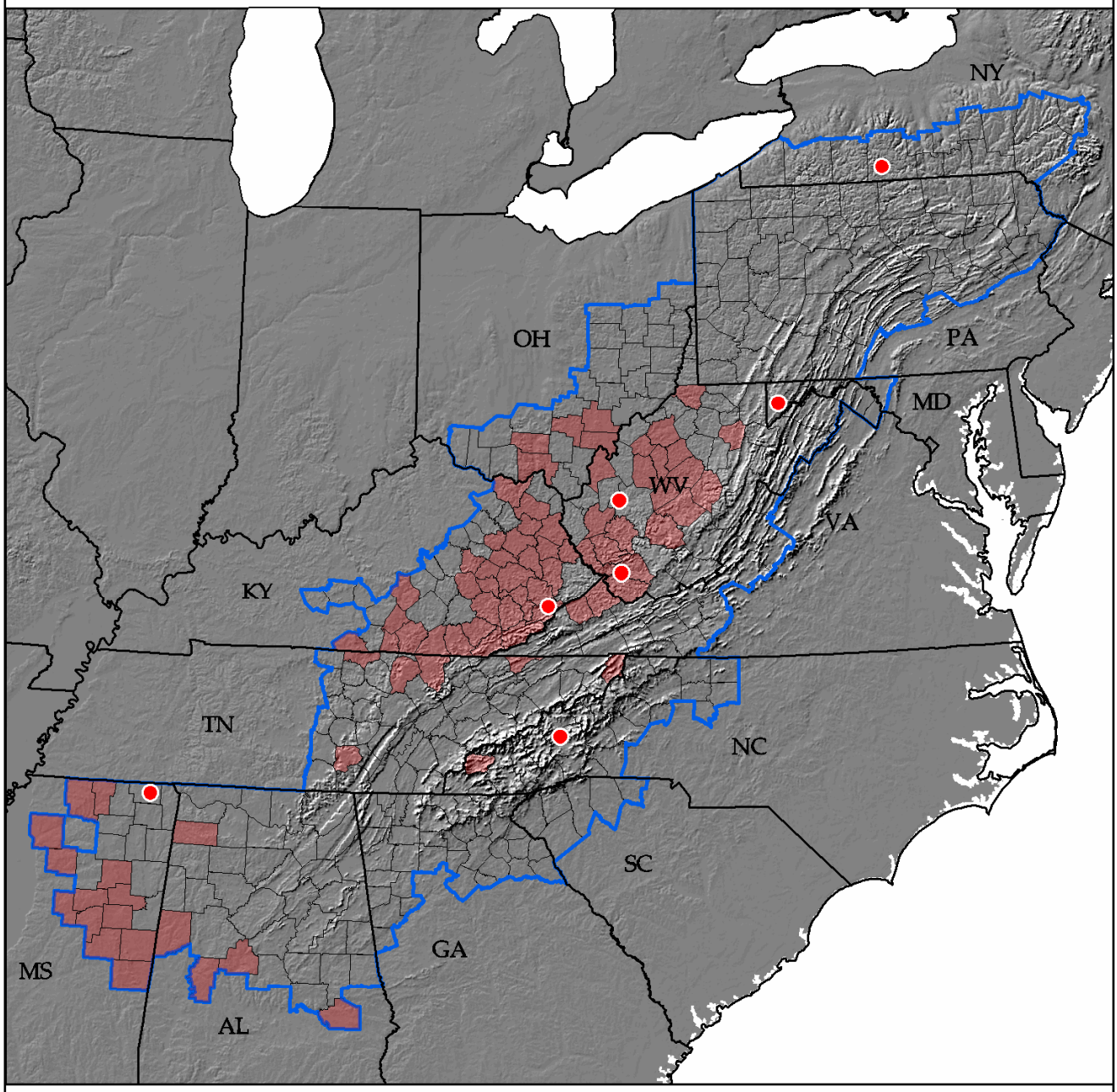
APPENDIX E
Community and System Level Case Studies: Introduction

Macro analyses and subregional analyses are not sufficient to understand all the practices and challenges facing individual communities. Although communities in the region have many similarities, they also have significant differences, which affect their infrastructure needs and their strategies for addressing those needs. To offer an in-depth view, this report presents assessments and analyses of infrastructure finance practices in seven communities selected to cover a broad range of challenges discussed in six case studies.

A selective inventory and case studies of best practices and financial management challenges and strategies are addressed. The UNCEFC research team selected a number of communities in Appalachia whose experiences illustrated the range of needs, challenges, and financial management strategies in the region. They used information and experiences from these communities to cross-check and complement information from public consultations and data analyses. These local-level studies were particularly helpful in identifying and analyzing the community financial management practices presented in chapter 6. For example, for each of the communities, actual needs as reported by local practitioners were compared with needs data in state- and national-level needs assessments. Seven of these communities were selected for in-depth study and have been written up in detailed case studies provided below (refer to Figure E-1) .

Figure E-1. Case Study Site Locations



Data Source: ESRI

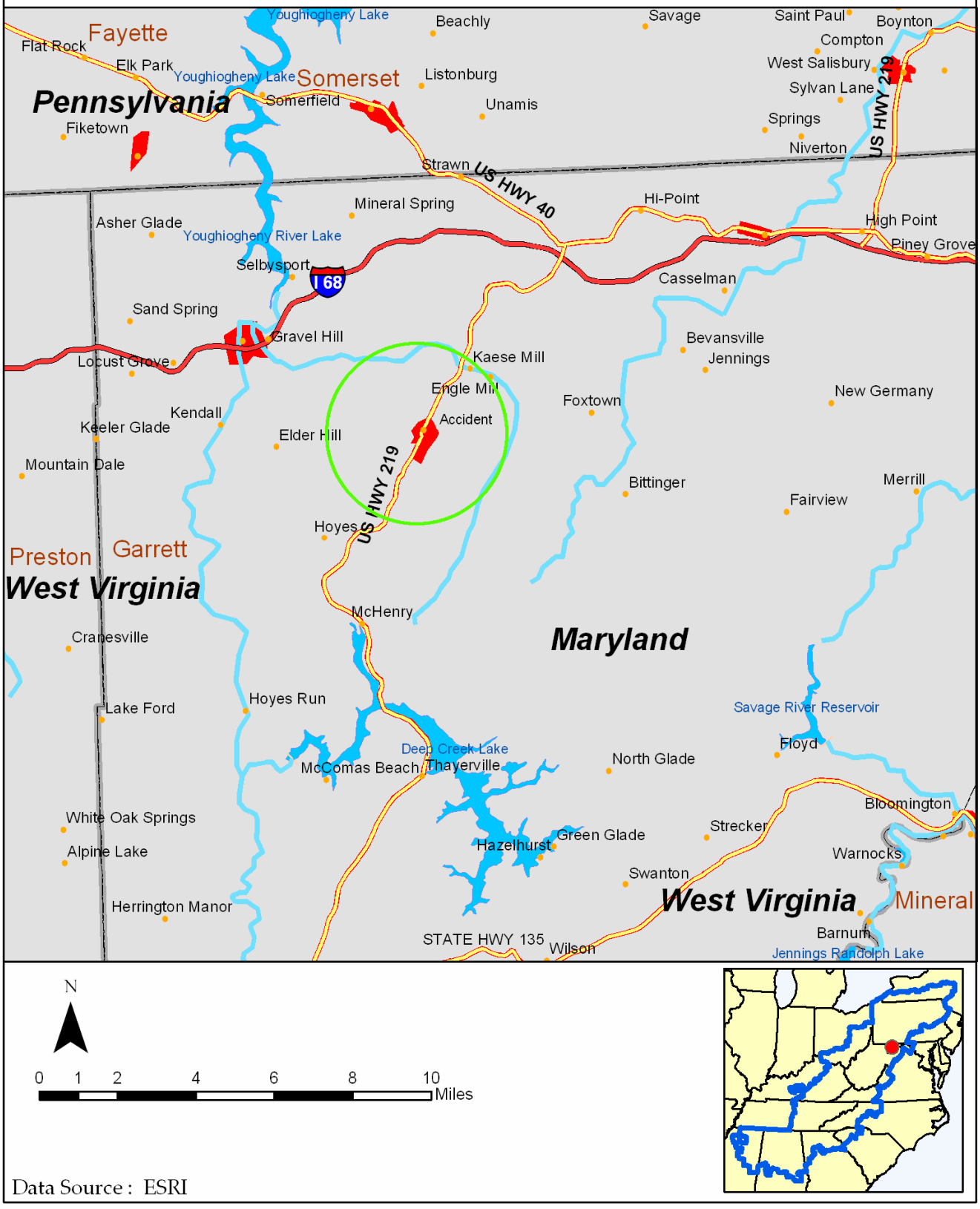
Case Study:
Accident, Maryland

Accident, Maryland, is like numerous other communities in Appalachia: small, very rural, and lacking many of the resources necessary for maintaining basic community services. However, the town has successfully leveraged outside resources, both fiscal and technical, to address its water and wastewater needs. The town has a consent order with the Maryland Department of the Environment because of effluent violations and unmet obligations for completing improvements to its wastewater treatment plant. This case study provides a brief description of Accident and its recent capacity-building efforts (refer to Figure E-2).

Economic Setting

Accident is located in the northeast corner of Garrett County, in the far western end of the state, near the watershed divide between the Upper Potomac and the Youghiogheny river basins. Like many other communities in Appalachia, Accident is agriculturally based. In fact, most of the land in Garrett County is maintained in some form of agricultural use. Accident consists of roughly 0.5 square miles, with one main road and a few secondary streets. Dairy farming is the main source of income for many residents. Other sources of employment are a bank, a country store, a bakery, a laundromat, an elementary school, a church, a car wash, senior citizen facilities, and a gas station.

Figure E-2. Location of Accident, MD, in Garrett County



Many residents of Accident are retired. The University of Maryland at Frostburg is within commuting distance, so a few students reside in the town. Although Accident has many of the problems typical of communities in Appalachia, including high unemployment and poverty rates and low per capita income, the Appalachian Regional Commission (ARC) considers it a "transitional" community (that is, one that has higher-than-average rates of poverty and unemployment and lower--than-average per capita market income). In 1999 its unemployment rate was 6.8 percent, which was higher than the average rates that year for the United States (4.2 percent) and Maryland (4.4 percent). In 2000 the poverty threshold was $17,603 for a household of four. The poverty rate in Accident that year was 17.5 percent, compared with Maryland at 8.5 percent and the United States at 11.7 percent.[1] The per capita income in 1999 was only $11,950, quite low compared with $25,614 for Maryland and $29,847 nationwide. The median household income that year was $22,500, compared with Maryland at $52,868 and the nation at $41,994.

Population Trends

Accident has a population of about 350, according to the 2000 Census. That represents an increase of only 4 people since the 1990 census. This population trend contrasts with trends in some other communities in Appalachia. For example, in nearby Berkeley County, West Virginia, population growth is the fastest in the state, the county having experienced a 28 percent increase in the last decade. Much of Berkeley County's rapid growth is due to its proximity to Washington, D.C., and its relatively low cost of living. Garrett County and other

[1] Appalachian Regional Commission, 'The Appalachian Region', www.arc.gov
City-data.com, Accident, Maryland, www.city-data.com/city/Accident-Maryland.html
Calculated from 2000 Census Summary File 3, Table P-87

western Maryland communities have not yet experienced the same growth pressure. Accident is located about 172 miles from Washington, D.C., and 288 miles from Philadelphia and thus is not within commuting distance of these large cities.

Many communities in Appalachia are losing population in response to the reconstruction of the coal mining industry. For example, West Virginia as a whole experienced its greatest reduction in population during the mid-1980s because of declining investments in that industry.[2] In western Maryland, at the industry's peak (between 1900 and 1918), production was between four and five million tons annually.[3] When the industry declined, so did employment rates throughout the region. Decreasing job prospects caused numbers of people, especially younger residents, to leave. As a result of the accompanying decline in their tax base, communities in Appalachia, Accident among them, often have trouble generating the funds necessary to support themselves.

Community Water Infrastructure

Accident is one of a few towns in Garrett County that own and operate their own separate drinking water and wastewater systems. Constructed in 1974, Accident's two systems each serve 197 customers, mostly residential.

The town has the authority to assess taxes, and in 2004 it was considering a tax increase to pay for necessary changes to the system. As might be expected in a

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[2] College of Business and Economics, WVU, Brian Lego, Dec. 17, 1999, 'The population roller coaster: WVU releases a century perspective on West Virginia's population'.

[3] Maryland Department of the Environment, 'Abandoned Mine Land Reclamation Program: General Historical Perspective', http://www.mde.state.md.us/Programs/WaterPrograms/MiningInMaryland/MiningInWestMD/index.asp

community where most of the residents are living on low or fixed incomes, there was opposition to the proposed increase.

The utility takes readings from only 150 water meters, with a total of 197 hook-ups. Single meters exist at an apartment complex, a senior citizens home, and a trailer park, each containing multiple lines. The systems are considered small, with both the drinking water and the wastewater system containing about 5 miles of distribution and collection system piping.

The sewer system was partially upgraded in 1994 because of leaks in the lines. The original pipes were made from steel and terra cotta. Terra cotta cracks easily, and when water infiltrates through the cracks, the steel rusts, causing a buildup that further deteriorates the piping.[4] The 1994 repairs included replacing the original pipes with ones made of PVC (polyvinyl chloride), and replacing manholes, castings, and lids.

Because of the physical deterioration of the pipes, inflow and infiltration of stormwater into the sewer pipelines has been the wastewater system's biggest problem. Even after the upgrades in 1994, the system was found to be deficient, with major leaks, illegal tie-ins of roof drains, cracked laterals, and some surface runoff causing pollutant discharge.[5] As a result, the Maryland Department of Education and the town filed a consent order in 2000 requiring the town to correct the problems with its sewage collection lines.

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[4] Traditional Building, Product Report of the Month, Terracotta Restoration, http://www.traditional-building.com/3-terra.htm

[5] USDA Rural Development, 'Earth Day 2003: Town of Accident, MD', www.rurdev.usda.gov/rd/earthdat/2003/md-accident.html

Capital Needs

The consent order was issued because of pollutant discharge into the South Branch of Bear Creek, which is a state-protected waterway. The pollutant discharge was caused by high flow rates into the plant (above its 50,000 gallons per day capacity) from precipitation and melting snow. The violations reported included elevated levels of biochemical oxygen demand, total suspended solids, and fecal coliform counts recorded over nearly four years.

Accident was directed to submit a facilities plan to be approved by the Maryland Department of Education. Once the plan was approved, the town was put on a schedule to complete Phase I and II of the plan and monitor the effectiveness of its efforts. In addition, the town was required to get the department's permission for any connections to the wastewater system above 20 equivalent daily units. Strict penalties were outlined for noncompliance with the consent order. Currently the town is obtaining bids for work to be completed in Phase I of the consent order. The town expects to meet all conditions and complete all updates on schedule.

Future needs of the wastewater system include repair of deteriorating mortar joints and crumbling blocks on the east wall of the plant, repair of fire hydrants at the plant, purchase of laboratory items, and purchase of a stationary emergency generator for backup.

Other possible improvements include a new computer, a new plow, valve replacements, a pick-up truck replacement, and some telemetry units that will allow for remote monitoring, level sensing, and state regulation monitoring. According to the 1999 Drinking Water Needs Survey administered by EPA, the national average need of a groundwater system serving fewer than 500 people is $392,020 over the next twenty years. The 2000 Clean Watersheds Needs Survey

estimates that Accident needs $206,000 of the county's $14 million in needs to cover rehabilitation, replacement, and upgrades of the system.

Accident does not have a capital improvement plan. Instead it relies on M. Mullan, the town circuit rider, and the Maryland Rural Development Corporation, for advice. Neither Mr. Mullan nor Mr. Murray nor the Accident town clerk was able to estimate or confirm the town's capital needs for the next twenty years.

Most of the water supply system is designed for residential homes, but there are a few other major users, including the laundromat, the elementary school, and the car wash. Two wells and one above-ground water tank supply the drinking water. The town relies exclusively on the two wells, as there are no back-up sources or intakes. Water is supplied by one well at a time, and the town has not had any problems with supply shortages. On average, 61,000 gallons of water are treated and pumped each day.

The water tank is currently in need of repair. Preliminary engineering assessments are being conducted as part of a process to purchase a new tank (estimated at $285,000). The old tank has been deteriorating because of chemicals such as chlorine and soda ash (sodium carbonate) that are used to treat the water. In 1998 a rubber seal had to be placed inside the tank because of some cracks. To place the seal in the tank, the plant had to drain the tank, repair it, and fill it again. That cost the town roughly $21,300.

Future needs for the drinking water system include replacing the fire hydrant, installing chlorine leak detectors, and replacing the feed system for the soda ash. According to town officials, the only problem associated with the drinking water system in Accident has been related to the tank. Currently there is no identified contamination or pollution of the town's groundwater source.

Community Resources

Accident has limited government resources. The town clerk works only part-time and is single-handedly responsible for bookkeeping and accounting. Mr. Mullan regularly attends town council meetings and helps with the town's proposal writing. He is paid $1,500 a year for his assistance. Mr. Murray provides help with technical aspects of upgrades. He is not in the town budget. The water system has two operators, one full-time and one part-time. Neither has been certified, but according to the town clerk, one is in the process of being certified, as required by the town's current grant agreement with the U.S. Department of Agriculture (USDA).

The operators work on repairs but are not well trained to handle large-scale problems. Therefore the town relies extensively on the Garrett County Sanitary District for technical assistance. The Garrett County Sanitary District operates water and wastewater systems throughout Garrett County.

Because of Accident's limited resources, it has not adopted a maintenance plan, so the systems work on a fix-when-broken policy. The town also has orally agreed with the USDA that the systems will remain municipally owned and governed. The town benefits from owning the plants, for it can control rates.

Water and Sewer Rates

Although residents are quite proud that the town owns and operates its own systems, repairs have been a significant drain on the town's limited fiscal resources. In fact, from 1999 to 2001, the town experienced a funding shortfall for maintaining the wastewater system. Over the last several years, water and wastewater rates in Accident have increased to keep up with rising operating and maintenance expenses (see Table E-1). The town charges each customer for 4,600 gallons of drinking water, whether they use all 4,600 gallons or not. It then

charges them for each 1,000 gallons they use above that. As of the last rate increase, effective July 2004, the rates are $14.05 for the 4,600 gallons and $3.25 for each additional 1,000 gallons. The town estimates a 5 percent increase in rates over the next five years.

Table E-1. Rates billed for Drinking Water (DW) and Sewer Water (SW)

Year *	DW rate for 4600 gallons	DW rate per 1000 additional gallons	SW flat rate	SW rate for each 1000 gallons used
1994	10.14	2.20	8.87	1.40
1995	10.14	2.20	8.87	1.40
1996	10.44	2.20	9.14	1.44
1997	10.44	2.20	9.14	1.44
1998	10.44	2.20	9.14	1.44
1999	11.48	2.64	10.05	1.58
2000	11.48	2.64	10.05	1.58
2001	11.48	2.64	10.05	1.58
2002	13.80	3.15	12.05	1.80
2003	13.80	3.15	16.50	2.50
2004	14.05	3.25	19.50	3.25
Projected 2005	14.19	3.28	19.77	3.29
Projected 2006	14.33	3.31	20.04	3.33
Projected 2007	14.47	3.34	20.31	3.37
Projected 2008	14.61	3.37	20.58	3.41
Projected 2009	14.75	3.41	20.87	3.48
Projected 2010	14.89	3.44	21.14	3.52

* Rates from 1994 to 2004 are actual rates. After 2004 rates for DW are estimated to increase by 5% in the next five years and a 7% increase is estimated for SW in the next five years.

The wastewater system has had a slightly higher increase in rates, with an extra increase effective in 2003. Service is billed at a flat monthly minimum rate, plus a separate rate for every 1,000 gallons of wastewater produced. In 2004 the base rate was $19.50, and the rate for each 1,000 gallons was $3.25. A 7 percent

increase in rates is expected to occur over the next five years to cover maintenance.

On average, the water pumped to each customer is less than 4,000 gallons a month. It ranges from about 330 gallons billed to a single individual to 9,900 gallons to a household of two with a hot tub.

Wastewater is not metered. Therefore customers are billed the equivalent amount of drinking water metered. The capacity of the system is about 50,000 gallons per month, but the system is generally running above capacity, mainly because of the town's inflow and infiltration problems. The average household bill as a percentage of the median household income for the town is shown in Table E-2.

Table E-2. Percent of Median Household Income (MHI) billed for Both Drinking and Sewer Water over time *

Year	MHI ($) **	Average DW customer billed/year	%MHI	Average SW customer billed/year	%MHI	Combined DW and SW billed %MHI	Percentage increase
1994	21875	121.68	0.56	173.64	0.79	1.35	(n/a)
1995	22000	121.68	0.55	173.64	0.79	1.34	-0.01
1996	22125	125.28	0.57	178.80	0.81	1.37	0.03
1997	22250	125.28	0.56	178.80	0.80	1.37	0.00
1998	22375	125.28	0.56	178.80	0.80	1.36	-0.01
1999	**22500**	137.76	0.61	196.44	0.87	1.49	**0.13**
2000	22625	137.76	0.61	196.44	0.87	1.48	-0.01
2001	22750	137.76	0.61	196.44	0.86	1.47	-0.01
2002	22875	165.60	0.72	231.00	1.01	1.73	**0.26**
2003	23000	165.60	0.72	318.00	1.38	2.10	**0.37**
2004	23125	168.60	0.73	390.00	1.69	2.42	**0.31**
2005	23250	170.28	0.73	395.16	1.70	2.43	0.02
2006	23375	171.96	0.74	400.32	1.71	2.45	0.02
2007	23500	173.64	0.74	405.48	1.73	2.46	0.02
2008	23625	175.32	0.74	410.64	1.74	2.48	0.02
2009	23750	177.00	0.75	417.48	1.76	2.50	0.02
2010	23875	178.68	0.75	422.64	1.77	2.52	0.02

* Based on average water used as 4000 gallons a month per customer.

** MHI are estimated as a linear increase, 1999 is actual data.

The highest increase in rates was in 2003, but 1999, 2002, and 2004 all had above-average increases. The average bill varies little from season to season. The total monthly bill in August 2000 was about 675,000 gallons, and in December 2003, about 750,000 gallons (still, on average, less than 4,000 gallons a month per customer).

Infrastructure Financing

Recently Accident had significant success in obtaining outside funds to finance improvements to its water and wastewater systems. In 2001 it received a grant from the Maryland Department of Education worth $150,000 for improvements to its wastewater system. It has tapped the money four times, and there is a remaining balance of $55,000.

The first payout, $40,000, was to Thrasher Engineering in 2001 to engineer a facility plan. The firm presented three sewer alternative rehabilitation plans, and it performed a smoke test and monitored the flow. In 2002 the town paid $15,000 for engineering design. It paid $40,000 and $15,000 again in 2003 and 2004 for engineering design and process billing, respectively.

In 2004 the town received several additional grants and loans including:

- An ARC grant for $250,000
- A Community Development Block Grant for $500,000
- A USDA Rural Utilities Service grant of $1,210,100
- A USDA Rural Utilities Service loan for $480,000

The USDA loan has a payback term of forty years with a below-market "poverty" interest rate of 4.5 percent. The interest rate is fairly high compared with those on loans provided by the Maryland Department of Education from

the state revolving fund (SRF). The standard rate for SRF loans is 1.1 percent, and rates for disadvantaged communities go as low as 0.4 percent.

Impact of Funding Package

The town plans to refinance the loan in a few years. A look at Accident's repayment plan on the loan of $480,000 at various interest rates is instructive (see Table E-3). A market-rate loan at 5.25 percent is compared with the poverty-rate loan of 4.5 percent provided by USDA. Additionally the rates for SRF loans are compared for the actual loan amount and for the total amount of funds provided to the town. SRF loans have twenty-year repayment periods as opposed to the forty-year USDA loan repayment time.

Table E-3. Loan Payments at Different Amounts and Rate *

Loan type	Interest Rate (%)	Loan Amount	Monthly Payments	Per 197 customers	Annual Payment	Per 197 customers
USDA (40 years)	4.50	480000	($2,173.73)	($11.03)	($26,084.71)	($132.41)
USDA (40 years)	4.50	2940100	($13,314.52)	($67.59)	($159,774.29)	($811.04)
Market (20 years)	5.25	2940100	($20,078.99)	($101.92)	($240,947.91)	($1,223.09)
SRF (20 years)	0.40	2940100	($12,771.44)	($64.83)	($153,257.25)	($777.96)

* The actual loan amount to town was $480,000 at a 4.5%APR over 40 years provided by the USDA. The total loan and grant amounts totaled $2.9 million.

The percentage of median household income needed to pay for the drinking water and wastewater needs, plus the loan repayment, can be examined under four scenarios: (1) the actual loan agreement of $480,000 at a 4.5 percent interest rate over the next forty years; (2) a loan of $480,000 at the SRF interest rate of 1.1 percent over the next twenty years; (3) a loan for the full amount needed to fund sewer repairs ($2.9 million) at the SRF interest rate of 0.40 percent over the next twenty years; and (4) a market-rate (5.25 percent) loan for the $2.9 million over

the next twenty years (see Table 4). The data projections assume no change in number of customers and no inflation in the next five years. Less than 1 percent of the MHI is needed every year to pay for the actual $480,000 loan; an average of about $132 is billed to each customer every year (see Table E-3).

Table E-4. Percent of Median Household Income (MHI) Billed for Utilities Needed to Pay Back Different Loan Amounts (Loan amounts from Table E-3)

Year	MHI	%MHI (Drinking and Sewer)	USDA LOAN %MHI of Loan worth $480,000 (4.5% APR) at an annual payment of: ($26,085)	Total %MHI	SRF RATE %MHI of Loan worth $2,940,100 (0.40% APR) at an annual payment of: ($153,257)	Total %MHI	MARKET RATE %MHI of Loan worth $2,940,100 (5.25% APR) at an annual payment of: ($240,948)	Total %MHI
2004	23125	2.42	0.57	2.99	3.36	5.78	5.29	7.70
2005	23250	2.43	0.57	3.00	3.35	5.78	5.26	7.69
2006	23375	2.45	0.57	3.01	3.33	5.78	5.23	7.68
2007	23500	2.46	0.56	3.03	3.31	5.77	5.20	7.67
2008	23625	2.48	0.56	3.04	3.29	5.77	5.18	7.66
2009	23750	2.50	0.56	3.06	3.28	5.78	5.15	7.65
2010	23875	2.52	0.55	3.07	3.26	5.78	5.12	7.64

The lower interest rate available through an SRF loan of this same amount would not reduce the annual payment per customer, but the life of the loan would be cut in half and hence the loan payment would also be cut in half (see Table E-3). If the total amount of funds that Accident has been able to generate through grants had been all from loans, residents would be paying on average an additional 3.3 percent of their MHI in loan repayments. This would be more than twice the amount that the average customer is paying right now. A higher interest rate (5.25 percent) reveals an even higher burden on the residents (see Table E-4).

Conclusion

Accident is an illustration of a small town dealing with the kinds of financial challenges that are common in Appalachia. Often, not enough revenue can be generated through fees to allow for necessary but costly repairs in the basic infrastructure. Accident has done remarkably well in meeting the challenges through grants and loans, providing a good example of the possibility for small towns to find funds. With only a couple of people managing its systems, the town often finds it difficult to meet all the demands and required improvements. It still lacks a maintenance plan, a capital investment plan, and knowledgeable operators with the proper certification. Nevertheless, Accident is providing the basic utility of water to its citizens and working on resolving its wastewater problems. With the amount of funding it has recently acquired, Accident is on the right track.

Accident, Maryland Case Study References

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Case Study:
Corinth, Mississippi

Corinth is a small city tucked in the northeast corner of Mississippi, 5 miles from the Tennessee state line and 20 miles from Alabama (refer to Figure E-3). The almost 14,000 residents of the city have a median household income of $23,436, almost $8,000 less than the state average.[6] As the largest city and county seat of Alcorn County, Corinth's 18.9% population increase has been the driving force in the county's 8.9% growth during the last decade.[7] Corinth is an example of an Appalachian community that faces important water infrastructure financing challenges due to population growth pressure, uncertain water resources, and the desire for economic development.

In 1954 the city created the Corinth Public Utilities Commission, a chartered nonprofit organization recognized by the state as a separate governing authority.[8] Although the original intent was that the commission would operate all city utilities, the sewer department remains under the control of the city. Therefore the commission has authority over only the natural gas and water distribution systems, which are operated jointly as the Corinth Gas and Water Department.

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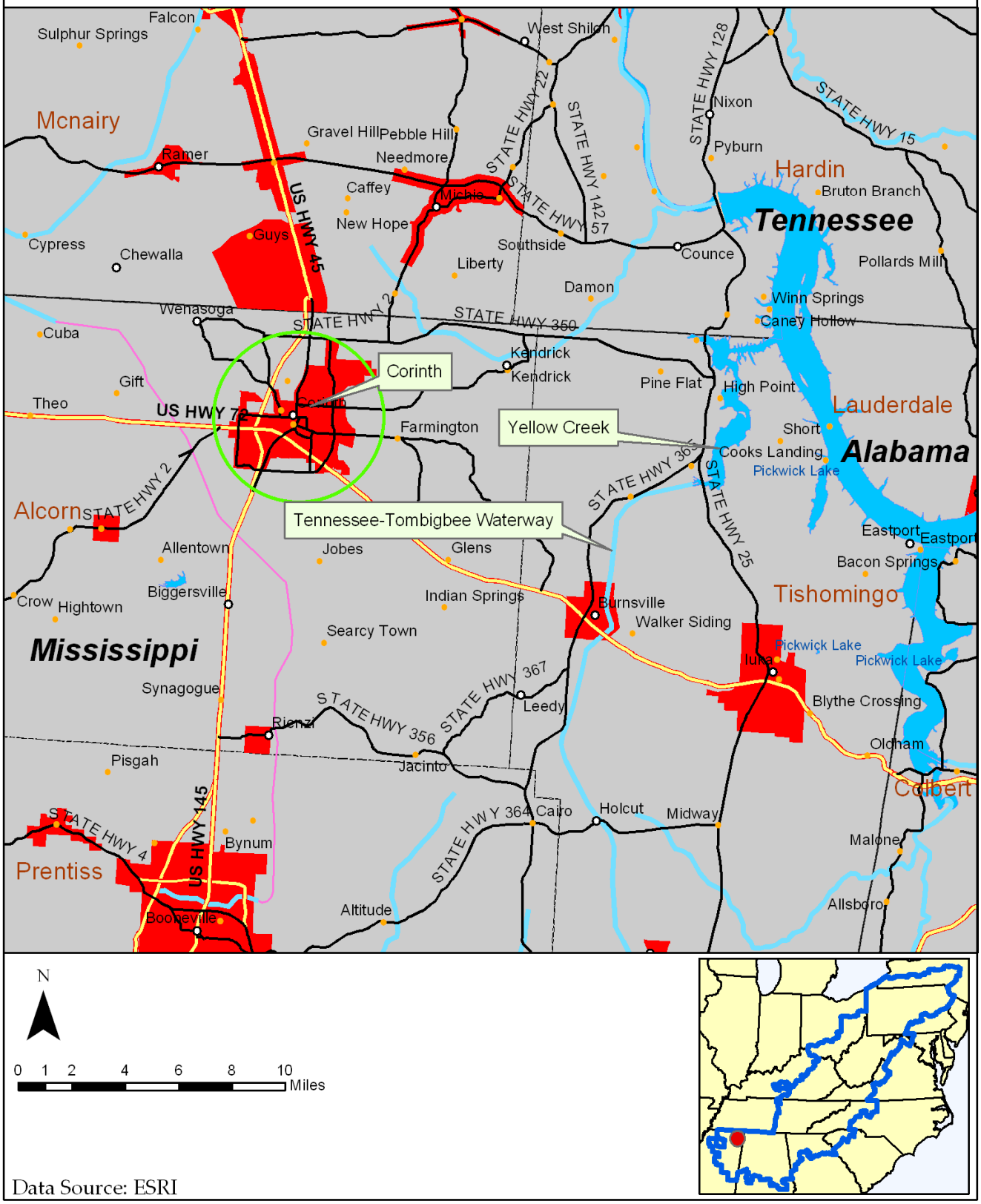
[6] Census Bureau, Census 2000, Summary File 3, Table P53

[7] Census Bureau, Census 1990, Summary Tape File 1, Table P001; Census 2000, Summary File 1, Table P1

[8] Corinth Water and Gas Department website, at www.corinthgasandwater.com.

Figure E-3. Location of Corinth, MS, in Alcorn County



Data Source: ESRI

Drawing groundwater from twelve wells that average 500 feet in depth, the department is the largest water system in the county.[9] Its 7,200 water meters serve 17,500 residents and several large commercial and industrial customers that, combined, withdraw an average of 3 million gallons of water a day from a Paleozoic aquifer.[10] The average Corinth household that uses 5,000 gallons of water a month pays about $15 a month for water service.[11]

The Need for a New Water Source

Beginning in the early 1980s, the Corinth Gas and Water Department sold water to neighboring rural communities and to industries within the city limits. However, by the end of that decade, the department noticed a decline in the water level of its wells and began to monitor withdrawal more frequently. The Mississippi Office of Land and Water Resources now reports that the water level of Corinth's wells is dropping by up to 3 feet each year.[12] Although the physical connection and the meters remain in place, the department no longer provides water to rural communities. However, as Corinth grows and other water systems have drilled additional wells into the aquifer, water continues to be drawn out faster than it can be replenished. The Corinth Public Utilities Commission estimates that with no increase in population, no expansion of service, and no increase in withdrawal rates, the aquifer could provide water for eighty more

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[9] *Ibid.*

[10] Environmental Protection Agency, FY03Q4 SDWIS data frozen January 2004, downloaded from http://www.epa.gov/OGWDW/data/pivottables.html.

[11] Ron Lilly, general manager, Corinth Gas and Water Department, interview, July 2004 and May 2005

[12] Jamie Crawford, Mississippi Department of Environmental Quality, Division of Land and Water, interview, May 2005.

years.[13] However, because of the growth of Corinth and the rural communities, the withdrawal rate has increased over the past decade and is expected to continue to increase. Even after discontinuing service to other communities, the department began to search for a more reliable and permanent water source.

Discussions about Consolidation

Once Corinth Gas and Water became aware of the diminished aquifer in the late 1980s, the department attempted to initiate a dialogue with the rural communities about a partnership. The department pushed for consolidation into a regional supply district to more adequately serve the needs of the tri-county area. However, after thirteen years of discussions, local politics and a lack of financial resources forced the department to withdraw from the discussions and independently plan its water future.

Economic Development

Corinth is home to several corporations, the largest a Kimberly-Clark plant that opened five years ago.[14] Recently the plant planned to implement a new industrial process that would have required 3 million additional gallons of water a day, doubling the department's typical withdrawal. Although hesitant to guarantee that much water, the city was interested in the economic development opportunity. The Corinth Gas and Water Department approached the state about issuing a permit for a new well but was denied because of fears of water shortages. Although the state had no control over the existing municipally owned wells, it threatened to deny new drilling permits in the future if the city

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[13] Lilly, interview.

[14] *Ibid.*

accepted Kimberly-Clark's plan. Eventually, Kimberly-Clark bought Scott Paper and altered its plan to draw only an extra 300,000 gallons a day.

After the department was unable to guarantee water to Kimberly-Clark, Corinth realized that its groundwater system would be insufficient to attract other industries. The composition of the Paleozoic aquifer makes it difficult to determine the amount of water remaining in the fissures of the rock. Since water recharges into the Paleozoic aquifer more slowly than it does into other groundwater systems, the department was unable to increase industrial withdrawal without compromising its residential customers' supply of potable water. Because it cannot identify water-filled fissures from the surface, the department has drilled many test wells at a considerable cost but with limited success. Although the wells are currently adequate to address the drinking water needs of the community, Corinth could not consider new economic development opportunities without a more reliable water source.

Ten years ago, Tupelo, a city in nearby Lee County, experienced many of the same economic development concerns as a result of a declining aquifer. It decided to build a surface water plant and 20 miles of pipeline to attract industries. This plant became a model for Corinth.

Corinth's Plan

The Corinth Gas and Water Department is planning to build a new surface water plant that will draw 15 million gallons per day from the Yellow Creek section of the Tennessee-Tombigbee Waterway. The department has bought 70 acres of land on which to build the plant, but the water will first have to be pumped 9 miles across land owned by the Army Corps of Engineers. This creates additional bureaucratic hurdles that have slowed the process. Although there currently are only three surface water plants in Mississippi, the department views this site as

the only realistic source of water because the National Park Service owns the nearby Shiloh Civil War battlefield, making digging for additional groundwater more difficult. According to the Corinth Public Utilities Commission, the Tennessee-Tombigbee Waterway "is the only water supply source that will satisfy an unlimited capacity with an unlimited design lifetime to meet the long-term needs of Corinth and Alcorn County."[15] The most recent estimate of the total cost of the undertaking is $26 million, and current plans call for the facility to be operational within six to eight years. This projected cost is slightly under the $29 million quoted by Corinth in the Environmental Protection Agency's 2000 Drinking Water Needs Survey.[16]

The Corinth Gas and Water Department already has withdrawn $250,000 from its reserve fund to cover preliminary engineering costs, purchase land, and gain approval from the Army Corps of Engineers. The remainder of the project's cost will be financed through revenue bonds and small grants, although the department has not yet investigated its potential to procure federal or state grants. The department does have experience with the state revolving fund (SRF) system and is currently using SRF funds to initiate fire protection in a newly annexed area. The city of Corinth will not play a large role in the surface water project, and no revenue from the city or the sewer department will be used to subsidize the new plant.

Corinth Gas and Water expects to generate funds for debt retirement and operating expenses through water sales once the plant is completed. It estimates that the average customer will see rates rise to about $22 per month for 5,000

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[15] Associated Press, "City to Tap Tennessee River for Water Supply," *Jackson (Miss.) Clarion-Ledger*, 22 August 2003.

[16] Data from Environmental Protection Agency, *Drinking Water Infrastructure Needs Survey: Second Report to Congress* (Washington, D.C.: EPA, 2001), compiled by UNCEFC.

gallons, an increase of $7.[17] If the full cost of the project is financed with revenue bonds at the market rate of 5.25 percent over a twenty-year timeframe, the department's debt retirement will require annual payments of $2,130,759, almost 100 percent of the department's total operating revenue for water in fiscal year 2003–04. Even if Corinth Gas and Water received a loan from the U.S. Department of Agriculture that could be repaid over forty years, the annual payment would be $1,567,446, more than 70 percent of last year's operating revenue.

Impact on Other Communities

The Farmington Water Association serves 7,365 residents of the neighboring rural towns and draws its water from the same aquifer as the Corinth Gas and Water Department.[18] Since the department stopped providing water, Farmington has made infrastructure improvements and drilled additional wells to provide service to its customers without having to purchase water from other systems. However, the association remains interested in planning for a more reliable water future. As Corinth continues to grow and the department pumps at increasing rates, the Farmington Water Association's ability to draw water for its growing community is being compromised. Although Farmington was one of the communities involved in consolidation discussions, the news that Corinth (the aquifer's largest water consumer) was building a new surface water plant made Farmington back out of consolidation discussions. With Corinth off the aquifer, the rural communities are more likely to depend on it in the future.

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[17] Lilly, interview.

[18] Environmental Protection Agency, FY03Q4 SDWIS data frozen January 2004, downloaded from http://www.epa.gov/OGWDW/data/pivottables.html.

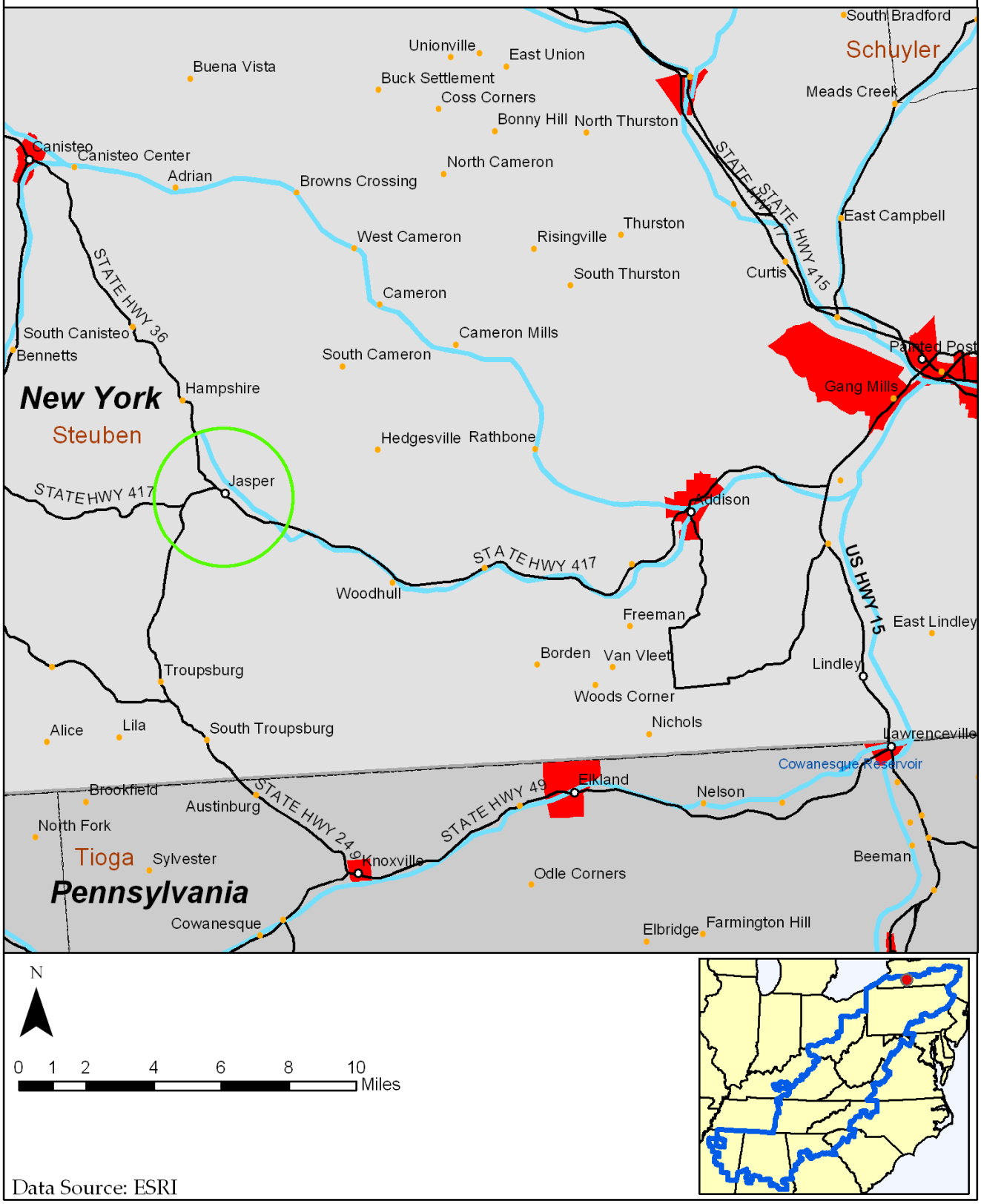
Furthermore, with most of the rural communities already in debt, consideration of consolidation is not currently economically feasible.

The supply volumes and the design criteria of the new surface water project reflect Corinth Gas and Water's belief that, like Tupelo's surface water project, it will eventually evolve into a regional system. To that end, the board of the Corinth Public Utilities Commission passed a resolution to sell wholesale water from the surface water plant to any rural community that exhibits a need. Farmington Water Association officials are not currently concerned with the aquifer level and are waiting to measure the wells once Corinth begins drawing surface water. Corinth's surface water plant is a reprieve for the association's short-term water future, but the association's ability to provide a long-term supply is still unknown.

Case Study:
Jasper, New York

The Hamlet of Jasper, New York, is not unusual for the area: It has no water or wastewater infrastructure, little industry, few high-paying employment opportunities, and few services for residents. All residents and businesses are on septic systems, which in many cases are failing, resulting in public health problems. The lack of infrastructure has had a direct, negative impact on economic development opportunities. In 2000, town officials began a process to build a wastewater system for the community. This case study illustrates their efforts and the importance of early technical assistance, committed leadership and an involved public to the successful completion of infrastructure projects in small rural communities. Municipalities in New York consist of unincorporated Towns (County subdivisions) and incorporated Villages and Cities. Hamlets are population centers within Towns. Although Hamlets have no official designation or authority, they are generally recognized as Town "centers." Towns generally have one or more Hamlets within them. Unless otherwise noted, "Jasper" in this case study refers to the Hamlet of Jasper, a population center within the Town of Jasper (refer to Figure E-4).

Figure E-4. Location of Jasper, NY, in Steuben County



Data Source: ESRI

Background and Demographics

The Town of Jasper is about 10 miles north of the Pennsylvania–New York border in rural southwestern Steuben County. The town's population in the 2000 Census was 1,270. It is located on the Appalachian Plateau and is predominantly agricultural and forested. The region's principal enterprises are agriculture and timber harvesting. Tuscarora Creek runs intermittently 500 feet from the center of Jasper and drains via the Canisteo River into the Chemung and Susquehanna rivers. The water table ranges from 18 to 24 inches below the surface in the hamlet and slopes in the area average 12%. Median household income in the town in 2000 was $33,393. Over 52 percent of the homes were built before 1939, and the average house is worth $47,500.

The wastewater project area is the hamlet, which had a population of 262 in 2002. There are 96 residences and 20 commercial or public buildings in the hamlet. The Jasper Troupsburg High School serves more than 300 students and staff on a daily basis. An income survey completed by the Northeast Rural Community Assistance Program (RCAP) found that 52.8 percent of the residents were of low or very low income according to U.S. Department of Housing and Urban Development guidelines for Steuben County, and 29 percent were below the poverty level. The survey determined Jasper's median household income to be $25,000.

In New York, villages and cities have authority for municipal water and wastewater infrastructure within their borders, although they often provide these services to customers outside their municipal limits. If property owners in unincorporated areas of a town want water or sewer service, they must approve the creation of a special district. In the case of water or sewer, the town administers the system on behalf of district residents. A single town can contain several water or sewer districts, all administered by the town.

The Problem

Like many unincorporated communities in the region, Jasper has never had a municipal water or wastewater system. Residents rely on private wells and septic systems. In many cases the septic systems have outlived their useful life and are failing, resulting in unhealthy conditions due to discharge of raw sewage. In older communities like Jasper, lot sizes are small, and as a result, septic systems are sited close to wells. Thus the potential exists for contamination of drinking water. Because of Health Department regulations on well and septic system sighting, residents with failing septic systems often are unable to install new systems because of their lot size and the proximity of their system to their own or a neighbor's well.

The lack of municipal water and wastewater services also has limited economic development opportunities. "Seniors who wanted to sell their homes and move into something smaller couldn't" because their septic systems failed percolation tests (the soil in the area is largely clay, which impedes absorption and therefore makes it unsuitable for septic system leach fields).[19] These homes were unable to pass full disclosure requirements, necessary for banks to approve a mortgage. (Among other tests, the NYS Department of Health requires that properties for sale with septic systems pass a percolation, or PERC, test. Any sale contract that is based on passing the PERC test is invalid if the system fails to pass the test, according to the NYS Department of State.)

The lack of wastewater infrastructure also has depressed property values. As one resident noted, "I am a senior citizen who needs to sell my home. One of the major questions by the buyer is 'Do we have a central sewer system?' Having

[19] Lucille Kernan, Supervisor, Town of Jasper, interview, July and August 2004

one would aid in selling property as well as increasing the value."[20] Two restaurants were built in the area but could not open because of well contamination and the inability to build appropriate onsite wastewater treatment systems. One owner noted in her support letter for the project, "Because of this waste problem, it also has been hard for me to sell the business and or building, and as long as there is this problem, then it will be unlikely that I will ever sell it."[21] Residents believed that the lack of an adequate wastewater system blocked economic development opportunities. A business owner noted, "It has never been an option for us to recommend Jasper as a location [to start or expand a business] due to its lack of wastewater treatment."[22]

Because of the obvious wastewater problems in the community, the Town Planning Board was compelled to address the issue. In 2001 an Ad Hoc Water and Wastewater Committee was created to explore the planning and funding process of infrastructure development in Jasper. The committee's eventual success was attributed to broad community support and the efforts of leaders to have a variety of stakeholder interests represented. "We tried to get a cross-section of the community, a well driller, a senior citizen. That gets more people talking on the street. The initiative [for the project] came from the community, and that's what kept it going."[23] A 1999 Community Master Plan Survey had found that "utilities," including water, sewer, and natural gas, was the most commonly cited challenge facing the town. The same survey asked business

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[20] Public comment included in the Town of Jasper Application for New York State Small Cities Community Development Block Grant, submitted to the New York Governor's Office for Small Cities, April 12, 2002

[21] *Ibid*

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[22] *Ibid.*

[23] Carol Whitehead, chair, Town of Jasper Ad Hoc Water Wastewater Committee, interview, August 2004

owners what services would enhance their business and improve business retention and expansion. The most common response was "utilities."

The Process

In spring 2001 the town learned about the Southern Tier Central Regional Planning and Development Board's Community Connections Program, which provides planning grants for infrastructure projects in the region. The town's successful application brought it together with technical assistance providers from Rural Community Assistance Partnership, the New York State Environmental Facilities Corporation (NYSEFC), the Rural Development Program of the U.S. Department of Agriculture (USDA), and the New York State Department of Health (NYSDOH). Several meetings were held with these agencies and town and planning board representatives, which resulted in local leaders becoming more familiar with the technical assistance available to them, funding alternatives, and the steps that they would need to take to complete a wastewater project successfully. Lucille Kernan, a town supervisor, characterized the initial grant as "pivotal" to the project's success: "It all came together at that point . . . This spearheaded it."[24]

Through the board's work with the Community Connections Program, the committee realized that it had to have data on the need for a wastewater system in the hamlet. A prime concern for the community was the potential of drinking water contamination from leaking septic systems. The NYSDOH agreed to work with the town to test drinking water, and not to pursue a consent order if there was no evidence of widespread contamination. Supervisor Kernan credits this informal agreement between the Town and the DOH to the success of this phase

[24] Lucille Kernan, Supervisor, Town of Jasper, interview, July and August 2004

of the project. More than 90 percent of the residents agreed to have their water tested. The success of the testing program is attributed to the manner in which it was conducted. Members of the committee contacted each resident of Jasper to gain his or her approval, and a committee member accompanied NYSDOH staff to each home and business for the test. According to a planning board member, without that contact and presence, "I think [residents] would have been apprehensive: 'Why are you here? Am I going to be fined if there's a problem with my water?' We developed a script for the committee members to use when they called people."[25]

The DOH tested 117 wells and one spring in the hamlet in May 2001. They found *Escherichia coli* in 3 wells and total coliform bacteria in 26 wells. Also, 7 wells exceeded NYSDOH limits for nitrate. Further, on the basis of observations and residents' responses to questionnaires, "most homes and businesses did not have onsite water supplies and onsite sewage systems that met separation distances [100 feet] that are recommended to protect water supplies from sewage contamination."[26] NYSDOH recommended that the town complete feasibility studies to assess the cost and the practicality of a wastewater system.

RCAP conducted a diagnostic survey of Jasper residents in May 2001. The survey asked about the type and the depth of their well, the location, the type and the age of their septic system, and so forth. Ninety-eight surveys were returned, a response rate of more than 90 percent. More than 62 percent of the respondents thought that there were septic system problems in their neighborhood, more than 72 percent had a water supply source less than 100 feet

[25] Carol Whitehead, chair, Town of Jasper Ad Hoc Water Wastewater Committee, interview, August 2004

[26] Diagnostic Survey of Current Conditions and the Need for Public Water Supply and Sewerage, Catherine Rees, The Northeast RCAP, January 2002, submitted with Block Grant application

from a septic system, and 80 percent favored a public wastewater system. It was apparent that there was broad public support for a wastewater system in Jasper.

Although there was anecdotal evidence that septic systems in Jasper were failing, the town realized that it needed data to support this claim. The town sent letters to all the property owners in the project study area, asking about their willingness to have their septic systems tested for leakage**.** In July 2001, committee volunteers conducted dye tests, which involved flushing dye through the system to be able to detect leaks. The conclusion was that of the 71 systems tested, 73 percent either regularly or occasionally discharged raw or partially treated sewage. "Some were so bad [that the testers] didn't even get outside before the dye leaked" from the septic system.[27] The effluent flowed into ditches, onto sidewalks, onto streets, and into Tuscarora Creek.

The committee issued requests for proposals to engineering firms, and the town board selected MRB Group of Rochester in October 2001 to prepare two engineering reports for a water and wastewater system (the town was considering pursuing both projects but decided to concentrate on the wastewater project). The decision to hire MRB Group was made after public input and after considering advice from NYSDOH and the New York State Department of Environmental Conservation.

The planning board recognized the need for public support of the project. Town leaders engaged the public early and kept them informed of the project's progress. They knew that a wastewater system would mean additional costs for residents and thus would require outreach and education to gain support. They held an initial public meeting in March 2001. The proposal for a wastewater system was introduced to the public, and representatives from RCAP and

[27] Lucille Kernan, Supervisor, Town of Jasper, interview, July and August 2004

NYSEFC talked with residents and business owners about the process of building a system in Jasper. Another meeting was held in July 2001 to report the results of NYSDOH's well tests, RCAP's diagnostic survey, and the committee's dye tests. At meetings in February and March 2002, residents were presented with the results of engineering reports, funding options, and project timelines. The local newspapers, the *Hornell Evening Tribune* and the *Corning Leader*, papers reported on the progress of the project throughout its evolution. Because of the demonstrated need for the project and the approach taken by the town and the committee—for example, committee volunteers accompanying NYSDOH staff for water testing—strong public support was generated. Supervisor Kernan noted, "We had an easement party with cookies, where people came in, and we paid them a dollar, and they got their easement notice." Kernan continued, "[The town] opted to go the more proactive way and do a petition [rather than a vote for district formation]. It was not on the ballot. It was the people who wanted it that signed the petition. It was widely supported." Kernan believes that this kind of outreach was a key to the project's acceptance and success.

The Funding

In September 2000 the town, along with several other communities in Steuben County, became a USDA Rural Development Champion Community. The town's active participation and successful petition were used as evidence of its commitment to the USDA program's goals of improving social and economic conditions and achieving sustainable community development.

The demonstrated need for a wastewater treatment system in Jasper (as evidenced by the NYSDOH well test and septic system dye test results), the financial status of Jasper residents, and the economic development potential created a case for significant financial assistance from state, regional, and federal

agencies. Jasper qualified for an NYSEFC hardship loan ($628,250) at 0 percent interest because of the community's low median household income. It also will receive an ARC grant for $150,000 and a New York Governor's Office for Small Cities Community Development Block Grant for $361,250. The bulk of the project will be funded by a USDA grant for $1,619,800 and a USDA loan for $100,000 at 4.5 percent interest. The town supervisor said, "The dye and water testing and the income survey, the letters of public support—all helped. Without the income survey, we might not have gotten the hardship loan."[28] The project had strong public support—the town received sixty-nine letters of support. Public health and quality of life were the chief concerns expressed by residents and business owners in the letters.[29] For example:

- "We have a little creek that runs [by] our house . . . that contains raw sewage that flows down it from the residences above our place."
- "Raw sewage flows across walkways in several areas of the community."
- "The septic system at [address deleted] had surfaced, and raw sewage was bubbling out of the ground onto our lawn, as well as having gone underground into our water well. At the time, we became ill from the e-coli contamination in our well."
- "The smell has gotten so bad you can't sit on your porch or yard."

The Project

The town received final approval of the project plan from USDA. It has received its funding from ARC and NYSEFC. Once USDA approval was received, the project was put out for a construction bid, and construction began in May 2005.

[28] Lucille Kernan, Supervisor, Town of Jasper, interview, July and August 2004

[29] Diagnostic Survey of Current Conditions and the Need for Public Water Supply and Sewerage, Catherine Rees, The Northeast RCAP, January 2002, submitted with Block Grant application

The design calls for an anaerobic sludge treatment plant with a capacity of 35,000 gallons per day capacity. The plant will discharge into Tuscarora Creek. The system will have about 15,500 feet of 8-inch collection pipe and lateral service connections. The project will serve 150 estimated dwelling units (EDUs), including 96 residences, 20 commercial or institutional customers, and the high school, a permanent population of 262. The plant requires an operator with a 2-A permit, who will be shared with the neighboring town of Troupsburg. According to Supervisor Kernan, it was "not feasible for an inter-municipal system. The service area is ten miles from the nearest system [Troupsburg]. The geology and hills would require pumping stations," which would increase the project cost. System billing and accounting will be the responsibility of the Town Clerk. The Clerk, a part time position, will use a billing software program. Supervisor Kernan does not expect any significant increase in the Clerk's workload. Customers will receive a separate bill for sewer services, rather than include the charges in tax bills. The average annual cost billed per EDU is estimated at $450.

The total project capital cost is $2,859,300, which breaks down as follows:

Table E-5: Project Costs

Wastewater collection system	$1,404,864
Treatment facility	850,000
Contingency (7% of construction)	157,836
Engineering and technical services	358,600
Legal, fiscal, and administrative costs	88,000
Total Project Cost	$2,859,300

As noted earlier, the project will be financed by grants and loans from several sources, as outlined below.

Table E-6: Project Financing

Funding Source	Amount
NYS Governor's Office for Small Cities Community Development Block Grant	$ 361,250
ARC grant	150,000
USDA Rural Development grant	1,619,800
Total Grants	$2,131,050
USDA Rural Development loan (38 years @ 4.5%)	100,000
NYSEFC SRF loan (30 years @ 0%)	628,250
Total Loans	$728,250
Total Financing	$2,859,300

Annual system operating and maintenance costs are estimated to be $42,300:

Table E-7: O&M Costs	
Treatment plant electricity	$ 3,100
Building energy costs	3,500
Pump stations electricity	600
Sludge hauling	300
Testing (monthly and annual)	2,000
Miscellaneous equipment and repairs	8,000
Operator salary and benefits	20,800
Vehicle costs	1,000
Administrative salary and benefits	3,000
Total Annual O&M	$42,300

Annual system costs will be $67,489:

Operating and maintenance costs	$42,300
SRF loan repayment	19,648
USDA RD loan repayment	5,541
Total Annual Costs	$67,489

Additional Issues

Like many small communities in Appalachia, Jasper lacks the capacity to develop a large infrastructure project on its own. Although elected leaders and town staff are committed to responding to constituents' needs and improving their communities, they often are part-time and in most cases do not have the experience or the background needed to see a project through. Communities frequently do not know where to start when facing an infrastructure project. Further, some funding agencies in New York have policies that can create hardships for communities trying to complete a project. These potential barriers to successful project completion are outlined in the following sections.

The Knowledge Gap

Jasper was lucky in being able to obtain a planning grant from the Southern Tier Central Regional Planning and Development Board and participate in the agency's Community Connections Program. This enabled Jasper to receive technical assistance early in its project and move ahead relatively quickly to resolve a serious health problem in the community. Not all communities have access to this type of assistance. Further, there is little institutional memory for large infrastructure development in these communities. Few people in elected

office or on town staff have experience with water or wastewater projects. Therefore, they often do not know where to go for needed assistance. As Supervisor Kernan said, "You have to know someone who knows about them [assistance programs]. It's getting better but still not the best. Many communities aren't computer literate, and they can't find information on line. It takes a lot of time to look for information. I have a part-time clerk, and she's not knowledgeable to look for information. There's no time and no staff to look." Richmondville Mayor Kevin Neary said, "Unless they have an engineering firm, they don't know where to go . . . I wasn't aware these skilled personnel were available."[30]

When asked how this knowledge gap could be closed, she offered some suggestions; "Teleconferences, but people don't always attend these. I've tried to help other communities that are starting a project. No more reading matter—we have piles of stuff to go through. Local training sessions with people from the different agencies would be good."[31]

The Application Process

Multiple, detailed funding applications can be a problem for many communities. One supervisor said, "You have to make sure you use the right forms. Everyone has a different application."[32] A resident who worked on a wastewater project commented, "We would have choked on the grant applications. The village didn't have the capacity for that."[33]

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[30] Kevin Neary, Mayor, Village of Richmondville, interview, July 2004.

[31] Lucille Kernan, Supervisor, Town of Jasper, interview, July and August 2004

[32] Myrton Sprague, Supervisor, Town of Perrysburg, interview, July 2004

[33] Allan Noble, Alleghany County Planning Board, interview, July 2004

Funding agencies also may have differing criteria. One technical assistance provider said, "Some communities hire a consultant or engineering firm [to complete applications], which is a big waste. From my perspective one application would be great. They're [the applications] vastly different.

"It's also the *emphasis*," the provider continued. "ARC is interested in the number of jobs created; [USDA] and [NYSEFC] are interested in residential impact . . . You have to change emphasis for the different applications for the same project . . . If they could get together on that, it would be great."[34]

Another mayor had a suggestion for streamlining the process: "I'm not sure how the agencies work together. Do they talk with each other about our applications? It would be good if we could just present our problem and they could come up with a solution. Businesses want one-stop shopping for regulations . . . They could have something like that."[35]

"A Use-It-or-Lose-It Situation"

Jasper received a block grant from New York based on its median household income and the health issues in the community. However, the Governor's Office for Small Cities has a two-year deadline during which a community must use the funds or the grant will be withdrawn. Supervisor Kernan described the situation: "We haven't been able to spend their money fast enough, so we could lose $300,000 [sic] if we don't spend it by December [2004]. It's a use-it-or-lose-it situation. That makes it harder for us. We're between a rock and a hard place."

A technical assistance provider acknowledged that this policy can create a serious problem for a community's project. "Jasper moved quickly, so it's not

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[34] Catherine Rees, Water Resources Specialist, RCAP Solutions, interview, August 2004

[35] Kevin Neary, Mayor, Village of Richmondville, interview, July 2004

been as much of a problem," the provider said. "You can imagine what it could be like in other communities . . . for example, if the engineering reports have to be redone. I have another community whose *only* funding is a CDBG grant, and they could lose it. If Small Cities pulled back that grant, it would be devastating."[36]

References for Jasper, NY Case Study

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Catherine Rees, Water Resources Specialist, RCAP Solutions, interview, August 2004.

Myrton Sprague, Supervisor, Town of Perrysburg, interview, July 2004.

Carol Whitehead, chair, Town of Jasper Ad Hoc Water Wastewater Committee, interview, August 2004.

[36] Catherine Rees, Water Resources Specialist, RCAP Solutions, interview, August 2004

Case Study:
McDowell County, West Virginia, and Letcher County, Kentucky

By Gary A. O'Dell[37]

Among the distressed counties at the core of central Appalachia, in the southern coalfields of the Allegheny/Cumberland Plateau, are McDowell County, West Virginia, and Letcher County, Kentucky (refer to Figure E-5). As in many parts of Appalachia, much of the population in these counties has neither a reliable water supply of good quality nor an effective means of wastewater disposal. Many rural neighborhoods comprising hundreds of families have never had access to any public water system.[38] Such households have, by necessity, been obliged to develop any water sources locally available. Individual water supplies are obtained from wells, springs, and rainwater collection, or by purchase of transported water.

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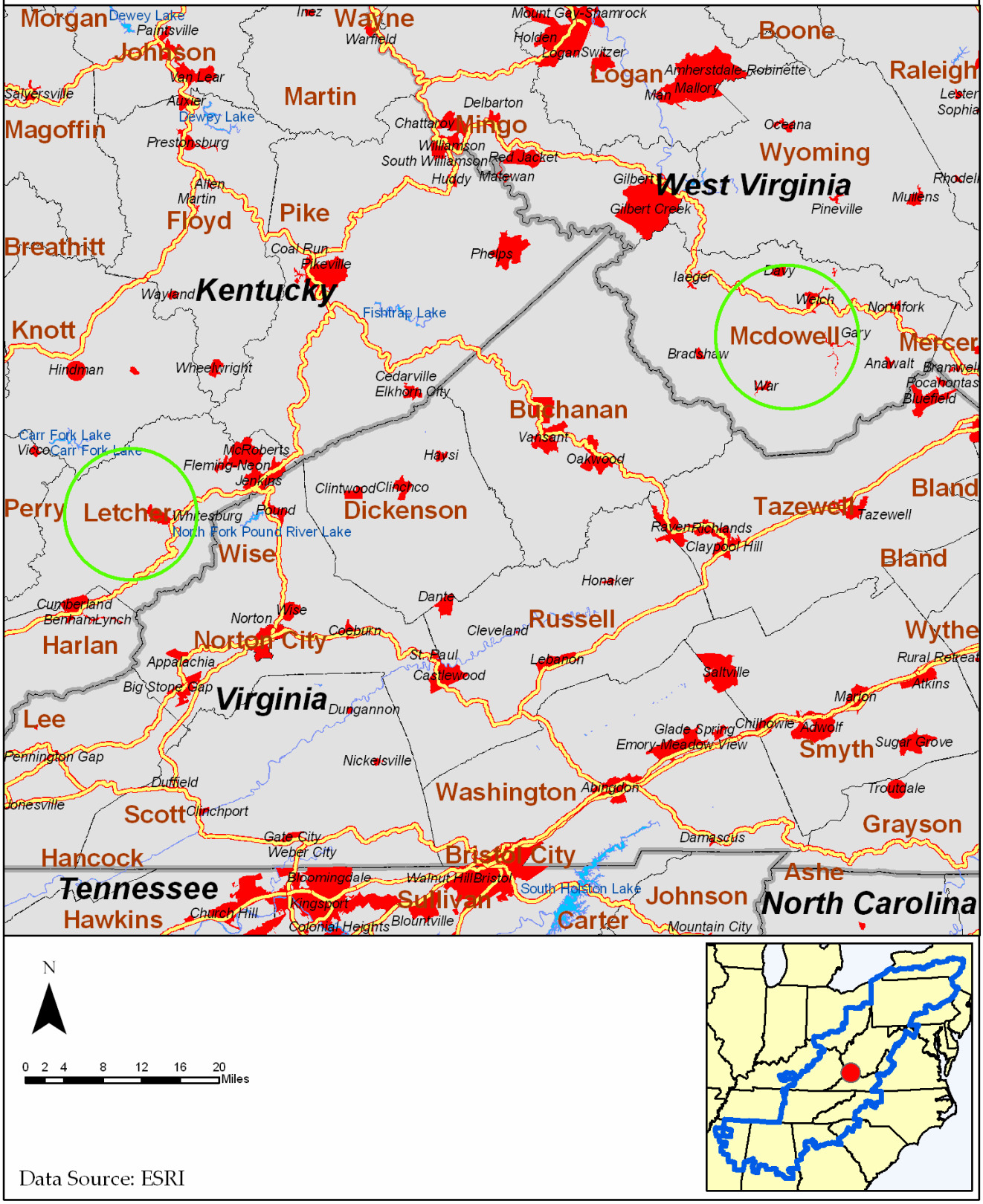
[37] Gary A. O'Dell is assistant professor of geography at Morehead State University (Kentucky). He thanks the many citizens and officials who provided information and insights concerning water and wastewater development issues. Particular appreciation is due to (West Virginia) Shirley Auville, Bill Baird, David Cole, Al Corolla, Lawrence Crigger, Kirk Easterling, Dr. Thomas C. Hatcher, David Hughes, Jim Stutso, Jack Whittaker, and Troy Wills; and (Kentucky) Chrystel Blackburn, Tracy Frazier, James McAuley, Ed Neal, Phil O'Dell, Mark Sexton, Jim Tolliver, and Robert W. Ware.

[38] A "public water system" is a publicly or privately owned system supplying piped water to a community, a subdivision, or a mobile home park. The Environmental Protection Agency provides technical definitions for classes of public water systems, according to the number of connections, the number of users, and the duration of use.

Figure E-5. Location of McDowell County, WV, and Letcher County, KY



Data Source: ESRI

Table E-8: Case Study Data

McDowell County	Population, 1950: 98,887
	Population, 2000: 27,329
	Median household income, 2000: $16,931
Letcher County	Population, 1950: 39,522
	Population, 2000: 25,277
	Median household income, 2000: $21,110

Thus many people depend on untreated sources of unknown quality for their drinking, cooking, and wash water. Water testing programs have shown that many Appalachian water sources, when untreated, are in fact health hazards, contaminated with wastewater, pesticides, or heavy metals. In addition to its being contaminated by human activity, water quality may be degraded by naturally occurring substances. Particularly in the Appalachian coalfield region, residents may be required to pump groundwater that has unpleasant if not harmful qualities; it stains clothing red (because it contains iron) or reeks like rotten eggs (because it contains sulfur).

Even in communities served by public water systems, many of the systems have undersized, aging lines and treatment facilities and are hard-pressed to supply the existing population cluster, let alone to broaden coverage to a dispersed rural population. In numerous areas a declining customer base for water utilities, the result of emigration from central Appalachia to areas of the nation with better economic opportunities, precludes sufficient revenues to upgrade or expand service.

Yet McDowell and Letcher counties, like other parts of the longest-mined areas in Appalachia, also contain aquifers of high-quality potable water, plentiful and free from harmful characteristics that might serve a much greater population than present if managed in a sustainable manner. The difficulty lies in making this water available to the population economically, either through community or neighborhood water systems or public systems of larger scale.

Of equal importance is the problem of wastewater disposal. Entire towns and rural households that lack wastewater treatment systems discharge raw wastewater directly into rivers and streams through open lines known as "straight pipes." Onsite septic systems often are impractical because of small lot sizes or unfavorable conditions of the local soil or bedrock geology. The lack of proper wastewater disposal promotes environmental degradation and creates potential health hazards, including contamination of drinking water sources.

The problems of water supply and wastewater disposal are inextricably linked. Per capita rates of water use in "self-supplied" households (those that supply their own water) are far less than in households connected to public water systems.[39] Providing public water system service to self-supplied households without sewer connections greatly increases domestic water use and therefore production of untreated wastewater, thus further degrading surface and groundwater quality. Ironically, because wastewater discharges provide much of

[39] Estimates for water use in Kentucky in 1995 were 50 gallons per day per capita by self-supplied users and 70 gallons per day per capita by users on public systems. Wayne B. Solley, Robert R. Pierce, and Howard A. Perlman, *Estimated Use of Water in the United States in 1995*, U.S. Geological Survey Circular 1200 (Washington, D.C.: U.S. Government Printing Office, 1998). The authors note, however, "Self-supplied domestic systems are seldom metered and few data exist" (p. 24). Data on water use by self-supplied households collected for twenty-six rural Appalachian households in Kentucky indicated a mean per capita consumption of less than 22 gallons daily. This study concluded that difficulties in obtaining water promoted rigorous conservation measures. Gary A. O'Dell, "The Search for Water: Self-Supply Strategies in a Rural Appalachian Neighborhood (M.A. thesis, University of Kentucky, 1996).

the flow of surface streams in McDowell and Letcher counties during dry months, replacing straight-pipe discharges with sewer connections may result in shortages of flow to plants that extract and treat surface water for public water systems. So the issues of water supply and wastewater disposal must be addressed simultaneously.

The greatest obstacle to provision of water and wastewater services in McDowell and Letcher counties is financial, and it has several dimensions. Water and wastewater projects are enormously expensive, particularly in Appalachia because of the rugged terrain. Funding sources are limited. The costs of connection to water and wastewater services, and the monthly charges necessary to repay loans, often are prohibitive in the economically distressed Appalachian counties where per capita incomes are among the lowest in the nation. For example, the community of Dayhoit, in Harlan County, Kentucky, was provided with a public system gratis, with no initial connection charge, by a manufacturing company that had been held legally responsible for chemical pollution of the local aquifers. Even so, within a few years, many of the initial customers had discontinued service and gone back to using traditional sources such as wells because they could not afford the monthly service fees.[40]

In West Virginia and Kentucky, as in many other states, agencies have established structures to assist communities with infrastructure development. The West Virginia Infrastructure and Jobs Development Council disburses state matching funds for water and wastewater development, and eleven regional planning and development councils serve as planners and financial facilitators for their respective regions. The Kentucky Infrastructure Authority allocates the 20 percent state match for projects funded by either of the two Environmental

[40] Phillip W. O'Dell, Kentucky Division of Water, personal conversation, 1999.

Protection Agency (EPA) state revolving funds; the funds are derived from an ad hoc bond issue incorporated in the annual state budget.[41] Fifteen local area development districts (ADDs)—public corporations consisting of elected officials, technical experts, and local citizens—engage in regional planning and work with individual communities to obtain funding for projects.

Many of the water-quality problems experienced in coal country appear to result from numerous shallow wells that tap poor-quality aquifers near the surface rather than deeper aquifers of far better quality. A 1997 estimate for Letcher County projected an average cost of $10,700 per household to provide public water system service.[42] For less than half of this amount, a drilled well that taps deep aquifers while sealing off shallow, poor-quality water can be constructed.[43] Although individual wells may not be the best solution in many cases, the example illustrates the concept that small-scale innovative solutions tailored to localities may sometimes be more desirable than large public utilities. In McDowell County, the community of War acquired the aging and deteriorated city waterworks from a non-responsive private company, and with labor provided by citizen volunteers, it is installing a modern system. In Letcher County, water and wastewater development has been undertaken at the grassroots level, combining regionalization with locally tailored solutions. In each case an external, nongovernment organization served as a catalyst to motivate the population and facilitate the process. The observations and the conclusions presented in this case study are based on field experience and

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[42] U.S. Department of Agriculture, *Kentucky Water 2000: A Plan for Action* (Lexington, Ky.: USDA, Rural Development, 1997).

[43] Estimates provided to the author in 1999 by three water well drillers located in Harlan and Letcher counties ranged from $2,500 to $4,000 for a complete well installation, including pump and filtration systems.

personal interviews with both civic authorities and ordinary householders undertaken during fall 1999 and updated by more recent communications with concerned people.

Characteristics of McDowell and Letcher Counties

Both McDowell County (538 square miles) and Letcher County (339 square miles) are mountainous, heavily forested, and relatively isolated regions in their respective states. They have similar socioeconomic histories: characteristics of local topography and geology fostered a legacy of resource extraction—timber and coal—that left each county largely devoid of the most fundamental infrastructure and economic opportunities. Many of the present-day communities were once coal camps, whose amenities were supplied according to the whim or the conscience of the coal companies. Once the companies withdrew their patronage , the camps were left poorly equipped to fend for themselves.

The socioeconomic situation in McDowell and Letcher counties is more or less typical of distressed counties in central Appalachia. The two counties have persistently been categorized as distressed since the Appalachian Regional Commission (ARC) began its system of classification of counties by economic status. Unemployment exceeds 10 percent.[44] About one-third of the population lives in poverty.[45] Further, per capita market income is only $7,951 in McDowell County, $10,465 in Letcher County.[46] Paralleling the decline of employment in the coal industry, populations have steadily decreased, McDowell County's from

[44] U.S. Department of Labor, Bureau of Labor Statistics, 1999–2001.

[45] Census Bureau, Census, 2000.

[46] U.S. Department of Commerce, Bureau of Economic Analysis, 2000. "Per capita market income" is per-capita income less transfer payments. Average per capita income for the United States in 2000 was $25,676.

nearly 100,000 fifty years ago to about 27,000 today, Letcher County's from nearly 50,000 to about 25,000.[47]

A declining population means a declining tax base, particularly when a lack of financial resources in the population discourages investment in maintenance of existing commercial and residential structures, let alone new business ventures and new construction. Accordingly, infrastructure development also has lagged. Although the coal companies often provided minimal environmental services such as water supply systems and rarely provided wastewater treatment facilities, physical facilities in many cases are generations old and deteriorating. The greater part of the population, however, has never had access to such amenities and today still follows traditional ways, obtaining water wherever possible from local sources and discharging untreated waste into rivers and streams.

Water and Wastewater Services in McDowell County

Framed in a box at the top-left corner of the *Welch Daily News* is the perennial appeal:

McDowell County Needs

Jobs

Modern Highways

Affordable Sewage Facilities

Affordable Quality Water Systems

In March 1999, Shirley Auville, resident of Iaeger and proprietor of the automobile junkyard south of the community, ticked off the local water supply

[47] Census Bureau, Census 2000.

problems on his fingers: "Starting at Long Bottom and following the road, all the wells are salt water—can't drink it. The new middle school has to treat for salt water from their well. About two miles from here, iron water starts. There is iron water in the wells at Johnnycake, Mohawk, Panther, Mile Branch, Ritter, Long Pole, Short Pole, Roderfield, and Redbird. From Bradshaw down to Virginia is iron water. On Coon Branch Mountain they don't have any water at all; they have to catch water in cisterns."

Auville continued his assessment, moving from the rural sections to the town systems: "Bradshaw has good water; so does Welch (the county seat)—the water has a good taste. Davy has iron water; it has a bad water system . . . Iaeger has real bad water. It has a nasty taste. There is iron and barium in it, and the pressure is always weak."

About Brushy Fork Mountain, near the county's southern boundary with Virginia, Kirk Easterling observed, "Everybody . . . has water problems. Most folks have cisterns; they catch rain water or haul water. The wells don't yield much, but the water quality is okay. A few people have springs out of the sandstone." His neighbor, David Hughes, uses water from a spring that flows from the opening of an abandoned drift mine, is collected in a 2,500-gallon tank, and is pumped uphill to his mobile home. Last year Hughes had to purchase three loads of water in the summer because the spring flow had dwindled to a trickle.

Water is literally precious up on the mountain. Easterling estimated that about a dozen families on his road purchase water, paying as much as $60 per load for two or three 2,000-gallon loads per month from a private hauler. The Bradshaw Fire Department hauls water for people in need, accepting "donations" of about $40 per load to offset vehicle maintenance costs.

Al Corolla of the Bradshaw Fire Department confirmed that the department receives as many as fifteen calls per week during the dry months, July through October. Using two trucks, it can transport two or three loads in the evening after regular work hours. "We tell people that the water is to be used only for washing, not drinking, but we have no control over what they do after the delivery," said Corolla. The department received about $4,500 in water-hauling donations in the previous year—just "barely enough to pay for vehicle maintenance," Corolla noted. He would like to end the program of hauling water because it is too hard on the vehicles, but "we probably won't because people have no other way to get water." Bradshaw has good water and wastewater facilities. Its system is small, serving a population of about 280, but all the main lines are new, installed in 1985, and the wastewater system is only nine years old.[48]

Municipal wastewater treatment is a relatively new development in McDowell County. Onsite disposal of waste has been the prevailing mode, at best through septic systems that often are inadequate for the terrain, but more commonly discharged in raw form through straight pipes into the nearest stream. Until the mid-1990s, only the town of Gary, with a population of 900, was equipped with a wastewater system. Like so many other communities in McDowell and other coalfield counties, Gary was a company town. Gary's former patron, the United States Steel Corporation, was more concerned with community welfare than many mining companies, and it equipped the town with a wastewater treatment plant. In the county seat of Welch, with a population of about 2,600, wastewater treatment did not begin until a $13.5 million plant came on line in November

[48] Population figures for communities in McDowell and Letcher counties are from Census Bureau, Census 2000,

1997, mandated by court order. Previously, all wastewater was piped straight into the Tug Fork River that runs through the town.

An $8.7 million treatment plant was constructed for War (population 780) and the nearby village of Warriormine in 2000. Funded by the U.S. Department of Housing and Urban Development (HUD), the grant was unique in West Virginia in allocating funds for household connections. The innovation was necessitated by the extreme poverty of the county. Furthermore, a special dispensation allowed the work to be performed by local rather than outside contractors.[49]

Despite such infrastructure gains, in all of McDowell County in 2004, only these four communities—Bradshaw, Gary, Welch, and War, representing about 21 percent of the total population—treated wastewater.[50]

Many community systems supplying drinking water in McDowell County are aging legacies of the boom years of coal mining, built and operated by the coal companies to serve the workers in company towns. When the markets for coal collapsed and companies pulled out, private operators took over the water systems. For a time, operations were profitable. However, constant erosion of the customer base, the result of long-term population decline in the county, has put most of these systems in the red.

The situation in War reflects the larger predicament of the county. At a public hearing in March 1999, officials of the community sat down with the owner of the privately owned War Water Works and a representative of the West Virginia Planning and Development Council to resolve the community's water-supply

[49] Dr. Thomas C. Hatcher, mayor of War, personal conversation, 14 June 2004.

[50] West Virginia Infrastructure and Jobs Development Council, *Public Water Systems and Public Wastewater Systems Inventory And Needs Assessment Report* (Charleston: the Council, 2002).

problems.[51] In October 1998 the city had filed a grievance against War Water Works with the West Virginia Public Service Commission. In response, War Water Works offered to sell the business to the city. The city, then constructing its first wastewater system to replace straight-pipe discharges, considered the proposal. The water lines were seventy-five years old, and the company had virtually no other physical assets, not even an office building. It had made no improvements or upgrades in the infrastructure in decades. There were only two 6-inch main lines in town; all others were 4- or 2-inch lines. "Any house that catches fire in War burns to the ground," said Mayor Thomas C. Hatcher, " because there is not enough water to fight [fires]." Two sections within the city limits, had no water service at all, after more than forty years of resolute petitioning. One of the sections, Middleton, threatened to secede from the city over this issue.

War had three options: (1) purchase the waterworks for a sum that would burden the city with debt for years to come; (2) allow the water system to remain in private hands; or (3) negotiate purchase of the system by the McDowell County Public Service District (PSD), an agency that had been acquiring and upgrading local community water systems for several years.

Of the 294 nonprivate water systems in West Virginia, 143 are PSDs, operated on a county level by county governments.[52] Since its inception in 1990, the McDowell PSD had been taking over and upgrading small private community systems in trouble, one or two at a time, and building new treatment plants as

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51 The following account is derived from notes taken by the author at the hearing, 22 March 1999, and in a prehearing interview with Mayor Hatcher, 22 March 1999.

52 , D. Jarrett, Annual Statistical Report: Statistical Data on Public Utilities in West Virginia (Charleston: Public Service Commission of West Virginia, 2003).

needed. Typically these small plants, often using groundwater extracted from deep abandoned mines, had cost $1.5 million–$3.5 million each, with funding provided by loans and grants from ARC and the Rural Utilities Service of the U.S. Department of Agriculture (USDA–RUS). Funding of this sort is generally unavailable to operators of private systems. Currently the McDowell PSD systems serve about 1,700 households in sixteen small communities. Planning is concerned with upgrading or extending service to the small but relatively dense settlements represented by the former mining camps. Any provisions for addressing the needs of the dispersed rural population remain in the distant future.

One of the PSD's acquisitions, in March 1999, was City Water Inc., of Iaeger. If ever a community had severe water problems, Iaeger fit the profile. Not only was the physical infrastructure in terrible shape, but the health hazard from a high natural barium content in the water source prohibited its use for any domestic purpose but flushing toilets. The citizens of Iaeger had a water system in name only, for they could not use the water. Following the acquisition, a new well solved the barium problem, and replacement of the distribution system will soon be made possible through USDA–RUS funding and a pending community development block grant from HUD.[53]

Another high-priority area for future PSD activity is Gary. The municipal system of this town pumps more than a million gallons per day, but more than 95 percent of the water is lost through line leakage. Gary and the county PSD plan a joint renovation of the water system and expansion of coverage to communities eastward.

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[53] David Cole, West Virginia's Region One Planning and Development Council, personal conversation, 23 April 2004.

Consequently, purchase of the War Water Works by the PSD was a viable option. Yet no matter who came into possession of the water system in War, water rates were projected to more than double. At the March 1999 hearing, the water plant operator presented a plan for a "vigorous" renovation and upgrade of the existing system. According to his calculations, an incremental expenditure of nearly a million dollars would be required to refurbish the plant and replace the main lines. The rate increases necessary to pay for the improvements would result in an almost immediate doubling of the then-current $18.55 monthly base to reach a level of more than $44 by the tenth year succeeding.

As the hearing proceeded, it became increasingly clear that the city was not, at that time, inclined to acquire the water system. "We are willing to work with either the water system owner or the PSD," Mayor stated. "All we want is drinkable water." The hearing concluded without a definite plan of action being established.

Inertia of this sort can sometimes be overcome by the influence of a third party, a nongovernment entity that can act as a negotiator, a motivator, and an organizer of resources. In February 1999, West Virginia Governor Cecil H. Underwood, specifically acknowledging the magnitude and the severity of McDowell County's problems in developing infrastructure, announced the initiation of a program to engage the local population in solving the problems. With financial assistance from ARC, the state engaged the Rensselaerville Institute, of New York, to implement leadership programs in McDowell County directed toward self-help and community development activism.[54]

The Rensselaerville Institute, which refers to itself as "the think tank with muddy boots," is a nonprofit, independent organization dedicated to helping

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[54] West Virginia Development Office, 9 February 1999.

low-income communities achieve concrete results with limited resources, using self-help and volunteerism. The institute's outcomes-focused development philosophy is based on the premise that local knowledge and grassroots initiatives often provide better, faster, and less expensive solutions than the conventional dependence on outside experts and millions of state and federal dollars ineffectively applied. The institute seeks out "human sparkplugs"—motivated residents with ideas and leadership potential—to build community capacity and make local improvements with volunteer help from citizens. Such improvements may be small projects that can have a large impact on a community, or large efforts, such as solving drinking water and wastewater problems. Nationwide the institute has assisted more than 300 towns and neighborhoods in obtaining or upgrading water and wastewater systems using the self-help approach.[55]

Collective action in McDowell County was made even more difficult by an ingrained sense of dependency, the product of a historic tradition of coal company paternalism and the physical and cultural isolation of McDowell County from the state administrative center in Charleston. Water and wastewater development in the county, as in most of the nation, progressed through a strictly top-down approach. Government officials and technical experts at the state level decide on priorities and procedures for implementation. This approach fostered in citizens a perception of detachment from the decisions that affect their lives. Although citizen involvement was officially encouraged, primarily through hearings, there was little evidence of grassroots participation. The March 1999 hearing in War, for example, was attended by only two persons from the community other than the local officials involved. Many people in the

[55] Rensselaerville Institute website, at www.rinstitute.org

county were concerned about water quality and availability, but they had little faith in either the solicitude of the state government or its ability to provide solutions.

At the governor's behest, the Rensselaerville Institute began by presenting a series of countywide workshops on leadership development and self-help.[56] Officials and citizens of War who attended were intrigued and decided to work first on two small-scale youth projects, involving local talent to stimulate young people's interest in science and music. The success of the youth projects encouraged citizens to tackle a larger undertaking, the longstanding problem of the Middleton neighborhood's lack of water supply. With funding provided by both the city and, somewhat reluctantly, the water company, during spring 2002 more than fifty residents of Middleton volunteered their time to dig ditches and lay new water lines to each household. By June the project was complete, and Middleton now is served by the city water supply for the first time in its history.

Success in this endeavor and the substantial cost savings achieved through citizen involvement encouraged optimism for a long-term solution to the city's water problems. In June 2000, War filed an another grievance against War Water Works to allow the purchase of the water system by the city, a plan that was opposed by the McDowell PSD. Hearings were held before the West Virginia Public Service Commission in 2003 to determine the ultimate fate of the War water system. At the hearing, strong citizen opposition to PSD acquisition became apparent. The perception was widespread among residents that the PSD had little concern for the needs of the people of War. Water rates charged to customers in other PSD–operated systems in the county were considered

[56] The following account of events in War and its involvement with the Rensselaerville Institute is derived from personal conversation with Mayor Hatcher and Jim Stutso, War director for Water Works, June–July 2004.

outrageous. War citizens had no desire to pay high rates for water provided to the community as a consequence of subsidizing water line extensions elsewhere in McDowell County.

The Public Service Commission ruled in the city's favor, and system ownership was transferred to the community in November 2003. An HUD block grant of $20,000 provided a down payment on the total purchase price of $250,000. War is currently conducting an engineering study to determine the cost of installing an entirely new water system to replace the ancient, undersized, and deteriorated plant and lines. Funding will be provided by a combination of sources, most likely HUD, ARC, and the state's Abandoned Mine Lands program. Civic participation in the project with encouragement and coordination by the Rensselaerville Institute will save an estimated 25 percent in costs relative to the price tag if the project was presented for bids. As Mayor Hatcher observed, "We have a lot of retired miners here, an able-bodied labor pool."

Water and Wastewater in Letcher County

The late James McAuley, proprietor of a small store in Kona, Kentucky, liked to tell a story that he swore was true. Coal mining, he said, has damaged or destroyed many good water sources in Letcher County over the years. Extension of deep mine tunnels often "cut the bottom out" of drilled wells, so a person (or community) might have plenty of water one day and nothing but a dry empty hole the next. McAuley told of a man whose well went dry, and as he stood over the borehole bemoaning the fact that he no longer had any water, a voice issued from the bottom of the well saying, "We've got plenty down here!"

Whether this particular tale is true or not, many residents have reported hearing muted voices and machinery noises coming from the underground mines that intersected their now-destroyed water wells. Kentucky law currently

requires that mining companies replace a damaged water supply within forty-eight hours.

At the end of the twentieth century, only about one in four Letcher County households had access to a community water supply or connection to a sewer line. Letcher County contains six municipal water systems: Whitesburg, the county seat (population 1,600), Fleming-Neon (population 840), Jenkins (population 2,400), Jackhorn (population 200), and Blackey (population 150). Also, there are several water districts in the county, which purchase water from these systems. Public sewers serve only Whitesburg, Fleming-Neon, and Jenkins.[57] Jenkins, like Gary in McDowell County, was a model coal camp, where a civic-minded company provided basic environmental services.

Across the county, however, many rural residents cope with marginal water supplies often tainted by iron and sulfur that leave fixtures and clothing indelibly stained and reeking of rotten egg, while thousands of straight pipes discharge wastewater to rivers and creeks. For years, local and regional newspapers have regularly featured stories with headlines that typically read as follows:

- Officials Investigate Sources of Sewage in Kentucky River[58]
- Sewage Going into Streams Draws Concern[59]
- Sewage Problems Hurt Health, Growth in Eastern Kentucky[60]
- County Men Study Water, Sewer Needs[61]

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[57] Governor's Water Resource Development Commission, *Water Resource Development: A Strategic Plan* (Frankfort, Ky.: the Commission, 1999). Available at http://wris.ky.gov/wrdc_plan .

[58] *Letcher County News Press*, 16 June 1993.

[59] *Whitesburg Mountain Eagle*, 30 June 1993.

[60] *Louisville Courier-Journal*, 2 December 1996.

- Lack of Clean Water Hampers Letcher County Development[62]

The North Fork of the Kentucky River originates in Letcher County and supplies water to Whitesburg and many downstream communities in the state. Advisories against swimming in the river, prompted by high levels of fecal coliform bacteria, have been in place since intensive testing began in 1991. Even simple contact with the river water is considered a health hazard.[63] Health statistics indicate that the average annual incidence of hepatitis A, a waterborne disease, is significantly higher in Letcher County than in Kentucky and nearly double the national incidence.[64] The leading sources of the bacterial contamination are defective septic systems and illegal straight pipes.

In 1992 in part of Letcher County, employees of the state Division of Water and the Kentucky River District Health Department conduction an inspection, walking many miles of river and streams. Straight pipes counted during the inspection ranged from 1 per stream mile to as many as 16, for a total of more than 1,000 in the areas surveyed. Various estimates have since placed the total number of illegal straight-pipe discharges in Letcher County at 3,000 –6,000.[65] According to Dr. Rice Leach, commissioner of the Kentucky Department for Public Health, the prevalence of straight pipes is attributable to several factors.[66]

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[61] *Whitesburg Mountain Eagle*, 15 May 1996.

[62] *Whitesburg Mountain Eagle*, 12 March 1997.

[63] Swimming Advisories in Kentucky (last updated 2 July 2004), Kentucky Division of Water website, available at www.water.ky.gov/sw/advisories/swim.htm.

[64] *Whitesburg Mountain Eagle,* 6 March 1996.

[65] *Whitesburg Mountain Eagle*, 18 November 1992, 24 July 1994, (author not identified), *Lexington Herald-Leader*, 30 June 1997.

[66] *Whitesburg Mountain Eagle*, 30 June 1993.

A 1993 survey determined that more than 90 percent of all new homes in Letcher County are mobile homes. Available financing packages do not include septic and drain field systems, which must be financed separately. The average cost of a septic system installation in Letcher County at the time was estimated at $1,700. Also, mobile home lots often are very small, with little room for a drain field. Further, there is a regional tendency toward "do-it-yourself" undertakings without benefit of a licensed plumber. It is complemented by the lack of zoning and building codes.

The situation regarding water supply and wastewater disposal in Letcher County had become of great concern to local and state officials. Water supply planning was addressed first, as part of a state-coordinated, county-based planning process implemented through the local ADDs. The County Water Supply Program grew out of the 1988 drought, when many communities across the state were forced to ration water. Responding to this emergency, then-governor Wallace Wilkinson issued an executive order creating a Water Supply Task Force. Building on task force recommendations, in 1990 the Kentucky legislature passed a law mandating development of long-range plans for county water supplies.

Each county plan was submitted to the Kentucky Division of Water in two phases. Phase I involved data collection and analysis to project which water systems would be adequate for the next twenty years. Phase II included (1) quantity of water plans (2) plans to prevent contamination from impacting the water source, (3) emergency response plans if contamination should occur, and (4) plans to manage drought. The deadline for completion of these plans, originally in 1998, was extended to July 15, 1999. As of April 1999, all ten counties in the Kentucky River ADD, including Letcher, had completed both Phase I and Phase II. Clearly the concern for water supply in this area was

strong: on the same date, 75 percent of the counties in other ADDs had not reached this stage; fifteen counties had yet to submit even their Phase I plans.[67]

The resulting planning document, submitted in projected water supply development in Letcher County as a gradual process of extending lines outward from existing suppliers to certain adjacent and relatively dense population concentrations over the next two decades. The water sources for both Whitesburg, the largest water utility in the county, and Jenkins, were deemed inadequate for expansion, so alternative sources had to be located. The plan recommended that Jenkins (then dependent on a small reservoir) seek connection to a Pike County system and that Whitesburg (then withdrawing water from the North Fork of the Kentucky River) develop nearby flooded mines. Under the plan the needs of the dispersed rural population would remain unsatisfied indefinitely.[68]

Up to this point, the planning process had proceeded according to a typical bureaucratic model in which regulatory officials imposed mandates on local officials, who then hired technical experts to meet those requirements. In this traditional top-down approach, there is little direct input from those who will be most affected by implementation of the plans—ordinary citizens. The Letcher Water Supply Planning Commission consisted of 4 community mayors, 1 representative from a minor water supplier, 1 county-judge executive, and 1 representative of the District Health Department. Limitation of citizen participation was not a matter of intent on the part of the planners, but a

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[67] Information obtained from Water Resources Branch, Kentucky Division of Water.

[68] Kentucky River Development District and Commonwealth Technology, Inc., *Final Plan Document and Plan Formulation Document Long-Range Water Supply Plan, Letcher County, Kentucky* (Hazard, Ky.: the District, 1996).

consequence of the way in which traditional planning is conducted. First, many officials proceed on the assumption that they are the elected representatives of the people and their views of the official are *de facto* the views of the people. Such an assumption overlooks the creative potential inherent in local knowledge and expertise and a diversity of opinions. Public input is officially encouraged only through public hearings, which in the case of the water supply planning agenda were held at the ADD offices in Hazard, a location sufficiently distant to preclude participation by people of limited resources.

Ultimately, Letcher County chose not to follow the traditional planning process. It took a different path, with the goal of providing water and wastewater services to a greater proportion of the county within a shorter span of time. It accomplished the planning and initial implementation stages by working from the bottom up—that is, from the grassroots level of ordinary people and local officials creating a shared vision rather than responding to an external mandate. The people of Letcher County were a fertile soil in which ideas of empowerment sprouted fruitfully.

The seeds of civic capacity were planted and nourished by a regional nongovernment organization, the Mountain Association for Community Economic Development (MACED), headquartered in Berea, Kentucky. In fall 1995, MACED, equipped with matching funds from the state Division of Water, sponsored a program in Letcher County to find ways to deal with the local problems of wastewater disposal. Brady Deaton became the coordinator of a group of interested local citizens in Letcher County, known as the North Fork Clean Water Project, and began working to convince rural homeowners to upgrade existing systems or install some alternative methods of wastewater treatment, such as constructed wetlands or peat systems. Incentive was provided in the form of cost-sharing by MACED, through which eligible people could

obtain up to 75 percent of the money necessary to install a system or make repairs. Another organization, Homes, Inc., helped owners finance their part of the cost with low-interest loans and low monthly payments.[69]

The North Fork Clean Water Project was originally intended to deal only with the wastewater problem, but it soon took on a life of its own and a greatly expanded mission because of the many needs of the local population. From the original organization, another citizens group formed in 1996, called the Letcher County Action Team, to address a wider range of social issues in the county. Subsequently the North Fork Clean Water Project operated as a subsidiary of the Letcher County Action Team. Much interest and energy was generated in Letcher County as a result of the activities of the North Fork Clean Water Project and the attention from state officials and the media concerning the unwholesome condition of the county's water.

Two other developments, which occurred early in 1996, were to have profound and lasting effects on Letcher County's water and wastewater situation. First, the Letcher Fiscal Court passed an ordinance requiring all certified electrical inspectors to receive a notice of release from the local health department before approving the electrical wiring in any new structures. This simple measure allowed the health department to ensure that all new construction in the county had adequate wastewater disposal.[70] Second, County Judge-Executive Carroll Smith appointed a study group of six people to examine the county's water and wastewater problems and make recommendations. Two members were chosen

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[69] *Whitesburg Mountain Eagle*, 6 December 1995.

[70] *Whitesburg Mountain Eagle,* 13 November 1996.

from the North Fork Clean Water Project sewer grant committee, one of whom, Kona storekeeper McAuley, became chair.[71]

The ordinance requiring inspectors to obtain a release from the health department before approving electrical work proved tremendously successful. Septic system permits doubled after the ordinance went into effect.[72] Impressed, State Senator Barry Metcalf introduced legislation modeled after the Letcher ordinance that was passed by the 1998 Kentucky General Assembly, mandating health department approval before electricity is provided to new construction.

In mid-May 1996 the study group presented its conclusions to Judge-Executive Smith, recommending the formation of a countywide water and wastewater district. In the countywide district, communities with existing systems would retain control of their own systems, including revenues, contracting with the district to supply service to outlying areas. A county system would eliminate much of the resistance to community system connection expressed by rural residents who feared that annexation would increase their tax burden. Later that month the Letcher Fiscal Court passed a resolution authorizing the county attorney to work with the citizens group to lay a framework for a countywide water and wastewater district. The real work was ahead: formalizing the details of the plan and persuading the state Public Service Commission to allow the district to be created.[73]

At the initial Public Service Commission hearing in March 1997, the application was denied. The commission operates under a mandate to prevent proliferation of water utilities if preexisting water suppliers can serve the

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[71] *Whitesburg Mountain Eagle*, 15 May 1996.

[72] *Whitesburg Mountain Eagle*, 16 July 1997.

[73] *Whitesburg Mountain Eagle*, 15, 29 May 1996.

proposed area. A feasibility study by commission staff had concluded that an expanded Whitesburg system could serve a larger population.

The ruling was appealed on the basis that the Whitesburg expansion postulated by commission staff would serve only a small portion of the area proposed for the countywide district. At a second hearing, in April 1997, the commission reversed its findings and ordered the creation of the Letcher countywide water and wastewater district, the first of its kind in Kentucky.[74] In June, responsibility for the proposed new district was formally transferred from the study group to a commission. McAuley was elected chair and served in that capacity until his death in February 2004.[75]

According to the plan developed by the Letcher study group with some expert assistance from numerous professionals, the district will expand in phases based on identified priorities. First, it will extend wastewater service to areas that receive their water supply from municipal systems but not wastewater service because of lack of funds, staff, and resources. The district will use the excess capacity of wastewater treatment plants in Whitesburg and Fleming-Neon. Second, because the flow of the North Fork of the Kentucky River is insufficient during the summer months, the district will develop a separate water source with a capacity of 4 million gallons per day and a storage capacity of 600 million–800 million gallons to provide a 200-day supply. Third, the district will extend water and wastewater service to densely populated regions of the county such as Mayking and Millstone.

These three initial phases would provide water to 56 percent of the county and wastewater to 53 percent, including the currently served population. The fourth

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[74] *Whitesburg Mountain Eagle*, 18 May 1997.

[75] *Whitesburg Mountain Eagle*, 2, 16 July 1997; Don Profitt, current chair of the Letcher County Water and Sewer District, personal conversation.

priority will be to provide service to parts of the county where the housing density is 10 per mile or greater. Finally, the district will construct alternative wastewater plants for settlements in small valleys containing 15–40 houses. This phased approach was deemed necessary because it is unlikely that all of the money needed will be available at one time. Construction priority is based on "the greatest need of the people and the environment." Should sufficient funds become available, phases might be constructed simultaneously.[76] The primary guiding philosophy of the district is to share county resources so that local excess capacity does not go unused.

Thus the Letcher County Water and Sewer District came into being. The new district had scarcely a dime in financial resources, yet the projected cost of the project exceeded $55 million. Funding began to trickle in, some from traditional sources, some from quite unexpected directions. Blackey received funding from ARC and USDA–RUS to build a $2.87 million water plant to replace the town's reliance on wells, many of which were found to be contaminated. The Kentucky PRIDE project was launched in June 1997, the creation of U.S. Representative Hal Rogers from Somerset, Kentucky. PRIDE stands for Personal Responsibility in a Desirable Environment and is tackling the problems of wastewater and open dumps in eastern Kentucky.[77] The North Fork Clean Water Project was phased out, and PRIDE adopted its goals for Letcher County. The county received two grants from PRIDE: $568,000 to Whitesburg to extend wastewater lines to twenty-two homes outside the city with adequate water but faulty septic systems or straight-pipe discharges, and $328,000 for an alternative wastewater disposal system for a cluster of thirty homes at Millstone. Recently the Kentucky River

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[76] *Whitesburg Mountain Eagle*, 28 August 1997.

[77] *Lexington Herald-Leader*, 30 June 1997.

Authority approved funding for the required match ($109,000) for the Millstone Demonstration Project. Further, Representative Rogers worked hard—and successfully—in Washington to secure more funds, obtaining an additional $1.5 million for Letcher County (attached to the bill that renews funding for EPA).[78]

The district had a bold plan, but it faced a great obstacle: locating a water source sufficient for the needs of an entire county. Letcher County is headwaters for many streams but has no large bodies of water. Existing water supplies are nearly strained to capacity. For a time, opinion favored tapping the supposedly vast water reserves in some local underground coal mines that were flooded, but the idea was discarded after some disappointing pumping tests and the objection of the state Division of Water. Consequently, sources external to the county had to be secured. The most abundant supply will be obtained from a proposed surface-water impoundment in adjacent Knott County. The new Carr Creek Water Commission, of which the Letcher Water and Sewer District is a member, will serve communities in three eastern Kentucky counties. Funding for the $7 million project has been obtained from ARC, USDA–RUS, EPA, and an HUD block grant.

The district has jurisdiction over the entire county outside the four municipalities of Whitesburg, Jenkins, Fleming-Neon, and Blackey. As of this 2004, the Letcher County Water and Sewer District provides water to fewer than 200 households but is extending water lines along the highway from Blackey, which has excess capacity, through the rural neighborhood of Isom. This will add about 750 households initially, and when feeder lines are extended up the mountain hollows from the main line, the system will provide service to an additional 750 rural homes. Current district chair Don Profitt estimates that the

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[78] *Whitesburg Mountain Eagle*, 1 April, 28 October 1998.

district will be able to provide water to nearly 4,000 households within five years.[79]

So through a combination of efforts at the lowest and highest levels, Letcher County's vision of a countywide, unified water and wastewater system is becoming a reality. There are still obstacles, but the grassroots energy and creativity that brought about the district is finding innovative ways to get around them. Christel Blackburn, who served as coordinator of the North Fork Clean Water Project from 1997 until the organization disbanded, observed, "Our mission here was to build citizen capacity to get good water and sewer," she says, "not specifically to form a countywide district. You can't cookie-cut what happened in Letcher; it was driven by personalities."[80]

Yet others have observed the Letcher experience and applied the lessons. Other county action teams, sponsored by MACED, have been formed in eastern Kentucky, and at least one action team, in Breathitt County, wants to emulate the Letcher County model and form a countywide system. The state continues to encourage regionalization of water and wastewater systems. Blackburn notes, "The Division of Water has the attitude of being very responsive to citizen participation."[81]

Implications for the Future

In McDowell and Letcher counties, the goals are the same: safe drinking water and proper wastewater treatment for all citizens. Citizen activism in McDowell

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[79] Don Profitt and Jack Martin, Letcher Water and Sewer District, personal conversation, July 2004

[80] Christel Blackburn, North Fork Clean Water Project, personal conversation, 3 April 1999.

[81] *Ibid.*

County is community-based, whereas in Letcher County, grassroots involvement is county-based and has involved a more holistic approach of cooperative needs assessment and resource sharing. In both cases the harnessed energy and enthusiasm of citizen volunteers appear likely to achieve the ends. In Letcher County, though, they may be accomplished sooner because the novelty of intercommunity cooperative infrastructure development attracts attention. The Letcher County approach has served as a stimulus to the brokers of political and economic power to find innovative ways to make development happen.

As Letcher County activist Blackburn noted, there is no "cookie-cutter" solution; no one-size-fits-all model for infrastructure development in Appalachia's distressed counties. Although an outsider might perceive all these counties to be alike in their rugged topography, their legacies of physical isolation and their social and economic impoverishment, they vary considerably in these and many other aspects. The lessons from Letcher and McDowell counties are intended not to provide templates for indiscriminate application elsewhere but to show what can be accomplished when a sufficiently motivated citizenry evaluates local circumstances to produce locally based solutions.

What does this mean in practical terms to policy makers? If no single model can or should be used, how can the experience of McDowell and Letcher counties be applied? One framework that may be useful for integrating the two approaches is to consider them in terms of scale: micro versus macro, or local versus regional. The micro approach addresses the specific local needs of a community or neighborhood, such as motivating volunteers to help install water lines in the Millville neighborhood of War. The macro approach undertakes to build infrastructure for a region, which may be a single county, as the Letcher County Water and Sewer District is doing, or a larger unit, as the multicounty Carr Creek Water Commission is doing. Governments, of course, employ both

micro and macro solutions in development. A more desirable alternative to top-down development is to encourage and integrate citizen participation at both micro and macro levels.

From the McDowell and Letcher county experiences, therefore, certain key concepts can be extracted that may be used elsewhere as a foundation on which local solutions to local problems, not limited to water and wastewater issues, may be constructed. The first and most important concept is citizen participation at all levels in assessing, planning, and implementing development projects. This goes far beyond the traditional process in which citizen participation is adjunct rather than integral, limited to comments solicited at hearings and aired in the media after plans already have been made by groups of experts. The professionals, representing such areas as public health, law, engineering, geology, and the environment, have a significant and necessary role but should serve as advisers who work directly with citizen representatives to plan achievable goals. Experts may suggest options and alternatives but should remain receptive to ideas generated from the local populace. In other words, they should facilitate, not dominate.

Motivating citizens to participate in the decisions that affect their own lives and welfare can be a challenging task in any part of America. It may be particularly daunting in parts of Appalachia where paternalistic coal companies dominated social and economic life for so long. In such a situation, an outside, nongovernment organization such as the Rensselaerville Institute or MACED's North Fork Clean Water Project may serve as a catalyst, providing the impetus and the means for people to get together and begin the process of evaluating their needs and making decisions about solutions. As in the case of the Letcher County Action Team, the effort may grow to address concerns that far outrange the original area of interest.

A key element of Letcher County's long-range plan for water and wastewater services is its pooling of resources among the communities for the betterment of the general population, while allowing the communities to retain autonomy. The problems of water supply and wastewater disposal were of such great concern to all that communities were able to overcome traditional rivalries and isolationist attitudes. Each community system became a link in a larger complex of resource sharing. At the same time, support was gained from rural residents who, fearing the consequences of annexation if they were to connect to a city water system, were far more willing to participate in a county-based system.

Another important benefit associated with a grassroots citizen movement is that the local community in effect takes ownership of the developed infrastructure and is willing to provide the necessary continuing resources to operate and maintain its significant initial investment.

Citizen-based planning does not guarantee success, of course. The huge cost of building water and wastewater infrastructure remains a primary hurdle when these basic services are lacking for large areas in which construction costs are high and funding sources are limited. Moreover, areas that completely lack water and wastewater are not the only ones in need. Many Appalachian communities with a public water system are poorly served by aging and inadequate facilities. The solution is likely to require an approach that at first seems contradictory: not only regionalization of water supplies to take advantage of efficiencies of scale in the pooling of resources, but also funding and support of small-scale, strictly local, often nontraditional methods of supplying safe drinking water and treating wastewater. By this two-pronged approach, the majority of citizens—those living in communities and in the most densely populated rural areas—can be served by a large public system, and the more isolated residents, living in dispersed

mountain hollows where pipeline construction costs are prohibitive, can be served by small local facilities under the management of the regional system.

These small systems would provide water and wastewater treatment for clusters of perhaps a few dozen homes. Rather than attempting to build pipelines into every hollow and pump water hundreds of feet vertically up mountainsides, existing water resources of good quality might be tapped through the construction of well fields or the use of flooded mines. In some cases, funding for individual home wells might be the best solution, for field evidence indicates that many water-quality problems derive from shallow, hand-dug wells or improperly constructed ones.[82] Wastewater treatment might be accomplished through the use of properly built and maintained septic systems, on a community or an individual scale, or by alternative methods, such as constructed wetlands or peat filters.

In sum, one size does not fit all in delivery of water and wastewater, even in similar parts of the ARC region. There are however, four primary conclusions can be derived from the investigations in McDowell and Letcher counties:

- Water supply and wastewater disposal must be addressed simultaneously. In the absence of proper wastewater treatment, an increase in the number of people served by a water system dramatically increases the volume of raw wastewater released into rivers and streams.
- Water and wastewater planning should be conducted on a regional basis, although many small communities may require strictly local solutions because of economic considerations. A regional system can incorporate many water supply sources and methods of wastewater treatment under one umbrella.

[82] Kentucky Division of Water, *Gateway Area Development District Water Well Study* (Frankfort: Natural Resources and Environmental Protection Cabinet, 1988).

- Direct and continuous citizen involvement in the planning, implementation, and administration of infrastructure improvements provides benefits in the form of local knowledge, innovative solutions, and morale building through empowerment. Further, it may generate a willingness to tackle other local issues.
- Stimulating grassroots participation may require a catalyst—an individual or an organization that can provide encouragement and coordination in the early stages.

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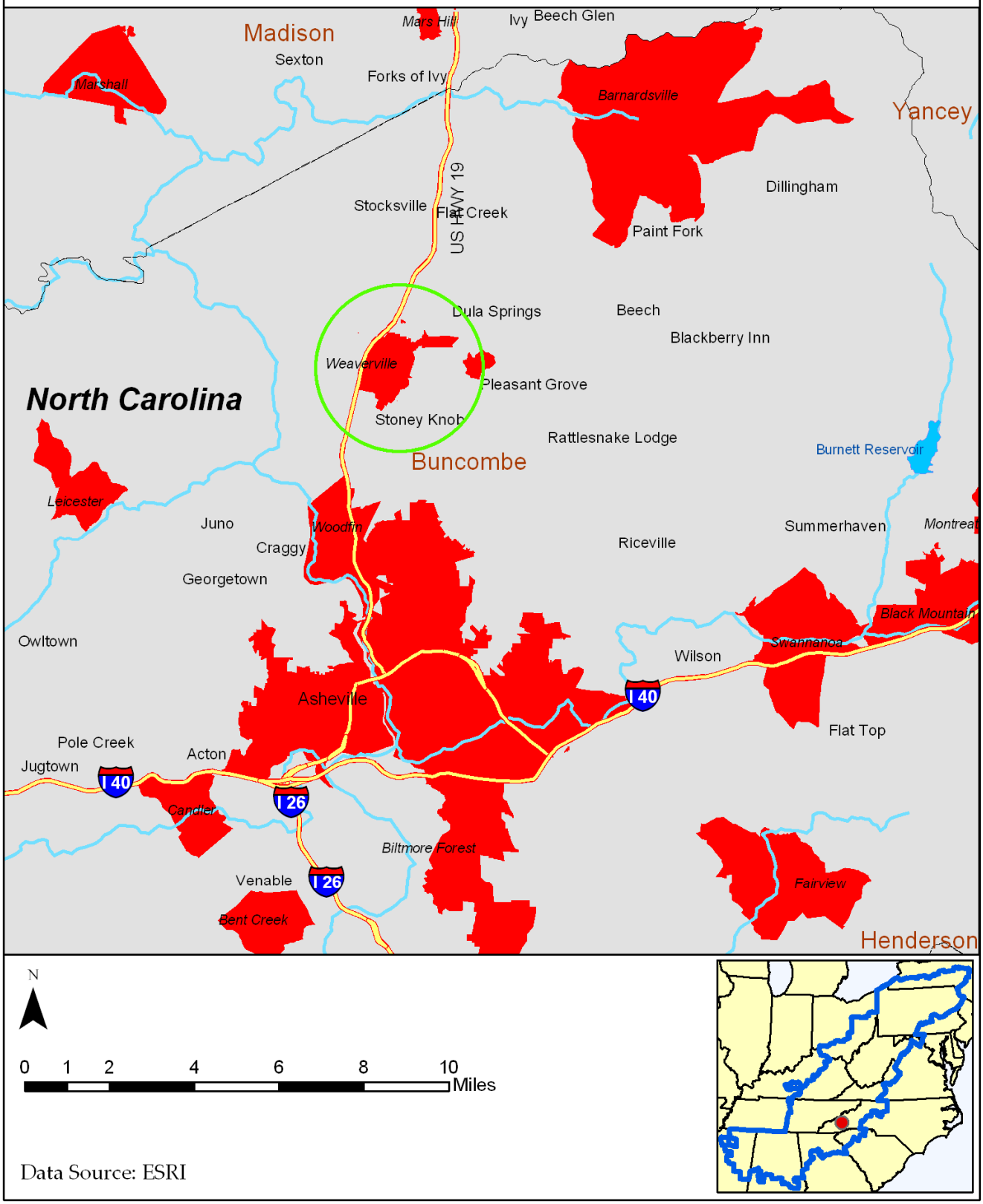
Case Study:
Weaverville, North Carolina

Weaverville, a town in western North Carolina, is just north of Asheville, in Buncombe County near the Madison County line (refer to Figure E-6). This part of the Appalachians is growing relatively rapidly. Newcomers are lured to the Asheville area from both the northern cities and the deeper parts of the southern United States. They come for the mild climate and the rare combination of a beautiful natural setting and vibrant urban amenities. Many settle outside Asheville, in Weaverville and its neighboring communities, Woodfin (a sanitary district) and Mars Hill (a town in Madison County), home of Mars Hill College. Weaverville has grown from 1,495 residents in 1980 to 2,107 in 1990 (a 40.9 percent increase) to 2,416 in 2000 (a 14.7 percent increase).[83] Adding to the pressure of growth is a new interstate highway segment, I-26, which will provide an alternative to the trip to Tennessee on I-40 through the Pigeon River gorge.

As a result of the population influx, there are many well-to-do residents in and around Asheville, and Buncombe County was a competitive county in 2004, in the typology of the Appalachian Regional Commission (ARC) (for a definition of "competitive," see chapter 1). At the same time, Madison County, like the other counties just outside the metropolitan area, is among the poorest counties in the state—"distressed" in ARC's typology.

[83] Census Bureau, Census 1980 Census of Population; Census 1990 Summary Tape File 1; and Census 2000 Summary File 1.

Figure E-6. Location of Weaverville, NC, in Buncombe County



In the area around Asheville, there is much new construction of housing that meets building codes for water and wastewater services, but there also is much older, rural housing stock that has been handed down in families or is still inhabited by the now-elderly builders. Weaverville and several other municipalities in the area can look to the Metropolitan Sewerage District for wastewater collection and treatment. However, much of the older rural housing stock is plumbed directly into the streams via "straight pipes," or it has a poorly maintained or failed septic system.

Adding to the water problems is a long tradition of keeping livestock and giving them direct access to the creeks. This is an efficient way to water the cows but a problem for downstream water quality in terms of turbidity resulting from animal waste and eroded stream banks.

A few communities in the Appalachians have had the ability and the foresight to get a water supply high up, at the headwaters, and protect it through land use restrictions or conservation easements, thereby ensuring some quantity of high-quality water for the future. Asheville has done this (see the sidebar, "The Asheville Watershed"). But in many other communities in the Appalachians, the generations-old traditions of finding water as needed and of resisting planning and land use controls leave them at risk of problems when the time comes to expand the water supply. Water has a way of cutting across the gaps between new and old residents, between wealthy and poor, between new systems and old straight pipes. For the thriving community of Weaverville to solve its water supply needs, it had to find a way to handle the legacy of inadequate wastewater treatment in the upstream, rural communities: high turbidity and coliform counts in the source water.

The Asheville Watershed

Although Asheville is located along a major river, the French Broad, early town leaders decided to find and secure a water supply of more pristine quality. They found it in two reservoirs high in the Black Mountains, northeast of the city, over the ridge from Weaverville.

In 1996, to protect this high-quality supply, the city placed a conservation easement on all 18,000 acres of the watershed. William A. Campbell, a lawyer, a professor at the UNC at Chapel Hill's School of Government, and then president of the Conservation Trust for North Carolina, helped negotiate the easement. The easement is monitored annually by the trust representative site visits. The Conservation Trust for North Carolina views its relationship with Asheville as a partnership, and city officials take the monitoring and the easement conditions seriously.

The easement allows limited logging in the watershed, and in 2004 city leaders and citizens were engaged in a vigorous discussion about the terms of a forestry management plan designed to let the city harvest some timber from the watershed without compromising water quality. The easement helped structure the debate, and as long as the land trust is sustained, it helps assure Asheville residents of a safe, high-quality water supply.

Land trusts are active throughout Appalachia and can be useful partners for water systems seeking a higher level of protection for high-quality supplies. For more information, see www.ctnc.org and www.lta.org.

Weaverville, Woodfin, and Mars Hill, seeing the growth trends and the resulting needs for expanded water service, began planning in the late 1980s how to meet projected needs (see Table E-9). Weaverville has supplied water to its residents since voters approved the construction of a municipal water system in 1913. By the late 1980s, its needs were the most severe. Its existing sources, Ox

Creek and Eller Cove, supplied only a small fraction of the town's predicted twenty-year demand.

Table E-9. Water Demand Trends

Community	Existing Water Supply Safe Yield (in 1987)	2010 Demand	2040 Demand
Weaverville	130,000 GPD (from 3 sources)	990,275 GPD	1.4–2.6 MGD
Woodfin	1,289,150 GPD (from 3 sources)	0.2 MGD (set aside only)	0.5 MGD (set aside only)
Mars Hill	531,115 GPD	0.2 MGD (set aside only)	0.5 MGD (set aside only)

GPD = Gallons per Day
MGD = Million Gallons per Day
Set aside values are estimates for emergency use (additional data was not readily available)

Sources:

M. Keith Webb, "Preliminary Engineering Report" McGill Associates, Asheville, NC, January 1987.

M. Keibth Webb, "Preliminary Engineering Report" McGill Associates, Asheville, NC, November, 1992.

Town of Weaverville Files, "Projected Water Needs; Year 2040" April 1992.

Weaverville, and initially Woodfin and Mars Hill, were interested in the Ivy River, a watershed north of Weaverville, nearly midway to Mars Hill and just across the county line. One turn of the Ivy River lies within Buncombe County, but the majority of the watershed lies within Madison County. The two largest tributaries join to create the main stem of the river, less than six miles from Weaverville, to form the Forks of Ivy.

However, the Ivy River was not classified as a source of drinking water. In the late 1980s, while the three communities were planning for their water needs, North Carolina passed the Water Supply Watershed Protection Act, which added water supply categories to the state's existing stream classifications and specified accompanying requirements (e.g. land use restrictions) to limit residential density, handle stormwater, maintain vegetated buffers for streams, follow best management practices for agriculture and transportation improvements, and

keep certain uses such as landfills out of the area designated as a water supply watershed. For the communities looking to the Ivy River, and other mountain communities in North Carolina, this act posed some political problems: it meant that one town's water supply, if located in another jurisdiction (as the Ivy River was, located in Madison County), would create limits to growth and impose land use restrictions on people living near that water but outside the town's water service area.

The Water Supply Watershed Protection Act proved to be a serious challenge for the proposed water supply on the Ivy River. By spring 1993, Madison county residents were concerned about the land use restrictions in the act, and they began writing their state legislators and seeking other ways to stop the drinking water intake for Weaverville. The letters expressed serious opposition to the Weaverville drinking-water expansion project into the Ivy River. An April 14, 1993 letter from the Madison County attorney to the North Carolina Department of Environment and Natural Resources (DENR) called the situation an "economic disaster . . . [that takes] land without compensation . . . [causing] depreciating the value of land …[that is] costing our citizens jobs . . . and substantially depressing the tax base."[84] Public notices were posed stating that lands had been "condemned without compensation to the owners." [85]

Land use restrictions were not the only problem. Reclassification of the stream as a water supply source required approval by DENR's Division of Water Quality and a sanitary survey and approval by DENR's Division of

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[84] Larry Leake, Madison County Attorney, letter to DENR, 14 April 1993, on file with Town of Weaverville

[85] 1993 Public Notice "This Property Shown On This Map Has Been Condemned Without Compensation To The Owners" (no author), on file with NC DENR

Environmental Health. Tests done in association with the request for reclassification and the drinking water intake revealed that the water quality in the Ivy River was badly compromised from upstream wastes and agricultural practices. Turbidity was regularly as high as 2,000–3,000 Nephelometric Turbidity Units (NTUs), and coliform levels ranged up to 6,000 colonies per 100 milliliters.[86] Wide and rapid fluctuation in turbidity and bacteria indicated that there were serious runoff problems from nonpoint sources.

The Division of Water Quality felt that the elevated turbidity and fecal coliform levels should not prevent the reclassification of the stream. However, actual regulatory approval of the new water intake required permission from the Division of Environmental Health, and the health regulators felt that the water intake should not be approved until the pollution sources were identified, corrective actions were implemented, and water-quality standards were met. Also, in 1987 the Environmental Protection Agency (EPA) had passed the Surface Water Treatment Rules, which applied land use restrictions to all surface sources of drinking water and viral inactivation or viral removal requirements. The rules became effective June 30, 1993. All of this meant higher costs for the project.

In July 1991, Woodfin withdrew its interest in the new water intake. Weaverville and Mars Hill decided to evaluate relocation of the intake upstream, above the confluence of the Forks of the Ivy, hoping that this would improve the quality of the source water. However, there were two concerns with this modification. First, additional distribution lines and two intake locations would be required, resulting in an increase of approximately $600,000 in project cost. Weaverville claimed that this additional cost was unmanageable unless Mars Hill was willing to bear it. Second, because of biological and hydrological

[86] Review of DENR Public Water Supply (PWS) files, dated July 1994, by Matthew Richardson, July 2004.

limitations, the relocation would limit the amount of water available for withdrawal, to the point that potentially only half of the 2040 water demands would be met. A November 1992 "Long Term Water Supply Engineering Report" for Weaverville raised the costs associated with extending the Weaverville water supply to the Ivy River from $4.6 million to $5.4 million. The report also documented that 45.4 percent of the water in the Weaverville system was unaccounted for. This proportion was significantly greater than the generally accepted amount of 10 percent to 15 percent for a water system the size of Weaverville's.

DENR pushed the towns to consider consolidation with the Asheville-Buncombe Water Authority (ABWA). Weaverville rejected this option on three counts. First, the ABWA had not yet developed its own source of long-term supply, and Weaverville, because of the immediate pressing need for additional water, could not wait for ABWA's unknown timeframe to be resolved. Second, Weaverville did not want ABWA controlling Weaverville's growth. Third, the fees that Weaverville residents would pay would be for the ABWA's system, whereas these monies could be used for Weaverville's own system.

By January 1993, Weaverville had set aside $100,000 in town funds, applied for $1.5 million from the Economic Development Administration, and applied for $200,000 from ARC. In April 1993, Mars Hill withdrew its interest in the project, leaving Weaverville on its own to face both the political opposition over the watershed restrictions and the problems with the quality of the source water. Opposition to the reclassification heated up, and with Mars Hill out of the picture, residents of Madison County felt that there was no benefit to placing restrictions on land use in the Ivy River basin. Following the discovery of bullet holes in the Weaverville town manager's vehicle, Weaverville employees

required personal security and protection in late spring 1993.[87] One citizen letter, dated June 23, 1993, to the Governor of North Carolina regarding the Water Supply Watershed Protection Act stated, "Both parties are sneaky, underhanded workers of the Devil, and should be removed from office."[88] Weaverville attempted to have the watershed removed from the Water Supply Watershed Protection Act through legislation. It succeeded in getting a bill passed, but the legislation was ultimately struck down by the North Carolina Supreme Court as unconstitutional.

Weaverville pushed ahead to find funding and to get help in overcoming the regulatory barriers. On June 1, 1993, the citizens of Weaverville approved (by nearly a 2 to 1 margin, with an 80 percent turnout) a forty-year general obligation bond of $4.6 million to extend Weaverville's drinking water supply to the Ivy River. The DENR Public Water Supply Section issued an annual permit for the Weaverville drinking water source in the Ivy River, conditioned on Weaverville's meeting all applicable federal and state regulations, with emphasis on protection of the watershed.

In June 1995, Weaverville submitted an application to the state for approval of $4.6 million in general obligation bonds. In North Carolina, all local general obligation indebtedness has to be approved not only by the voters in the government unit issuing the bonds but also by a state regulatory agency, the Local Government Commission. In November 1996 the bond series was issued. However, only about 85 percent ($3,904,000) of the approved general obligation bond was needed. The balance was not issued.

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[87] Mike Morgan, Weaverville town manager, interview with Matthew Richardson, July 2004.

[88] Ms. Carole Dee Shuford's letter to Jim Hunt (former) Governor of North Carolina, June 23 1993; on file with Town of Weaverville

The Farmers Home Administration of the U.S. Department of Agriculture (USDA–FHA) purchased all the general obligation bonds—$3.9 million worth. Additional project support was provided by a $1.5 million grant from USDA–FHA, a $200,000 grant from ARC, and $100,000 in Weaverville township funds. The application for $1.5 million from the Economic Development Administration was not approved. (The Drinking Water State Revolving Fund (DWSRF) did not begin until 1997. Therefore DWSRF monies were not available for this project.) Other potential sources of funding in Western North Carolina include the Clean Water Management Trust Fund and the Pigeon River Fund (refer to sidebar). A fairly significant jump in water rates was (accurately) projected for 1998 (see Table E-10).

Table E-10. Customer Water Rates in 1995 and Projected Rates after Project Completion

Location	Current (1995) (per 6,000 gallons residential)	Projected after Project Completion (1998) (per 6,000 gallons residential)	Percent Change
Within city limits	$23.25	$26.95	15.9
Beyond city limits	46.47	53.90	16.0

Source: "Application for Approval of GO Bonds; Town of Weaverville" by McGill Associates, Asheville, NC, June 1995.

In January 1995 the environmental health regulators reported to the water quality regulators that they had identified two likely sources of waste runoff: straight pipes for household sewage, and livestock watering and feeding areas and barn lots near streams. With the exception of one facility that had an operating treatment system for livestock waste, all the other livestock operations in the Ivy River watershed were exempt from animal waste registration rules because of the small number of animals (less than 100 head) on each property.

The Pigeon River Fund

The Pigeon River Fund was created to help support water quality and water-related projects in the Pigeon and French Broad river basins of North Carolina. It is a good example of how dedicated funds for environmental purposes can sometimes solve other problems. In the early 1990s, Carolina Power & Light Co. (CP&L, now Progress Energy) was renegotiating its federal license for the Walters Project, a dam on the Pigeon River near the North Carolina/Tennessee line. The negotiations were stalled; in fact, the case was in litigation at the Federal Energy Regulatory Commission (FERC) and had become the oldest case on the FERC docket. The issues were complicated by contaminated sediments behind the project dam, the result of decades of uncontrolled waste discharges from the Champion Paper Company mill in Canton, North Carolina. Tennessee absolutely refused to allow any of the sediments to be released through the dam. However, the thirteen-mile stretch of river immediately downstream from the dam received no water from the dammed upstream portions, a condition that was permitted under the power licenses of the Depression era but not under those of the modern era. If the license did not require CP&L to release water to provide minimum flows to the stretch not receiving water, the company would receive a windfall because it could use all the water in the reservoir for power generation. However, this was unacceptable to fishermen and environmentalists and under modern environmental law.

As a compromise, CP&L agreed to put money into a fund, the Pigeon River Fund, more or less equivalent to the value of the extra water it was allowed to keep in the reservoir, until the water quality in the reservoir matched the very high-quality conditions of the tributaries to the stretch. The initial capitalization was $1 million. The fund, begun in 1996, is overseen by a board of directors as set out in the FERC license. It has funded numerous projects in the region. Its grant amounts are much smaller than those of some other funders, such as the North Carolina Clean Water Management Trust Fund. However, according to Forrest Westall, Water Quality Supervisor for the Division of Water Quality and a fund board member, it has found a special niche in providing planning money for projects that then seek larger grants for implementation.1 For more information, refer to the website at www.pigeonriverfund.org.

In August 1995, DENR granted conditional approval for the water intake, provided that (1) a program for the elimination of unpermitted sources of fecal coliform contamination was established before plant startup and (2) an engineering report could demonstrate an effective mechanical substitute for a pretreatment reservoir to equalize fluctuations in turbidity, bacteriological concentrations, and chemical quantities. If these parameters were not met, DENR might require development of a new intake location.

The lead engineering firm helped meet the second condition by proposing to add an upstream clarifier with a 30- to 68-minute retention time to the packaged drinking-water plant to control the turbidity of water entering the plant. Similar processes constructed at two plants in Illinois and Kentucky had proved to be successful in removing turbidity and managing total coliform and fecal coliform.[89]

The first condition was more complicated because the sources of the water pollution were outside the jurisdiction of Weaverville. Indeed, they were primarily in another county. Helped in part by attention given in a 1995 Year of the Mountains summit that led then-Governor James B. Hunt to set a goal to eliminate straight pipes in western North Carolina by the end of the decade, in 1996 the legislature established the Wastewater Discharge Elimination (WaDE) Program to manage sources of fecal coliform operating without a permit (see the sidebar, "The Wastewater Discharge Elimination Program").

[89] December 19, 1994 Letter from McGill Associates to Mr. Harold Saylor NCDENR; on file with DENR PWS Division

The Wastewater Discharge Elimination Program

At its inception in 1996, the state's flagship program for eliminating straight piping and failing septic systems, the Wastewater Discharge Elimination (WaDE) program, consisted of one environmental health specialist and one data-entry person. WaDE was forced from the outset to seek partners, and it did so with great success. For example, for the 1998 residential surveys in the Ivy River watershed, it was assisted by the Land-of-Sky Regional Council (LOSRC), Madison County, ARC, and the North Carolina Clean Water Management Trust Fund. Keith Roland, onsite wastewater assessor with the Buncombe County Health Department, contracted with Madison County on a part-time basis to manage the survey and review its results.

In January 2000 the key partners in the WaDE program included the Buncombe County Health Center, Environmental Health Division; the North Carolina Rural Communities Assistance Project; the U.S. Department of Agriculture, Rural Development program; Mountain Housing Opportunities, Inc.; and LOSRC. LOSRC was the financial administrator for processing household loan requests. (For the monies allocated by these and other funders of the Buncombe county/Ivy River watershed WaDE surveys, see Table WaDE-1).

Table WaDE-1. WaDE Funding Sources

Source of Funds	Amount (FY 1999–2000)	Amount (FY 2000–2001)
Mountain Housing Opportunities, Inc,	$ 61,200	$ 62,400
WaDE	49,126	53,000
U.S. Department of Agriculture, Rural Development	46,200	2,400
Land-of-Sky Regional Council	8,563	2,000
North Carolina Rural Communities Assistance Project	6,648	—
N.C. Department of Environment and Natural Resources, Non Point Source Division	4,126	—
Western North Carolina Housing Partnership, Inc.	3,500	—
Buncombe County Health Center, Environmental Health Division	2,000	4,500
Total	$181,363	$124,300

Source: NCDENR WaDE's "Buncombe Environmental Survey Project Report," Asheville, NC, October 2000

WaDE began door-to-door surveys to determine the scope of the problems. Numerous partners supported it in this effort: the local health departments, the towns, the Land-of-Sky Regional Council, the North Carolina Rural

Communities Assistance Project (RCAP), the USDA Rural Development program, and a nonprofit entity called Mountain Housing Opportunities, Inc. During the surveys, the surveyors distributed educational materials on wastewater treatment and conducted dye tests (dropping dye tablets into sinks and toilets to see if colored water emerged into a stream or septic tank area). The number of violations discovered was roughly three times the number anticipated. WaDE's October 2000 report on Madison County cited 996 violations based on a survey of 5,360 homes. By the time of the report, 133 of the 996 violations had been corrected. The approximate cost of the survey per household was $50.98. In Buncombe County (a portion of which lies in the Ivy River watershed), in a survey of 1,243 homes, 161 violations were discovered, including 117 straight pipes, 35 failing septic systems, 4 unpermitted pit privies, and 2 homes with no waste facilities whatsoever. Forty-eight of the 161 violations had been corrected by October 2000. The approximate cost of the survey per household was $47.58.[90]

A welcome surprise from the survey was how well the inspectors were received. Surveyors documented 95.0 percent of the homeowners as extremely cooperative, 4.9 percent as hesitant, and only 0.1 percent as uncooperative. Almost all the people who were identified as having a violation or a problem cooperated with repairs.[91] Probably a major reason that they did so was the financial assistance that WaDE and its partners put together to help repair the problems. The Buncombe and Madison county health departments processed the

[90] NCDENR WaDE's "Buncombe Environmental Survey Project Report," Asheville, NC, October 2000

[91] Matthew Richardson, "North Carolina's Waste Discharge Elimination System" (paper submitted for Applied Environmental Finance Class, spring 2004; on file with author and professor).

violations resulting from the surveys and led property owners to the financial resources administered on behalf of WaDE and its partners through the Land-of-Sky Regional Council. In November 1999, USDA set aside $45,000 to finance corrective actions for residential wastewater elimination in the Ivy River watershed. Meanwhile, Mountain Housing Opportunity made $60,000 available for housing rehabilitation.

The small community of Stumptown was identified as the source of numerous straight pipes. With funding from the North Carolina Clean Water Management Trust Fund and matching town grants (which took nearly five years to negotiate), Stumptown was connected to the regional wastewater collection and treatment system.

It is easy to see why wastewater problems are costly to correct in Madison County. The roads wind up and down past rocky, fast-flowing streams and creeks that drain into the French Broad River. Houses are near streams and often far apart from each other, usually on back roads. A resident can install a conventional septic system for about $2,000 if he or she has enough land for a septic tank and a drainage field downhill from the home. However, if wastewater has to be pumped uphill, costs can easily reach $8,000 or more. Therefore, punitive measures against straight piping have been loosely enforced. Local officials are aware that even $2,000 may be beyond the means of many families. "Who would tell cash-strapped people—more often than not, elderly—that they had to sell or abandon their home or family farmstead because of a housing code violation?" wrote Fred D. Baldwin, freelance writer[92]

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[92] Fred D. Baldwin, "Cleaner Water: North Carolina's Straight-Pipe Elimination Project," *Appalachia Magazine* [online], September–December 1999, available at www.arc.gov/index.do?nodeId=1277.

To address agricultural practices, in 1999 the Nonpoint Source Management Program of DENR collaborated with the USDA's Natural Resources Conservation Service (NRCS), Madison County Soil and Water Conservation District, to secure $1,072,750 in funding from a combination of federal and state sources. The monies were allocated to work with forty animal operations in the Ivy River watershed to establish controlled grazing demonstrations, promote education, develop alternative watering systems, redistribute livestock, and restore vegetation. According to Russell Blevins, a conservationist with the USDA–NRCS district in Madison County, the agricultural community has accepted and supported the program, even though most grants require 25 percent cost-sharing by the farmer.[93]

Meanwhile, in 1998, Weaverville completed construction of the Ivy River Water Treatment Plant. The plant is working well, under the direction of an experienced operator, Tony Laughter, Weaverville's public works director, Larry Sprinkle, and the town manager, Michael JaVan Morgan. In 2000 the utility served about 1,125 customers in Weaverville and another 550 in the county along the water supply line from the Ivy River. The system was working well by March 1999, and the plant was meeting all state and EPA standards.[94] The plant also monitors stream conditions, giving the basis for future assessment of the upstream wastewater improvements. Coliform and turbidity levels vary greatly, so the plant will have to review data over a long period to determine just how effective all the work in the Ivy River watershed has been. The preliminary data look promising, though.

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[93] Russell Blevins, district conservationist, USDA–NRCS, telephone interview with Matthew Richardson, 15 July 2004.

[94] Town of Weaverville Water System 1999 Water Quality Report, Weaverville, NC

A 1999 report by the Nonpoint Source Management Program rated the Ivy River as having the 5th and 11th worst water quality (depending on water quality metric) of the 130 streams in seven counties monitored by the citizen-based Volunteer Water Information Network. However, the 1999 raw data documentation file in DENR's Public Water Supply Section reports a 40- to 50-percent decrease in fecal coliform numbers (based on the number of days that have less than 300 fecal coliform colonies per 100 milliliters) from the same time period the previous year. [95] In addition, VWIN's statistical trend analysis of the Ivy River watershed for 1992–2002 reports some improvement. Measured fecal coliform concentrations in the Ivy River watershed have noticeably decreased in the past five to ten years.[96] This is primarily a result of alternative livestock feeding and watering operations coordinated by Blevins and the Madison County Soil and Water Conservation District.

The Weaverville water system recovers its costs through user charges (water sales, tap fees, reconnection fees, interest income, etc.). Water rates are based on meter size and location within or outside town limits. Rates were raised by about 25 percent from 1992 to 2000, about 43 percent from 2000 to 2004 (see Table E-11).

Table E-11. Weaverville Customer Water Rates 1992, 2000, and 2004

	Cost inside Town				Cost outside Town			
	2,000 gal./mo.	**4,000 gal./mo.**	**6,000 gal./mo.**	**10,000 gal./mo.**	**2,000 gal./mo.**	**4,000 gal./mo.**	**6,000 gal./mo.**	**10,000 gal./mo.**
1992	$5.90	$12.10	$18.59	$31.57	$11.80	$24.19	$37.17	$ 63.13
2000	7.38	15.13	23.25	39.49	14.76	30.25	46.47	78.91
2004	10.60	21.70	33.30	56.50	21.20	43.30	66.60	113.00

[95] Microbiological Operations Reports for Town of Weaverville's Ivy River WWTP, on file at NC DENR Public Water Systems (PWS) Division

[96] Ms. Marilyn Westphal, analytical chemist and VWIN coordinator, conversation with Matthew Richardson, July 20, 2004

Source: 1992, 2000, and 2004 Town of Weaverville Water Department, Ordinances to Establish a Schedule of Rates, Fees, Charges & Penalties

Weaverville's median household income in 2000 was $45,100 per year. In that year, water rates accounted for 0.20 percent to 1.10 percent of such income for people within the town limits, 0.39 percent to 2.10 percent for people outside the town limits (see Table E-12).

Table E-12. Weaverville Water Rates as Percentage of Median Household Income, 2000

Percent age of 2000 MHI inside Town				Percentage of 2000 MHI Outside Town			
2,000 gal./mo.	**4,000 gal./mo.**	**6,000 gal./mo.**	**10,000 gal./mo.**	**2,000 gal./mo.**	**4,000 gal./mo.**	**6,000 gal./mo.**	**10,000 gal./mo.**
0.20	0.40	0.62	1.10	0.39	0.80	1.20	2.10

Source: Census Bureau, Census 2000 Summary File1; Table P1

In 2002, Weaverville residential water cost more than water in 90 percent of North Carolina (based on the charge for 3,000 gallons per month for a residential account).[97]

The construction of I-26 has developed a growth corridor in the area. This is a benefit to some people (relative to economic growth) but a detriment to those who are opposed to "outsiders" in the area. Regardless, there is currently a general consensus by the parties involved that water quality in the Ivy River watershed has noticeably improved, and consequently the regional flora and fauna also have flourished.

As for Governor Hunt's call for eliminating straight piping in western North Carolina by the end of the decade, in July 2002, in a survey of 1,844 homes, the number of straight piping violations was down to 265, and 154 of them had been corrected through septic system replacement or were in the process of being

[97] Review of the North Carolina League of Municipalities Survey "How Much Does Water Cost?" December 2002. Rpt#329. www.nclm.org.

resolved.[98] As of July 2004, there remained some homes in the watershed that were not in compliance with straight-pipe laws.[99] Funding for repairs and replacements was available to the homeowners but had not been used. Blevins identified three main reasons for this: (1) the funding was primarily in the form of low-interest loans, not grants, and homeowners were choosing not to go into debt; (2) some homeowners did not qualify for loans; and (3) some strong-willed homeowners were opposed to large organizations (such as DENR and the U.S. Government) instructing them in their actions on their own land.[100]

Future drinking-water needs are difficult to determine precisely. To estimate the national needs for drinking water infrastructure over the next twenty years, EPA conducts nationwide surveys every four years, the most recent survey for which results are available was in 1999. They are based on a methodology that samples a portion of the nation's drinking water systems and then draw additional information from the Safe Drinking Water Information System to extrapolate drinking water needs at the state and national levels. To determine needs for a specific geographical location such as Weaverville, one must re-extrapolate the needs to the local level on the basis of an inventory of water systems in that geographical area. Using the 1999 EPA methodology and working with the eight small and the two medium-sized drinking-water systems in Weaverville, the estimated twenty-year drinking-water needs for Weaverville are $13,927,340 (UNCEFC calculated estimate). Note that one of the two medium-sized systems was an EPA survey sampling point, therefore the

[98] WaDE's "Buncombe Environmental Health Survey Project" status reports 1999 through 2002

[99] (however the documentation is unclear on the precise number); WaDE's "Buncombe Environmental Health Survey Project status reports 2002

[100] Blevins, interview.

proposed needs values are actual reported values, rather than modeled estimates for this single system. Given that EPA's survey is conducted on the national level, and estimation of Weaverville's needs is a community-level analysis with a series of extrapolations, a number of data limitations may be identified. Weaverville's town manager reported that over the next twenty years, with potentially two plant expansions, the $14 million estimate is a loose but reasonably accurate estimate.

Although Weaverville has a secure source of water for the future, Mars Hill is reaching capacity with its source. Mars Hill and Weaverville officials have been engaged in discussions regarding supplying Ivy River water to Mars Hill. Weaverville's town manager is open to the idea of selling treated water to Mars Hill but says the town cannot sell water more cheaply to Mars Hill residents than it does to Weaverville residents. Mars Hill officials think that the rates are unreasonable. However, given the projected growth rates in the region, it is likely only a matter of time before Mars Hill is supplied with Ivy River water.

Future regional issues include Weaverville's high water rates relative to the rest of North Carolina, growth associated with the recently completed segment of I-26, the remaining residential straight pipes, the quality of Ivy River water, and Mars Hill's drinking water capacity limitations.

Weaverville could never have foreseen the obstacles in its path when it set out to find a new water source in the 1980s. Through persistence and creativity, it overcame those obstacles. The community could not have secured the water supply it now has, without the outside help such as the ARC, USDA–RUS, and WaDE, potential funding sources including the N.C. Clean Water Management Trust Fund and the Pigeon River Fund, the state legislature, and many partners at the local and regional level that worked hard to address problems and calm fears.

The primary goals of WaDE are twofold: (1) identification and correction of violations from onsite wastewater systems through door-to-door surveys and (2) identification of sources of financial assistance for wastewater management, for low-income homeowners and communities.

Typical WaDE surveys discover that from 9 percent to 60 percent of the homes are in violation. Noncompliance involves straight piping of black or gray water, failing and overflowing systems, and outhouses. The WaDE Survey Manual familiarizes communities with wastewater treatment processes and assists them in successfully completing surveys aimed at eliminating straight piping. The manual includes sample letters, survey forms, sample notifications of violations, press releases, and a recommended list of stakeholders that should participate in the community effort. The eight basic components of a survey project include funding, administration, surveying, corrections, financial assistance, enforcement, education, and data gathering/reporting. During the surveys, educational information is disseminated, and where plumbing configurations are not self-evident, the surveyors drop dye tablets into sinks and toilets (different colors for each) to see if colored water emerges into a stream or septic tank area.

For more information on WaDE, visit the website of the Environmental Finance Center of the University of North Carolina at Chapel Hill, at www.efc.unc.edu/, and click on N.C. Onsite Wastewater Systems: Funding and Resources.

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Case Study:
West Virginia–American Water

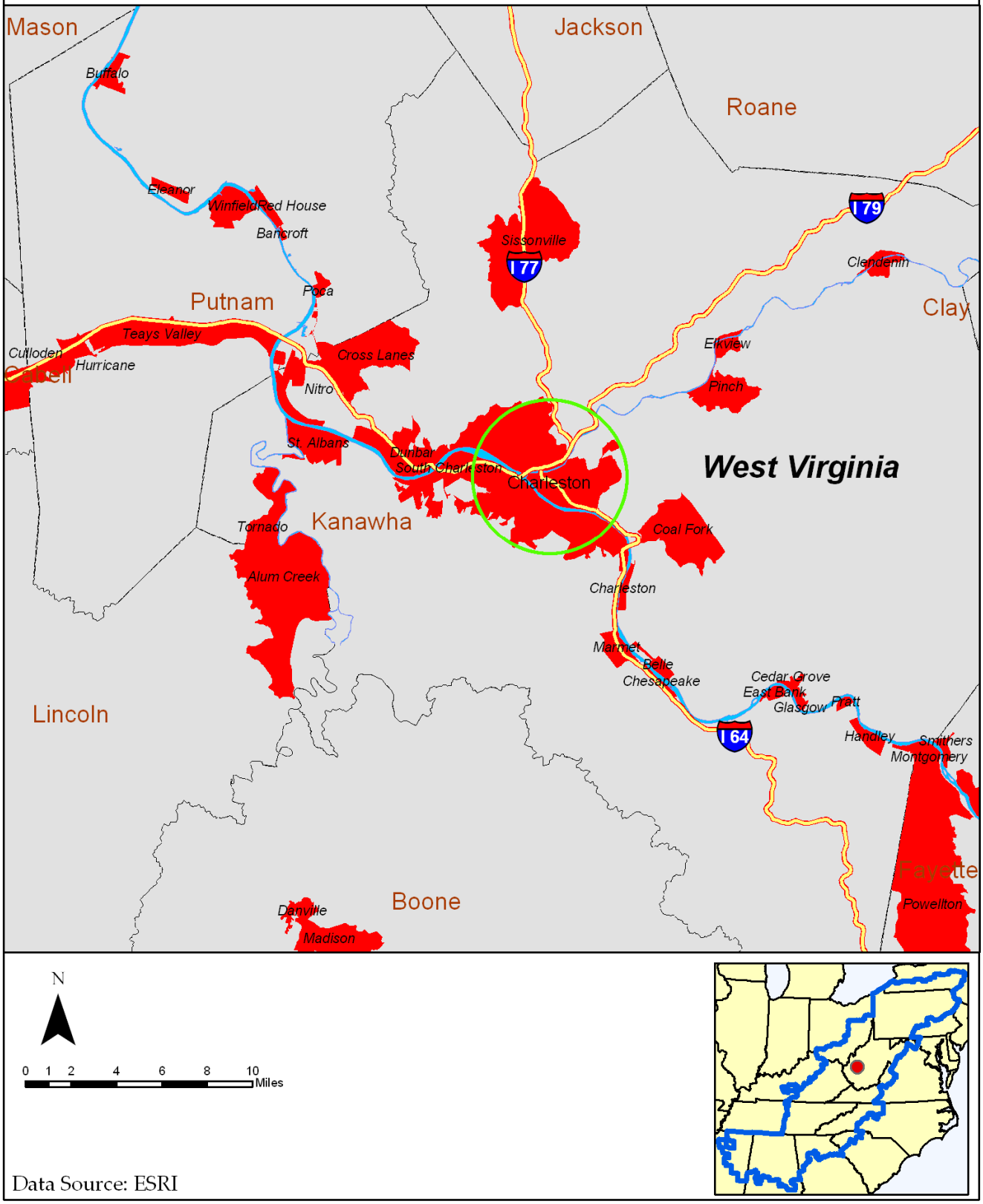
West Virginia–American Water (WVAW) follows many of the core strategies of financial sustainability promoted by the Environmental Protection Agency (EPA) and others.[101] It is a large, consolidated regional system that takes pride in its asset management and operational innovations. It practices meticulous cost accounting and has developed a pricing structure that it thinks accurately covers the full cost of providing water to its customers. WVAW also is a successful business that strives for efficiency and profits. This last point is an advantage or a detriment, depending on one's view about the privatization of water services.

West Virginia's largest drinking-water provider goes by different names depending on who is describing it. The official name, West Virginia–American Water Works, used by company officials and investors, reveals the company's relationship to one of the largest for-profit water companies operating in the United States, American Water Works.[102] State officials charged with regulating WVAW often refer to it simply as "the Company," a nickname that reflects its size and profile relative to other, smaller companies. (Refer to Figure E-7.)

[101] Environmental Protection Agency, "Sustainable Water Infrastructure for the 21st Century" (last updated 18 December 2003), available at www.epa.gov/water/infrastructure/.

[102] American Water Works itself is part of a larger, international water company, Thames Water, and Thames Water, in turn, is part of an even larger company, RWE, based in Germany.

Figure E-7. Location of Charleston, WV, in Kanawha County (West Virginia-American Water Headquarters Office)



Data Source: ESRI

The provision of drinking water by for-profit companies remains controversial, especially among government drinking-water providers, and WVAW has not escaped this controversy. So local officials will occasionally refer to WVAW simply as "the Spider," a water system that depends on pulling in other systems to survive and thrive. Gilbert Cross uses yet another image, "Dynasty of Water," to describe American Water Works and its affiliates in his 1991 company-commissioned corporate history.[103] Regardless of how the water provider is described, like its parent company, WVAW clearly is an ambitious and aggressively growth-oriented drinking-water provider that has a major influence in the areas where it operates.

WVAW provides drinking water to about 165,000 customers in eighteen counties in West Virginia and in several communities in Ohio and Virginia.[104] In terms of population served, approximately 500,000 West Virginians rely on WVAW water, more than 27 percent of the state's population and more than 35 percent of the state's population served by community water systems.[105] As of 2000, WVAW operated thirteen water treatment facilities and treated about 53.3 million gallons of water per day.[106]

Access to Capital

[103] Gilbert Cross, *A Dynasty of Water: The Story of American Water Works* (Voorhees, N.J.: American Water Works, 1991).

[104] Data from WVAW website (last visited 3 June 2005), at www.amwater.com/awpr/wvaw/start/index.html.

[105] Dan Bickerton and Chris Jarret, WVAW, interviews with author, June 2004.

[106] "Meeting Infrastructure Challenges" (compilation of WVAW presentations and reports, provided to author).

For-profit water and sewer providers often have difficulty gaining access to public capital funds. The two largest national programs providing infrastructure funding, the U.S. Department of Agriculture's Water and Waste Disposal Loans and Grants Program and the EPA's Clean Water State Revolving Fund, are prohibited by law from providing grants or loans directly to for-profit companies. EPA allows states to provide Drinking Water State Revolving Fund assistance to for-profit providers. However, the practice is fairly uncommon, and many states have imposed rules that make for-profit providers ineligible. Many state-specific programs have similar constraints.

WVAW has tapped a variety of capital sources and used some sophisticated financing strategies to maintain and expand its capital infrastructure. Despite the limitations and the difficulty in accessing public funds, it has developed a series of structured partnerships with local governments, with the result that millions of dollars in lower-cost public capital has helped develop the infrastructure that provides WVAW customers with their water.

WVAW's first large-scale partnership involved Mercer and Summers counties, state and federal government agencies, and the Oakvale Road Public Service District (PSD), a government-owned water utility. The project replaced two aging treatment facilities with a larger, regional facility capable of treating five million gallons of water per day. It also added 64 miles of pipeline that connected several communities and provided an additional 5,000 residents with public drinking water.[107]

The partnership behind the project was structured to provide a combination of private and public sources of capital. WVAW invested $23 million for the

[107] "Mercer/Summers Water Project Overview" (November 1999) (summary report compiled by Oakvale Road PSD and West Virginia Region 1 Planning and Development Council, provided to author).

construction of a water treatment plant, a raw-water intake, and a water storage facility, all of which it now owns and operates. The Oakvale Road PSD took out approximately $15 million in low-interest loans from the West Virginia Infrastructure and Jobs Development Council to cover much of the cost of the line extensions. The lines are technically owned by the Oakvale Road PSD. However, they are operated and maintained by WVAW under an agreement that requires WVAW to pay the Oakvale Road PSD $670,000 per year. The PSD uses the payments to service its debt.

Grant financing also played a major role in the project. No single program was able to cover all the costs, so local officials sought assistance from a variety of funders, including the U.S. Economic Development Administration, the Appalachian Regional Commission, the U.S. Department of Housing and Urban Development's Community Development Block Grant program, and the U.S. Army Corps of Engineers.

Finally, local governments contributed about $1.3 million in capital funds.

Completing all the arrangements necessary to put this project together required considerable planning and political support from local, regional, state, and federal officials.[108] Preliminary planning meetings for the effort began in 1991. The water treatment facility was completed in 1996, and the main transmission mains were put into service in 1997.

Since perfecting the partnership model that led to the Mercer/Summers project, WVAW has completed a number of similar projects in the state. For example, the Fayette Plateau Regional Project, which included a new water treatment plant and 64 miles of pipeline, led to the consolidation of five smaller regional systems and the retirement of five obsolete treatment facilities. As with

[108] Dave Coles, West Virginia Region 1 Planning and Development Council, and Lyle Huntington, Oakvale Road PSD, interviews with author, July 2004.

the Mercer/Summers project, the Fayette Plateau project relied heavily on public funds, with about $18 million of the $47 million cost paid for from low-interest loans and grants. Assets paid for from grant and loan funds are essential parts of WVAW's system infrastructure, but they are not the property of WVAW and are not included in the company's capital rate base.

The primary difference between the financing of the Mercer/Summers project and the financing of the Fayette Plateau project was the use in the latter project of a capital-lease arrangement allowed under West Virginia's Industrial Development Bonds (IDBs) Act.[109] WVAW used an IDB capital-lease arrangement for its own capital contribution toward the project. It financed its share of the project with a blend of commercial debt and equity. After the facilities were constructed and put into service, WVAW transferred legal title to them to the *Fayette* County Commission, and the commission then leased the facilities back to WVAW. The facilities thus are considered to be public property and exempt from certain property taxes. Under the IDB statutes, the commission has no debt service or operational liability for the leased assets. WVAW uses the funds that it would have paid in taxes to pay a "use fee" to the county. The county uses the revenue to pay off its portion of the public loans for the project.

WVAW now depends on structured partnerships and creative financing as a tool for providing capital finance for many of its major facilities. Between 1994 and 2005, the company estimates, $492,322,803 went toward construction of new and expanded water facilities, $364,555,000 of which came from WVAW and $127,767,803 of which came from public-sector sources.[110] Much of this money went toward replacing thirty-five smaller facilities with nine regional facilities.

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[109] W.VA. CODE art. 2C, ch. 13 (1931).

[110] "West Virginia–American Water Analysis of Construction Expenditures, 1994 through 2004" (analysis included in "Meeting Infrastructure Challenges").

WVAW maintains a detailed database of potential service areas and line extensions to prioritize and plan its line investments. In some cases it uses 100 percent of its capital to reach unserved customers. In other cases it partners or shares costs with local governments and other utilities such as the Oakvale Road PSD.

The gap in funding capital takes on a new meaning in the context of small projects extending services into rural areas. In some instances a line extension from WVAW may be the only opportunity for a rural resident or community with failed wells, yet the costs per household may approach or exceed the value of the property to be served.[111] Some critics of for-profit utilities suggest that a concern for profit cannot help but impede the utilities' reaching these pockets, and that private systems are more likely to choose more profitable areas to serve, leaving less desirable areas to other providers.[112] WVAW's response is that it can invest only to a limit but is normally open to serving customers if a public body steps in. Asked about the financial incentives for expanding into high-cost, impoverished rural areas like McDowell County, company officials responded that those areas make a case for public systems.[113]

Completing projects with high per-unit costs is not alone a problem for private systems. Many public systems do not have the capital resources to carry out expensive extensions, even if they are not scared by the poor return on investment.

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[111] Bickerton and Jarret, interviews.

[112] Fred Stottlemyer, Putnam PSD, interview with author, July 2004.

[113] Jarret, interview.

Rates and Charges

Are customers who are served by private for-profit water providers better off? Answering the question is particularly difficult for multiple reasons. "Better off" means different things to different people and communities. To the director of the Oakvale Road PSD, one of WVAW's partners, the expanded service area, the economic development potential, and the modern facilities provided by WVAW far outweigh the added monthly cost to his customers.[114] However, a customer used to the intimacy of the customer service department of a local utility office might view having to address billing concerns to a regional call center representative in a different city (or state) as a major sacrifice.

In many states, North Carolina among them, for-profit providers tend to own very small systems that may not be appealing to public systems. Comparing a major urban drinking-water provider that serves 100,000 people from one major facility, with a for-profit provider that serves 20 small, isolated systems averaging 75 customers each is difficult. WVAW's average system size is quite large in comparison with many for-profit providers. In fact, WVAW operates many of the largest facilities in West Virginia.

Until last year, WVAW customers in downtown Charleston, the state's largest urban area, paid the same for water as customers in the most rural and remote WVAW service areas.[115] This "single tariff" strategy is one of the most important financial aspects of the WVAW system. Local governments and customers have mixed feelings about it, depending on their perception of the actual cost necessary to serve their community. For example, officials with the Putnam PSD have resisted becoming incorporated into the WVAW system, partially because

[114] Huntington, interview.

[115] Under WVAW's newly approved tariff structure, all customers pay the same charge by volume, but several areas pay surcharges.

they think that the cost of serving the relatively dense (by West Virginia standards) Putnam service area is significantly below the price that WVAW would charge.[116] On the other hand, people in very rural service areas think that the economy of scale inherent in WVAW's system brings them lower costs and prices than they would otherwise have. WVAW officials stress that some of their most expensive investment projects have occurred to serve the needs of urban customers and that all the different communities in their service area benefit to some degree from their ability to spread costs across large geographic areas.[117]

WVAW rates are reviewed and approved by the West Virginia Public Service Commission. WVAW is permitted to recover various costs through its rate structure. For many in the public sector, the most controversial cost components relate to the rate of return that WVAW is allowed, to recover its capital investment and its taxes. Advocates of public provision of service often argue that allowance for return on capital and taxes makes private-sector provision inherently more expensive. WVAW recently reached an agreement regarding a rate increase, after it began a lawsuit based on an earlier ruling by the West Virginia Public Service Commission.[118] One of the key elements of the case involved the rate of return that WVAW was allowed on its capital.

The ability of for-profit companies to receive a return on the funds that they have invested in capital provides a clear financial incentive for capital investment that does not exist for many of their public counterparts. According to regulatory

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[116] Stottlemyer, interview.

[117] Bickerton and Jarrett, interviews.

[118] "West Virginia American Water Rate Case Settlement Reached" (27 December 2004), available at www.amwater.com/awpr1/wvaw/newsroom/press_releases/page5763.html.

officials, WVAW has invested more heavily than many government-owned public systems in the state.[119] In most cases the investment brings a higher level of service, but it also brings additional cost to customers. According to the annual report of the West Virginia Public Service Commission's Consumer Advocate Division, "West Virginia-American continues to be among the highest-cost suppliers of water in the state and nation."[120] The division's analysis of thirteen large water systems in West Virginia shows WVAW as having the most expensive water, with an average cost of just under $40 (see Table E-13 below).

Table E-13: Monthly Cost of Water Service for Residential Customers in West Virginia, Winter 2003–2004 vs. 2004–2005

Water Company or Municipality	2003–2004 Average Cost for 4,500 Gallons of Water	2004–2005 Average Cost for 4,500 Gallons of Water	Percent Change
Morgantown	$ 5.92	$ 7.65	29.2
Elkins	11.57	12.60	8.9
Wheeling	12.97	12.97	0.0
Weirton	17.37	17.87	2.9
Fairmont	17.96	17.96	0.0
Logan	20.20	20.20	0.0
Grafton	21.74	21.74	0.0
Clarksburg	22.50	23.72	5.4
Parkersburg	18.98	23.80	25.4
Beckley Water Co.	24.53	24.53	0.0
Martinsburg	28.33	28.33	0.0

[119] Amy Swan, West Virginia Public Service Commission, interview with author, July 2004.

[120] "Consumer Advocate Division's Annual Report for 2005 and Comparative Residential Rate Study" (last visited 6 June 2005), available at www.cad.state.wv.us/2005report.htm.

Water Company or Municipality	2003–2004 Average Cost for 4,500 Gallons of Water	2004–2005 Average Cost for 4,500 Gallons of Water	Percent Change
Lewisburg	32.45	32.45	0.0
WV–American Water	36.23	39.36	8.6

Source: Reprinted from West Virginia Public Service Commission, Consumer Advocate Division, www.cad.state.wv.us/2005Table1A.pdf.

Conclusion

WVAW officials and operators clearly are proud of their system and the service they provide to their customers. They argue that the level of service they provide and the assets they manage, and the management expertise they are able to provide system customers far exceed what other smaller systems can.

In summary, WVAW has put into place many of the financial strategies and policies cited as being essential for sustainable infrastructure. The company has found innovative ways to access public funds and reduce its tax burden, measures that reduce what it has to pass on to its customers. The inclusion of a rate of return and adherence to a "profit motive" continue to separate it from its public counterparts. The company has clearly gone a long way in meeting the infrastructure gap in many communities while illustrating that many of the strategies cited for bridging the capital gap ultimately carry a significant cost to the customer.

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