to protect and conserve water. It provides a number of activities and tips to educate students about water issues. (U.S. Department of Agriculture)

DWPKPE49/Packet, 98 pp. — 1996

EPA Safe Drinking Water Is In Our Hands

This booklet lists the primary drinking water contaminant standards that systems must comply with to satisfy the Safe Drinking Water Act (SWDA) requirements. It lists the regulated contaminants, the maximum contaminant levels (MCLs), the maximum contaminant level goal (MCLGs), and the potential health effects of each contaminant. It also lists the secondary drinking water regulations for some contaminants. Future activities of SDWA are listed. (U.S. EPA)

DWPKRG47/Booklet, 12 pp. — 1998

Your Drinking Water: From Source to Tap, EPA Regulations and Guidance

Intended to help answer questions about drinking water supplies, this document addresses such topics as water sources, possible contaminants, how scientists determine acceptable contaminant levels, and how the government establishes drinking water laws and guidelines. (U.S. EPA)

DWBLRG04/Booklet, 16 pp. — 1990

Benefits of Water and Wastewater Infrastructure

This report addresses the need for the U.S. government to continue to support water and wastewater infrastructure funding. The document discusses clean water’s benefits to health, economic development, environmental protection, standard of living, and technology development. (NDWC, National Small Flows Clearinghouse)

DWBBLRE06/Booklet, 14 pp. — 1996
Tech Brief Package

The NDWC’s Tech Briefs are four-page fact sheets included in On Tap. Each fact sheet provides concise technical information about drinking water treatment technology relevant to small systems. The documents are aimed at drinking water professionals, particularly small system operators, and the content is fairly technical. Tables and/or helpful illustrations are provided as sources for more information. A three ring binder holds all the current Tech Briefs in print. New selections can be easily added to the package as they become available.

(NDWC)

DWPKPE71/Packet — 1998

NDWC Products Order Form

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☐ Check/Money Order  ☐ MasterCard  ☐ VISA  ☐ Discover

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"One-Stop Shop" Web Site for Federal Grants

The Federal Commons, a new Web site recently launched by the Inter-Agency Electronic Grants Committee, will provide a “one-stop shop” for the entire federal grant application process. Currently, users can search the General Services Administration catalog of federal grant programs from the site. However, the site will eventually allow applicants to submit and track their grant applications online. This site may prove to be a valuable resource for local governments searching for funding for specific projects.

The Inter-Agency Electronic Grants Committee is made up of members from 23 grant-making agencies who are working to streamline the grant application process. The committee itself is the byproduct of an earlier Department of Transportation pilot project to create a government-wide grant site, the Electronic Grants Project. The Federal Commons initiative was aided by the 1999 Federal Financial Assistance Management Improvement Act, which set a November 2002 deadline for agencies to begin accepting grant applications electronically. After the law was passed, the committee pitched the Federal Commons project to the Office of Management and Budget (OMB) as a way of achieving government-wide compliance with the act. OMB has supported the project as it has promised to develop a common electronic grant application form.

To access Federal Commons and perform a search of grant programs, go to www.cfda.gov/federcommons/

USDA Studies E. coli Testing

U.S. Department of Agriculture (USDA) scientists have developed a new test to detect potentially pathogenic E. coli O157 bacteria in creek water.

In a report of their study, the investigators concluded the test appears suitable for routine water sample screening, tracking the spread of bacteria in contaminated water supplies, and pinpointing sources of waterborne infections.

As reported in the July issue of the Journal of Applied and Environmental Microbiology and titled “Quantitative Detection of Escherichia coli O157 in Surface Waters by Using Immunomagnetic Electrochemiluminescence,” USDA scientists used the test to analyze creek water samples spiked with known concentrations of E. coli O157. They tested raw water samples, in which bacteria had been concentrated, and enriched samples, in which bacteria had been allowed to grow before testing.

The results suggest the test detects as few as 25,000 E. coli O157 cells per liter (roughly one quart) of raw water, 250 cells per liter in concentrated samples, and one or two viable cells per liter in samples that are both concentrated and enriched.

Other testing methods are suitable for detecting E. coli O157 in fecal, food, or water samples that have been enriched or subjected to chemical treatment to extract the bacteria. But none of these other methods has been shown to detect E. coli O157 in raw or concentrated surface water samples, which contain sediments, organic particles, and unidentified microorganisms that can distort test results, according to investigators.

For more information about the report, write to the American Society for Microbiology, 1752 N St., NW, Washington, DC, 20036-2904; call (202) 942-9319 or visit their Web site at aem.asm.org.

Fun Time Puzzle Solutions

How Things Work

“The strongest principle of growth lies in the human choice.”

Mary Ann Evans, also known as George Eliot (1819-1880)
NDWC Crossword Puzzle

Across
1. FDR's Programs (with 63 down)
5. Necessity for life on Earth
10. Faithful
14. Affectionate name for the CCC (with 66 across)
15. Unaccompanied
16. Things belonging to us
17. Related to urine
18. "_____ and Martin's Laugh In"
19. Is not
20. Not absolutely necessary
23. Cool water fish
24. Depart
27. King with the golden touch
31. _____ alcohol
33. Doctrine
36. _____ tract (what a gas-mask protects)
39. Amongst
41. Brazilian volleyballer Barros
42. Ireland to poets
43. Happen
46. Levy
47. Embroidery design
48. Ornamental cup (var.)
50. Plod
53. Rush plant (var.)
57. Preservation
64. American Standard Code for Information Interchange (abbr.)
65. Red organic pigment
66. (see 14 across)
67. Seagull (var.)
68. Always
69. Salacious
70. Tightens
71. Relax

Down
1. Scare
2. Mistake
3. _____ Acid
4. Lecture hall
5. Armed conflicts
6. Succulent plant
7. Small city
8. Related on the mother's side
9. Go back on an agreement (var.)
10. Eau de _____
11. NDWC Funder
12. Vase
13. Fifth time zone west of Greenwich (abbr.)
21. Agitate
22. Region
25. Brusk
26. Neighbor of Lebanon
28. Pastrami place
29. Sailing
30. Overflow
32. Catamount
33. Poetic unit
34. _____ growth (community planning)
35. Bishop's headdress
37. Hipbone
38. Tease
40. Subtracted
44. Do over
45. Poet Pound
49. One or the other
51. Annoying insects
52. German industrial city
54. Strainer
55. Dwellings
56. Unable to move
58. Beige
59. Circle
60. Competes
61. Tuscaloosa Testing Labs (abbr.)
62. Wrath
63. (see 1 across)
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Quotes

“A human being is part of a whole, called by us the Universe, a part limited in time and space. He experiences himself, his thoughts and feelings, as something separated from the rest—a kind of optical delusion of his consciousness. This delusion is a kind of prison for us, restricting us to our personal desires and to affection for a few persons nearest us. Our task must be to free ourselves from this prison by widening our circles of compassion to embrace all living creatures and the whole of nature in its beauty.”

Albert Einstein, (1879–1955)

“I worked myself up from nothing to a state of extreme poverty.”

Groucho Marx, (1890–1977)

Water Fact

Water is the only substance found on earth in three different forms—solid, liquid, and gas.

Source: U.S. Environmental Protection Agency

Drinking Water Trivia

What percentage of water in the United States is located underground?

(a) 25 percent
(b) 50 percent
(c) 60 percent
(d) 75 percent
(e) 99 percent

Answer: According to the American Water Works Association, more than 75 percent of water in the U.S. is located underground. However, they note, half of all U.S. drinking water is from surface sources.


“Tree Army CCC Conservation Depression EPA”

FDR Smart Regulations
Growth Respiratory
Infrastructure Rights
Planning RUS
Reclamation

Word Search  Solution on page 47

Tree Army CCC Conservation Depression EPA

It’s true confession time: When I started working at the National Drinking Water Clearinghouse three-and-a-half years ago, I took drinking water completely for granted. When I turned on the tap for a glass of water or to run a bath for my children, I didn’t give it a second thought. Living in a water-rich area like West Virginia it’s an easy thing to do. It’s also symptomatic of how many of us consider water, as a resource, and how under-valued it is in much of the world.

Taking water for granted, though, may soon be a luxury we can ill afford. In a new book titled Resource Wars, Michael Klare, director of the Five College Program in Peace and World Security Studies at Hampshire College, argues that resources—especially oil, but, increasingly water—will replace ideology as the main cause of strife in the post-Cold War era.

In an interview with Tamara Straus, a reporter with the AlterNet news service, Klare predicts “… a much higher level of international conflict over access to critical sources of oil and water, such as the Persian Gulf area, the Nile River basin, the Jordan and so on. Conflict will also erupt within many countries, as various groups (whether defined by class, ethnicity, tribe or religion) fight over the control of arable land, energy supplies, water and so forth. We could also see unprecedented levels of international migration, as people move from overpopulated and drought-stricken areas to countries with adequate supplies of land and water.”

Water as a valuable commodity and possible source of conflict is also a concern to the U.S. Central Intelligence Agency (CIA), reports syndicated columnist Jack Anderson. George Tenet, CIA director, notes that the world’s population will reach 7 billion by the year 2015 and that most of the increase will occur in Africa and Asia, where, the CIA expects the “primary fallout will be a lack of water.”

And, it’s not just a problem for “other” parts of the world. Increasingly, water will be a point of contention in the U.S., particularly in the West where water is scarce. (On Tap Assistant Editor Jamie Knotts explores this subject in more detail in “Water Wars” on page 18 of this issue.) Students of resource and political geography will be tempted to say “we’ve been talking about this for decades.”

In his 1981 book The Nine Nations of North America, Joel Garreau, for example, writes “The [water scarcity] problem is simply stated: the thin strip of the Pacific shore along the Coast and Cascade Mountain ranges from Northern California to southern Alaska is the only place in the West with enough water. Everything else for a thousand miles in any direction is basically desert.”

While all of this might seem like nothing but gloom and doom, I believe that there are encouraging signs. If successful movies can serve as one measure of public interest, then water issues can be seen as a growing part of our societal consciousness. Witness the popularity of films such as 1988’s The Milagro Beanfield War—the tale of a small community fighting a huge development over water rights—or 1998’s A Civil Action—where a lawyer investigates deaths associated with contaminated water—and it seems fair to say that awareness of water’s importance is on the rise.

The bottom line, I’ve come to realize, is that water is a precious resource and we should treat it as such. We can’t survive on this planet without it. As Garreau points out, “You can make gasoline out of cow manure if you have to, but you can’t make water.”

Managing Editor Mark Kemp-Rye
studied resource geography and political science at West Virginia University and the University of Toronto, Canada.

by Mark Kemp-Rye
On Tap Managing Editor
The National Environmental Services Center (NESC, pronounced “nessie”) is an organization that specializes in providing technical assistance and information about drinking water, wastewater, and environmental training to communities serving fewer than 10,000 individuals. You may be familiar with our individual programs, each well established as a national leader in its areas of expertise.

**National Small Flows Clearinghouse (NSFC)** is a national information and assistance program that helps small communities identify appropriate wastewater technologies. NSFC offers more than 400 free or low-cost products, including posters and brochures; Small Flows Quarterly, a magazine for the wastewater industry with nearly 45,000 subscribers; and Pipeline, a newsletter written for the public with approximately 20,000 subscribers. The NSFC maintains five databases—bibliographic, manufacturers and consultants, state regulations, health department, and facilities databases. The NSFC annually hosts a conference where state regulators share information.

**National Drinking Water Clearinghouse (NDWC)** services include a toll-free technical assistance hotline; On Tap, a quarterly magazine that combines the NDWC’s newsletters On Tap and Water Sense into a single publication with approximately 25,000 subscribers; more than 300 free products; a literature database, and RESULTS [Registry of Equipment Suppliers of Treatment Technologies for Small Systems] database.

**National Environmental Training Center for Small Communities (NETCSC)** services include E-Train, a quarterly newsletter with approximately 7,000 subscribers; five databases that provide information about trainers and environmental training activities; and many free and low-cost products as well as the NETCSC Environmental Training Resources Catalog. NETCSC has helped develop 30 training curricula and hosts an annual national environmental training institute for local officials.

**National Onsite Demonstration Program.** (NODP) encourages the use of alternative, decentralized wastewater treatment technologies in small and rural communities. The NODP assists communities in funding, installing, monitoring, and managing model wastewater treatment systems as cost-effective alternatives to centralized sewage systems.

Located in Morgantown, West Virginia, NESC is based at one of the nation’s major doctoral-granting research institutions, West Virginia University.

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IN COMING ISSUES

Protecting Small Water Systems: Special Counter-Terrorism Issue

The Canaan Valley Institute: Helping Appalachian Communities Help Themselves

Wastewater Reclamation and Dual Systems: Can wastewater reclamation save water for communities and utilities?

Alternate Funding for Water Projects in Rural America: The Housing Assistance Council

Public Participation: How can you involve citizens in community decisions?

How To Prevent Water Hammer

Local Government Environmental Advisory Boards

Do You Have Great Ideas?

Do you have a great question for our “Ask the Experts” column? For that matter, do you have a great idea for an article we should publish in this magazine? The On Tap editors are always eager to hear story ideas and topics we should cover in these pages.

Write to us at:
On Tap Editor,
National Drinking Water Clearinghouse
West Virginia University
PO Box 6064
Morgantown WV 26506-6064

You may also send an e-mail to editors Mark Kemp-Rye (mkemp@wvu.edu) or Kathy Jesperson (kjespers@wvu.edu) or give us a call, toll-free, at (800) 624-8301. We’d love to hear from you!
The National Drinking Water Clearinghouse assists small communities by collecting, developing, and providing timely information relevant to drinking water issues.

Our mission at the National Drinking Water Clearinghouse (NDWC) is to make sure people in small towns and rural areas have the best drinking water possible. The NDWC has information available to help your community achieve that goal.

If you have questions about drinking water issues, look to the NDWC for answers. We provide a variety of services, including a toll-free technical assistance hotline, more than 300 free and low-cost educational products, and the free magazine On Tap. The NDWC also sponsors conferences, workshops, and seminars to bring our services to you in person.

Our staff is made up of engineers, researchers, technical writers, and editors who locate and distribute information on subjects, such as:

- water treatment technologies,
- source water protection issues,
- operation and management strategies,
- regulatory updates, and
- funding sources for community water treatment infrastructure.

NDWC maintains three information databases: RESULTS 3.0 [Registry of Equipment Suppliers of Treatment Technologies for Small Systems], an organizational database with more than 300 drinking-water related groups listed, and a general information database with close to 2,000 water-related article topics. All three databases are accessible to the public through our Web site at www.ndwc.wvu.edu.

The technical assistance hotline may be reached Monday through Friday from 8 a.m.–5 p.m. Eastern Time.

Contact us today for a free information packet.

National Drinking Water Clearinghouse
West Virginia University Research Corporation
West Virginia University
P.O. Box 6064
Morgantown, WV 26506-6064

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