

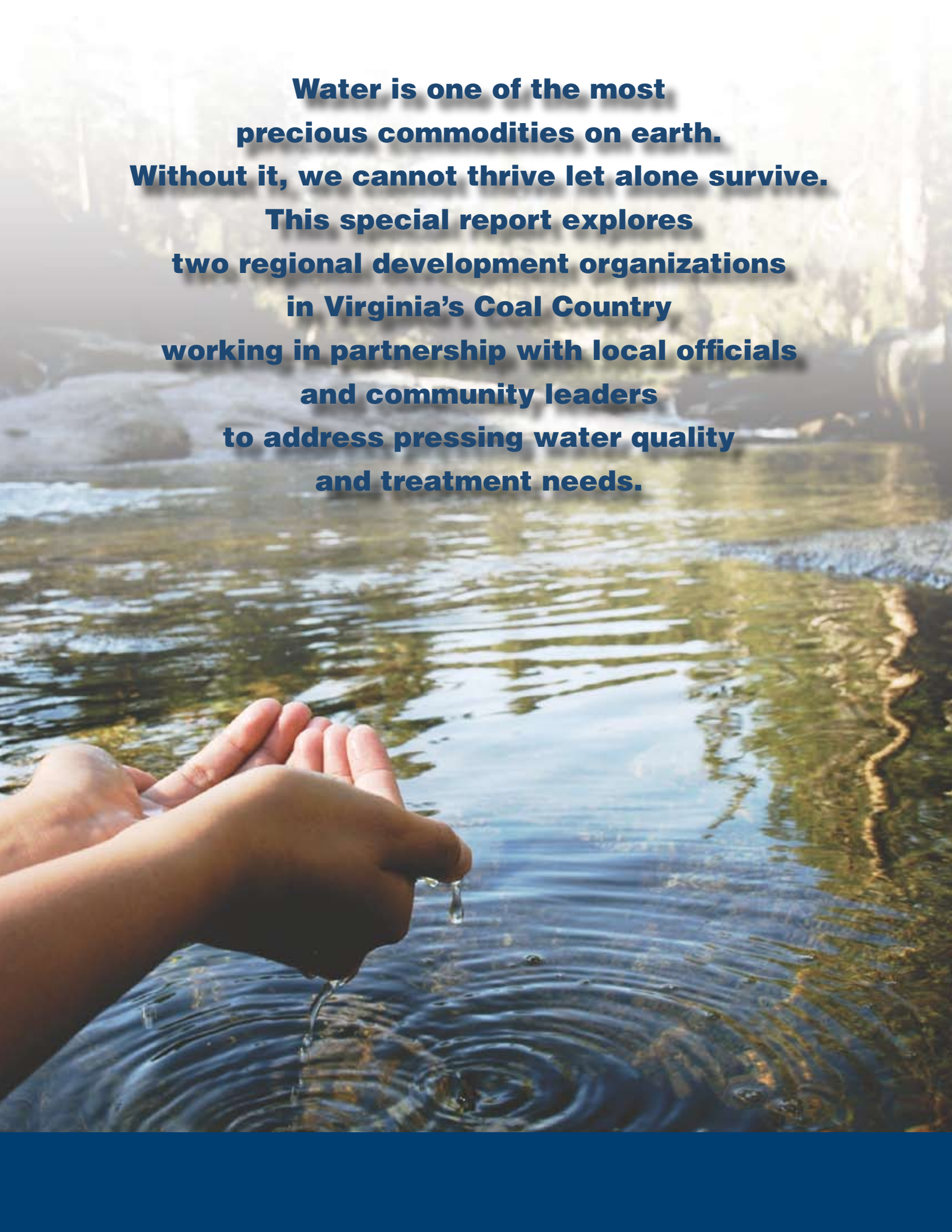
DECEMBER 2007



Clean Water for Virginia's Coal Counties:

A Case Study in Regional Leadership, Partnerships and Strategic Investments

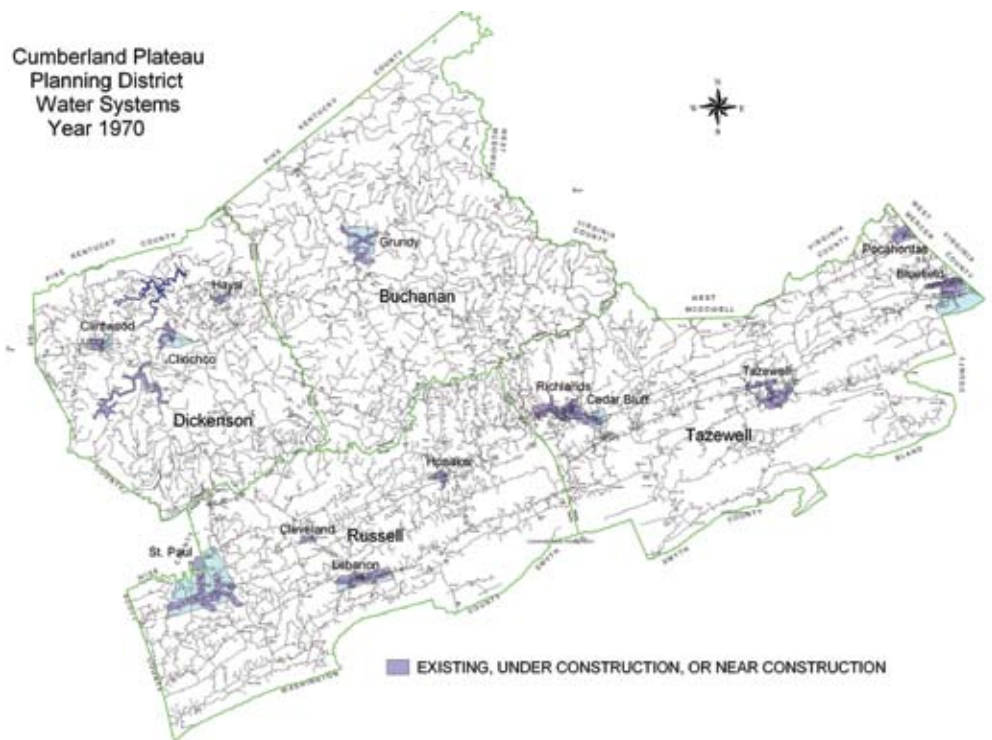
**NADO RESEARCH FOUNDATION'S
CENTER FOR ENVIRONMENTAL STEWARDSHIP AND REGIONAL DEVELOPMENT**



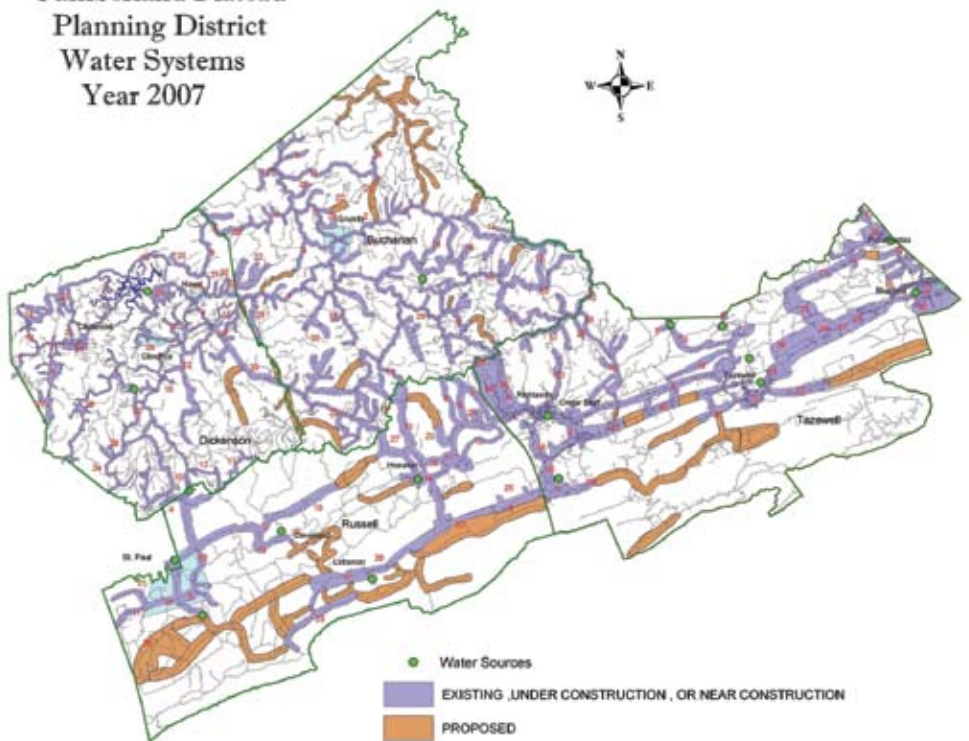
**Water is one of the most
precious commodities on earth.
Without it, we cannot thrive let alone survive.**

**This special report explores
two regional development organizations
in Virginia's Coal Country
working in partnership with local officials
and community leaders
to address pressing water quality
and treatment needs.**

“Physical infrastructure is the basic building block of sustainable economic development, which now includes telecommunications in addition to roads and clean water and waste-water services,” notes the federal co-chair of the Appalachian Regional Commission, Anne B. Pope. “That is why the work of the Lenowisco Planning District Commission and the Cumberland Plateau Planning District Commission in combining the laying of pipe and cable is so important. This far-sighted approach is not only saving costs. It will reap important dividends in job creation, public investment leveraging, and tax revenue in the future.”



Cumberland Plateau Planning District Water Systems Year 2007



Clean Water for Virginia's Coal Counties

Most residents of the seven southwestern Appalachian counties in Virginia's mountainous coal fields now enjoy clean, safe water the same way as most other Americans – by simply turning on a faucet. This is a recent success story.

A few decades ago, maps of the counties' public water service marked isolated small-town systems with odd splotches of color, like paint spills on a canvas dropcloth. By 2007 the maps show mostly interconnected systems, as if the paint spills had run together along wrinkles in the canvas.

The numbers behind the maps are largely due to the efforts of two regional development organizations, known in Appalachia as local development districts. They are part of a 72 LDD network in the 13-states served by the Appalachian Regional Commission, and part of the nationwide network of 520 regional development organizations – multi-jurisdictional planning and development organizations that provide administrative, professional and technical assistance to more than 2,000 counties and 15,000 municipalities across the nation.

In the state's far southwestern tip, the Lenowisco Planning District Commission (PDC) serves three counties and an independent municipality (Lee, Wise and Scott counties and the City of Norton). In 1997 only 56 percent of the households in this area had public water. During the past decade another 7,100 households were connected, increasing the 2007 percentage to 78 percent. Related projects improved the quality of water service for approximately 10,000 previous customers connected to systems with serious deficiencies.



Immediately to the east and northeast, the Cumberland Plateau PDC serves a similar area consisting of the other four coalfield counties (Dickenson, Buchanan, Russell and Tazewell). In 1997 only 51 percent of its households were connected to public water. During the same 10-year period, the PDC helped connect 9,150 additional households, increasing the average 2007 connection percentage to about 68 percent, plus upgrading existing systems.

Pulling off all of these accomplishments required the groups' to overcome three main challenges: converting rural residents' passive dissatisfaction with inferior water into active demand for something better; fostering a spirit of cooperation across local jurisdictional lines, and establishing an effective working relationship with multiple funding sources, primarily state and federal agencies, each operating under its own set of fiscal and regulatory constraints.



Up One Hill and Down the Other: *Ridges and Hollows Present Major Obstacles*

By any measure the coal field counties are rural. The population of the entire seven-county area totals just over 200,000 – about 63 persons per square mile. The largest town is just over 5,000 residents, and the combined population of the three largest towns totals less than 15,000.

The land is mostly ridges and hollows. As with road and highway construction, difficult terrain increases per-mile costs with water projects. Water pressure increases by slightly under a half pound for every foot of increased elevation. To reach the target pressure for domestic water at a household tap – about 45 pounds per square inch – water tanks should be located about a hundred feet higher than the highest house on a line. Pumps are needed to move water across ridges or, sometimes, to reach houses on ridgelines. Equally often, however, pressure-reducing valves must be installed to prevent unacceptably high pressures near the bottom of hundreds of feet of downhill line.

“This terrain is a lot of fun to work in ... if you like a challenge,” says Leman Kendrick, vice president of surveying for Thompson and Litton, a civil engineering firm that has designed many of the water systems in the area. “It’s just up one hill and down the other.” Jim Baldwin, Cumberland Plateau PDC executive director, repeats someone’s joke about one hill-and-hollows project: “By the time that water gets to the end of the line, it’ll be almost too tired to drink.”

Historically, residents of the coal counties not connected to public water systems have depended on wells, hillside springs and rainwater captured in cisterns, or more often, drinking water hauled in by truck. Bacterial contamination is always a possibility, and high concentrations of sulfur, iron and other minerals are common. There is reason to believe that overall quality has worsened in recent decades because coal mining has fractured the rock through which underground aquifers flow, adding new channels for contamination. [See sidebar “Water and Health” on page 4.]



Sulfur gives off a rotten-egg smell, and iron stains almost everything it touches – clothes, dishes and porcelain fixtures in kitchens and bathrooms. “Where I live the water had a lot of iron, a lot of sulfur,” says Kathy M. Roberson, who helped mobilize demand for a Lenowisco water project in Wise County. “You couldn’t wash anything white in it because it would turn orange. You had to buy water to drink.”





Water & Health: *Silent and Invisible Hazards*

Water from wells and mountainsides in Virginia's coal counties is often unfit for drinking, cooking and bathing because of its high concentrations of iron, sulfur and other minerals. It is also likely to be contaminated in less obvious but potentially more dangerous ways, say experts on the area's water quality and wastewater disposal issues.

"The great possibility of bacterial contamination is the number-one issue," says Tamim Younos, Ph.D., research professor and associate director of the Virginia Water Resources Research Center, affiliated with the Virginia Tech College of Natural Resources in Blacksburg. "The area is characterized by sinkholes, caves and that sort of thing. Garbage is sometimes dumped in these sinkholes. Downstream the water may show up as a spring, and the people are not aware of what's happening upstream."

"Karst – underground limestone formations – can be 'Swiss-cheesey,'" says John Dreyzehner, M.D., M.P.H., director of the Cumberland Plateau Health District and acting director of the Lenowisco Health District. "Some people dig wells or use springs and think they've got an aquifer when they're really getting surface water underground. That increases the risk of surface contamination from sources like agricultural run-off."

As travelers to developing countries often learn, people who live in any area tend to develop immunity to locally prevalent bacteria, so this class of health hazards may not be obvious to them. Sinkholes may also collect inorganic contaminants from trash – also undetectable without laboratory analysis. One bit of good news: the known problems associated with sulfur and iron are aesthetic. However, as Dr. Younos cautions, "a lot of these waters may meet EPA drinking water requirements, but their long-term health impacts are not known."

Both Dr. Younos and Dr. Dreyzehner emphasize that all water systems need regular maintenance and testing, which may not occur with very small systems. The Virginia Department of Health has no authority to regulate either private water wells or systems with fewer than 25 connections. Therefore, problems in these situations may remain undetected.

Spark Plugs Characterize Self-Help Culture

Connecting a new area to a water system is far from an overnight job. In a typical project, 30 months may pass before residents in an off-system area begin to lobby local officials for "town water" and actually draw it from a household tap. It rarely takes less time and more commonly takes even longer. The final construction phase is a small part of that – perhaps two to four months, depending on project complexity. Everyone involved feels a need to say, "That's the easy part."

Documenting a need for clean water is not the same thing as demonstrating effective market demand. "You don't build a water system and then hope that residents will want to connect to it," explains Ron Flanary, executive director of the Lenowisco PDC. There has to be assurance of a revenue stream sufficient to repay the up-front costs of building or expanding systems.

But signing up customers used to "free" water can be a labor-intensive, time-consuming process. It requires public meetings or canvassing door-to-door for signatures on contracts and easements. This can take months. The PDCs and their major partners, the public service authorities (PSAs), often lack the financial and staff resources necessary to initiate the process.

Instead, the Lenowisco PDC and the Cumberland Plateau PDC rely on volunteers – not just casual volunteers but highly dedicated ones they call "spark plugs." These are people who want public water themselves – or who feel passionately that their neighbors deserve it – and they are willing to work long hours to explain the project and sign up customers.

Roberson was one of these spark plugs. She went door-to-door and estimates she signed up about 125 people. Her zeal led the Wise County Board of Supervisors in 2000 to ask her to serve on the county PSA board, its first female member and later its chairperson.

Another spark plug for Wise County projects was Marcella Powers, now a member of the Lenowisco staff. “My cousin turned on the faucet and mud came out,” she recalls. “Her well was running dry. I thought, ‘If that was her this week, it’ll be me next week.’ So we decided to see if we could do anything about it.”

Powers, like other spark plugs, shows potential customers that water they considered free actually costs them

more than public water. She ticks off a list of recurring expenses: pumps, pump parts and filters; money for commercial laundry; bottled water, and so on. She also reminds people of periodic hassles. “If you’re a young, strong mechanic, and something breaks in the well,” she says, “you just go out and replace it. If you’re 70 and have arthritis and hands that don’t work so well anymore, and maybe have had a hip replacement, it’s another matter.”

Super Roundtables Prime Regional Pump

When enough people in an area agree that they want water service, they make their case to their county’s PSA, and the project, if it appears feasible, is added to a master list. Long before that, however, the staff of either Lenowisco or Cumberland Plateau has already started planning how to put together a funding package that will keep monthly water bills affordable (typically around \$30 per month) for households with low-to-moderate incomes.

Most projects are funded in whole or in part with low-interest loans, supplemented here and there by grants. “It’s sort of like a jigsaw puzzle,” Baldwin says. “You’ve just got to put all the pieces together.”

A Rubik’s cube would be more like it. The lion’s share of project money comes from three sources: the Safe Drinking Water Act (SDWA) of 1974, administered by the U.S. Environmental Protection Agency (EPA)

through the Virginia Department of Health; Rural Development money from the U.S. Department of Agriculture; and Community Development Block Grants (CDBG) from the U.S. Department of Housing and Urban Development through the Virginia Department of Housing and Community Development.

Other funding sources may include the Appalachian Regional Commission (ARC), the Economic Development Administration (EDA) and the Abandoned Mine Land (AML) program (U.S. Department of Interior through the Virginia Department of Mines, Minerals and Industry). The Coalfield Water Development Fund, created in 1998 after the Virginia Coalfields Regional Water Study documented the area’s water problems, is another source, and both Flanary and Baldwin have chaired the Fund’s board, which includes representatives from public agencies and from the coal industry.



At one time or another the Lenowisco and Cumberland Plateau PDC staffs estimate that they have tapped into about a half-dozen other sources of water project capital, including foundations and private partners.

These agencies have different rules governing eligibility, loan terms and matching requirements for grant money. They also have different application deadlines. Funding limitations may lead to informal guidelines nearly as absolute as statutory limits. For example, by law Community Development Block Grants (CDBG) are restricted to projects in which at least 51 percent of the households served are low-to-moderate income; in practice, Flanary and Baldwin agree the percentage should be at least 65 percent.

To sort all this out, both Lenowisco and Cumberland Plateau regularly convene potential decision-makers – local water service providers, funding agencies and regulatory authorities. Baldwin calls his agency’s quarterly meetings “super-roundtables.” “We initiated the model,” he says, “to look at ways that towns and counties could work together. The funding agencies see that we are working together to address our issues, and when our applications come they have a little bit

of knowledge about the projects. I think they appreciate that we don’t flood them with 10 applications when we know they can only fund three.”

Based on advice from funding sources, applicants may divide a large project into smaller, more affordable pieces. Conversely, if funds are available, they may combine two or more small projects into a larger package. Right-sizing applications results in faster funding, which speeds up project start dates and completions. Baldwin says that funding agencies working with the coal-county PDCs “know we’re not going to hang around a couple of years to move our projects forward.”

One indicator of both the area’s demand for good water and the ability of the PDCs to squeeze value out of dollars is that about 500 of Lenowisco’s and about 550 of Cumberland Plateau’s new connections have involved community self-help projects, the water-system equivalent of neighbors cooperating on a barn-raising, that can reduce labor costs as much as 40 percent. PSA crews operate heavy equipment, but community volunteers lay pipe, flag traffic and handle other chores. Able-bodied women may work alongside men in roads and ditches; others bring hot meals. Local merchants often donate food or other items.

Creating a Regional Water Grid

One goal of both PDCs is to tie water systems together – as Flanary puts it, “so there would be a water grid the same as you’d have a power grid.” As the maps show, this goal has been substantially achieved. It is easier now than in the past to deal with emergency situations, ranging from localized problems with pumping stations to area-wide problems like drought-induced water shortages.

“We’ve been able to translate that degree of cooperation into other things,” Flanary says continues. “We’ve enjoyed a greater degree of mutual appreciation on economic development work. Our jurisdictions have banded together and regionalized our jail network. We’ve been able to work together on the broadband project.” [See sidebar “Broadband Network Grows with the Flow” on page 10.]

Anyone who has tried to coordinate projects across multiple jurisdictions knows this is a significant achievement in its own right. “Getting these systems

tied together was not without some tough battles behind the scenes,” Flanary acknowledges. “You had people resistant to change, suspicious that someone is going to suck all the water out of their jurisdiction for some other jurisdictions. This didn’t just happen through some miracle of cooperation where someone met in a field and held hands and sang. You have to constantly work at it.”

Nevertheless, both Flanary and Baldwin are at pains to mention how many people have contributed to expanding water systems in their areas. Each director cites a long list of partners – “spark plugs” and other volunteers, local public officials, private firms that offer support either free or at a discount, officials in funding agencies and, of course, state and national political leadership. Flanary notes very strong support from state legislators, Virginia governors, and the state’s representatives in the U.S. Congress. [See sidebar interview with Congressman Rick Boucher, page 9.]

Regional Success Has Many Parents

“Our counties didn’t have public service authorities,” Baldwin says, explaining a relatively slow rate of new connections until about 10 years ago. “There were a lot of years spent just gearing up and getting the first projects under way.”

Both directors say that the 1998 Virginia Coalfields Regional Water Study served as a catalyst for action. During the past decade Lenowisco has helped bring 110 projects to completion and has another 25 in some stage of design. The comparable totals for Cumberland Plateau are 127 completions and 20 more projects on the way. To date the Lenowisco projects, counting both line extensions to new customers and improvements to deteriorating systems, have cost \$159 million, and those for Cumberland Plateau have cost \$156 million.

Despite all this progress, many coal-county households still lack clean, drinkable water. The average connection percentages (78 percent in the counties served by Lenowisco and 68 percent in those served by Cumberland Plateau) mask considerable county-by-county variation – from well over 90 percent to not far above 50 percent. It may seem counter-intuitive, but connection percentages tend to be lowest in the counties with the most relatively level valley acreage because residents there are more likely than hills-and-hollows residents to have functioning wells. But these wells, often relatively shallow, are increasingly vulnerable to surface water contamination.

Flanary and Baldwin estimate that future capital construction costs to bring public water to almost all of the households in the area served by the two PDCs will require nearly \$200 million in current dollars. Baldwin adds that many older municipal water systems have deteriorated and that there is less funding available for replacing old lines than for installing new ones. No one hazards a guess about the price tag for future wastewater disposal projects, costlier than water projects. How much more costly depends largely on system design. [See sidebar on sewer/wastewater issues on page 8.]

Providing public water to 100 percent of the households in the coal counties will also likely require technical innovation.

Tamim Younos, Ph.D., associate director of the Virginia Water Resources Research Center, affiliated with the Virginia Tech College of Natural Resources in Blacksburg, points out that old standby – rain-collecting cisterns – are often the most cost-effective option for houses built on ridges. The water collected in these cisterns tends to be of much better quality than coal-county ground water, and treatment technologies are well understood. He mentions that a small Buchanan County municipality is looking at plans for a community-wide rainwater collection and treatment system to take advantage of most years’ ample rainfall. “In these areas rainwater harvesting could have great potential,” Dr. Younos says. “Right now it’s mostly used for individual housing. But you could plan this for a cluster of houses, or you could use it for shopping centers, schools or commercial purposes.”

For the time being, extending conventional water lines has priority, and everyone seems to have a favorite story about what clean water means to people who have never had it before. Baldwin keeps in his office a jug of rust-colored water he calls “Amonate tea,” given to him by the project spark plug from a small mining community whose residents once had to drive almost 20 miles to wash clothes at a laundromat.

A Lenowisco staff member mentions a little girl’s delight at being able to invite her friends to her house, no longer ashamed of its orange-brown, and foul-smelling water. Flanary describes a phone call from a man who began by saying, “I took a shower this morning.” The caller explained that he had never taken a shower for more than a minute. That morning, he said, “I just let the water run over me for almost 15 minutes until my skin started to wrinkle. I felt guilty wasting water, but I’ve never enjoyed anything more in my life.”

“You look at all these charts and graphs,” Flanary sums up, “but at the end of the day these are people you’re trying to serve. It’s been an overwhelming challenge, but we’ve seen the map fill up so much. I think we can look at each other and say, ‘We’ve done a good job.’ But ‘we’ includes a lot of people. Success has many parents and failure is an orphan. This is a success that has many parents.”

Wastewater Management: *The Next Big Challenge*

Where public utilities are concerned, local governments in urban areas may think of “water and sewer” hookups as a package, a familiar pairing like “bricks and mortar.” Private septic systems are natural choices for wastewater management in some suburban and many rural areas. Neither approach provides an easy fit in an area blanketed with ravines and ridges, making the task of providing adequate sewage disposal even more difficult and expensive than providing public water.

“We’ve been pretty successful with water,” says John Dreyzehner, M.D., M.P.H., director of the Cumberland Plateau Health District and acting director of the Lenowisco Health District, “but in some of these remote areas where we’ve brought in water we’re only now addressing sewage, and that’s the harder piece.” Ironically, Dr. Dreyzehner continues, “the successes of Lenowisco and

or roads, a fact that complicates securing easements from land-owners, not to mention construction. In fact, the gravity-flow path is likely to follow a stream (often meaning the stream bed itself). This tends to raise difficult environmental issues.

These factors, combined with the cost of treatment plants, almost rule out extensive reliance on conventional sewer lines running long distances. Providing septic systems for single homes is often unaffordable or infeasible. Homes perched on ridges or squeezed into hollows on small parcels of land may have neither the space nor the soil for a suitable system.

From a public health perspective, wastewater disposal is important. So-called “straight pipes” (pipes that discharge raw sewage directly into a creek) are illegal in Virginia under state laws governing compliance with the National Pollutant Discharge Elimination System (NPDES). Local officials say the law is vigorously enforced wherever there is an alternative. Discharge of untreated waste, once common, is now rare, accounting for no more than three to five percent of residential wastewater disposal arrangements in the most rural counties. The percentage of residential septic systems that would not pass inspection is almost certainly much higher. Nationally, the U.S. Environmental Protection Agency estimates that 10-20 percent of such systems malfunction each year.

Dr. Dreyzehner and others agree that wastewater solutions for rural areas in mountainous terrain will rely heavily on small, decentralized treatment systems. Two such projects, each serving about 10 households, are already operating in the Lenowisco service area and two more are under study. One project has been funded within the Cumberland Plateau service area and five more are under study. Even these mini-systems cost money to build, of course, and not all public entities will be eager to take responsibility for maintaining them.

Ron Flanary, Lenowisco’s executive director, notes that individual households can hardly be expected to feel the same sense of urgency about upgrading sewage systems as they feel when a well begins to run dry, so there is less political pressure for fast action. Nevertheless, he continues, “There’s a growing environmental consciousness out there. People realize that this degrades their own environment. It’s not only a quality of life issue but a public health issue, and it’s a fundamental piece of economic development. But that’s a steep curve to climb.”



Cumberland Plateau PDCs in bringing public water to previously unserved rural areas make sewage treatment problems more severe by significantly increasing the volume of wastewater effluent that must be treated.”

It’s relatively easy to pump water uphill, but sewage lines must, for all practical purposes, be at gravity-flow levels. Even under ideal conditions, public sanitation codes require manholes at regular intervals and at turning points. In a mountain hollow, the natural path for a gravity-flow line may not follow property lines

Interview with Congressman Rick Boucher

Congressman Rick Boucher represents Virginia's Ninth Congressional District, which includes the state's seven coal-producing counties. Now serving his thirteenth term in the U.S. House of Representatives, he is a member of the House Energy and Commerce Committee and chairs its subcommittee on Energy and Air Quality. He has been a strong supporter of rural water and wastewater projects in his district. What follows are his responses to questions during a telephone interview.



How would you assess the progress made in bringing public water to remote rural homes in your district?

These are counties with very challenging terrain – all ravines and mountains. A lot of the communities being served require the installation of long transmission lines for water and a number of pumping stations. It has been a great challenge, but we have gone from a public water availability rate of about 40 percent two decades ago to more than 90 percent in some of our coal-producing counties. We have had a substantial flow of federal dollars into this district, which has been sustained for a period of years at about \$30 million annually.

Was it worth the expense and effort?

It has been a tremendous quality of life improvement. It also helps us in terms of our longer-term economic development efforts. By putting water and wastewater systems into our industrial parks, we can accommodate industry that previously had nowhere to locate within some of our counties most in need of development.

Why is it necessary for regional planning and development commissions to serve as the principal channels of communication between federal funding agencies and local governments?

That is an indispensable role that they play. Very few local governments on their own would have the expertise to assemble the comprehensive funding packages that are central to build these projects. In the absence of that kind of aggregative effort by the regional development organizations, we would not be able to obtain sufficient funding for these projects.

If we were having this conversation five years from now, what would you expect to be different?

I would expect that we would have extended public drinking water to every home in the region where it could reasonably be extended. There will be the occasional house that sits by itself on hillside where it just is not realistic – unless that homeowner helps cover a substantial part of the cost.

What do you see in the future for sewer and wastewater systems?

Building sewer systems will require the same kind of broad-fronted effort that we launched to build drinking water systems. If your question had been, 'Where will we be 25 years from now?', I would say that we will have public sewer systems extended to most of the locales where we will have water systems five years from now. And that will be virtually everywhere that it is reasonable for a public authority to extend them. It will involve a variety of waste-disposal technologies, I'm sure.



Broadband Network Grows with the Flow

“Any time you open a ditch you want to take full advantage of it,” says Ron Flanary, executive director of the Lenowisco PDC.

Flanary is talking about a synergy between public water projects and fostering high-speed telecommunications. When Lenowisco work crews lay down PVC pipe at the bottom of a newly dug trench for a water line (or sometimes sewer lines), they often install another, smaller conduit alongside of it. That’s for fiber optic cable. The cable may not go in immediately, but it can easily be pushed through at some point in the future. Because the labor and equipment cost of burying cable exceeds the cost of the cable itself, potential savings far exceed the cost of extra PVC pipe, even if some lines should never be installed.

This kind of foresight has helped Lenowisco and its next-door neighbor, the Cumberland Plateau PDC, develop regional broadband systems forming the backbone of two high-speed telecommunications networks: the Lenowisco network, serving three counties, has approximately 200 miles of cable and the Cumberland Plateau network, serving four counties, has about 300. The two networks are interfaced at multiple points.

The projects that now give these rural counties 21st-century telecommunications infrastructure began in 2003, and the economic development payoffs have already been substantial. Lenowisco points to over 1,200 new jobs created and served by its system. That has meant about \$55 million in new private investments and about \$35 million annually in new payroll.

Cumberland Plateau reports 1,100 new jobs, \$60 million in private investments, and \$40 million in new payroll. Both systems also serve public schools, business incubators and major healthcare providers. Jim Baldwin, executive director of Cumberland Plateau PDC, thinks these numbers are actually conservative because the

PDCs have few means of getting information on network-related new jobs in industries that were previously located in the area.

Baldwin mentions two major high-tech firms, both new to the area, that will rely on the broadband network – Northrop Grumman, an aerospace manufacturer, and CGI, a software systems integrator. They’re locating in Russell County and together are slated to bring in over 800 new jobs. “It’s changing the face of this little county,” Baldwin says.

With respect to network architecture and management, the two PDCs made virtually identical decisions. Both networks were built almost entirely with grant funds, primarily from the Economic Development Administration and the Virginia Tobacco Commission. The Virginia Coalfield Coalition, which represents local government and business leadership across the state’s seven coal-producing counties, is a project partner. There’s no debt service, but the operation is just now breaking even on operating and maintenance costs.

Sunset Digital, a firm created by local entrepreneurs in Lee County, operates the Lenowisco network, and a nonprofit created by Lenowisco retains ownership and receives 30 percent of gross revenues, which are plowed back into other economic development projects. Cumberland Plateau has the same kind of arrangement with Bristol Virginia Utilities Board.

Both networks’ top priority is economic development, distinct from signing up residential customers. That may come later. Flanary notes that the backbone already in place would permit connections by 20-25 percent of the population in his PDC’s three-county service area. “You can easily get a gigabit of internet service in your home,” Flanary says. “It sounds like a ridiculous amount of bandwidth, but you never know. We may have entrepreneurs who have a need for this kind of thing.”

Acknowledgements

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Founded in 1988, the NADO Research Foundation is the non-profit research affiliate of the National Association of Development Organizations (NADO). The NADO Research Foundation identifies, studies and promotes regional solutions and approaches to improving local prosperity and services through the nationwide network of regional development organizations. The Research Foundation shares best practices and offers professional development training, analyzes the impact of federal policies and programs on regional development organizations, and examines the latest developments and trends in small metropolitan and rural America. Most importantly, the Research Foundation is helping bridge the communications gap among practitioners, researchers and policy makers.

The Research Foundation's current portfolio of educational programs and research projects covers issues such as community and economic development, rural transportation planning, homeland security and emergency preparedness, brownfields redevelopment, environmental stewardship and small business development finance. With support from the Environmental Protection Agency, the Research Foundation's Center for Environmental Stewardship and Regional Development provides training, information and professional resources for small metropolitan and rural regions to pursue innovative strategies that expand the capabilities, capacity and effectiveness for navigating regional environmental issues.

Visit www.nado.org to learn more about the Research Foundation and the Center.



Online resources for water management and quality improvement:

Cumberland Plateau PDC Homepage – information about Cumberland Plateau Planning District Commission including a link to water systems and census maps www.cppdc.org/index.htm

Lenowisco PDC Studies and Reports – comprehensive listing of water studies and other economic development activities within the Lenowisco region www.lenowisco.org/reportstudy_index.htm

National Water Program – partner of the U.S. Department of Agriculture, this site offers a snapshot of water projects, research and success stories around the country www.usawaterquality.org

National Rural Water Association – membership-based non-profit organization intended to meet the needs of small rural water and wastewater systems www.nrwa.org

Rural Community Assistance Partnerships – association that provides technical assistance and resources to rural communities across various issues including their Safe Water Assistance Project www.rcap.org

EPA Office of Water – regional and national resources for groundwater, wastewater, water science, watersheds, as well as information on grants and funding for water-related projects www.epa.gov/water

Virginia Water Resources Research Center – studies, reports and publications on Virginia Tech's water research over the past several years www.vwrrc.vt.edu

Virginia Department of Environmental Quality – news about Virginia's water quality regulations plus water reports and tools for communities www.deq.state.va.us/water

Water and Wastes Digest – national publication that offers articles about community water projects and product reviews on water system components www.wwdmag.com



**National Association of Development Organizations
(NADO) Research Foundation**
400 North Capitol Street, N.W.
Suite 390
Washington, DC 20001
202.624.7806 Tel
202.624.8813 Fax
Info@nado.org
www.nado.org