Barry Ryan

Rural Sewage Treatment Falls Short of Clean Water Goals

To comply with clean water goals, rural areas need to build $20 billion worth of sewage treatment facilities by July 1 of this year. Communities not in compliance may be running out of luck in hoping for Federal help. Over the next decade, the Federal Government is turning over to State and local governments much of the responsibility for financing such facilities.

Federal spending on wastewater treatment systems since 1972 has exceeded $57 billion, yet America is far from achieving the goals of the Clean Water Act. The Environmental Protection Agency (EPA) estimated, in 1984, that the cost of building additional treatment facilities capable of meeting these goals would exceed $62 billion. A third of this spending is needed in America's rural areas.

Progress has been made, however, as indicated by both the increased availability of sewage treatment services and overall improvement in water quality nationwide. Rural America has shared in these developments, but not all rural communities have shared equally. Some have made more progress than others.

Federal law requires all municipalities (regardless of income or size) to bring their sewage effluent discharge into compliance with established water quality standards by July 1 of this year. Compounding the compliance problem are recent changes in Federal policy that have shifted the financial burden of constructting sewage treatment facilities back to State and local governments. Regulators, in considering smalltown fiscal realities, seem to have little choice but to defer enforcement in the hope of encouraging future compliance. Tight budgets and competing priorities require that every wastewater treatment dollar be spent efficiently and effectively. Knowing where progress has been made, and where problems still exist, can improve the capital investment decisions of rural policymakers.

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Federal Subsidies Give Way to State Revolving Loans

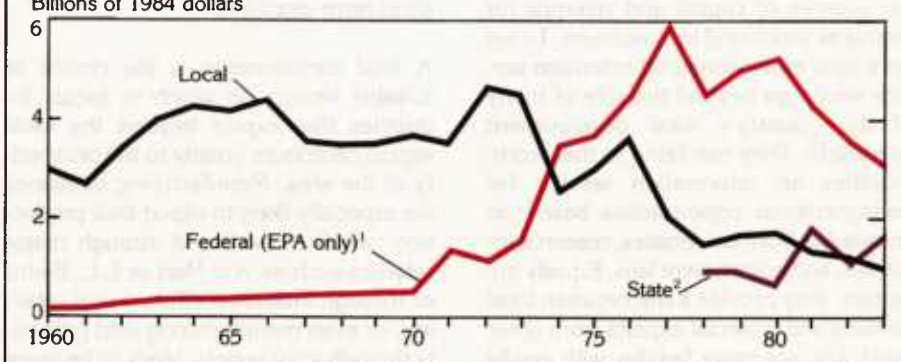
Federal intervention in matters such as pollution control is widely accepted, since benefits generally extend beyond the boundaries of individual communities. The Environmental Protection Agency's construction grants program has been instrumental in motivating local governments to build public wastewater treatment facilities. Its effect on the condition of America's sewage treatment infrastructure has been visible and direct. After 15 years of subsidizing facility construction, the construction grants program is scheduled to be phased out in 1990, returning the financial burden of building new facilities back to State and local governments. How rural communities will fare is still uncertain. An EPA task force report admits the changes will probably hurt them.

The EPA program is by far the most important Federal initiative, accounting for 87 percent of the Federal wastewater treatment capital budget. From a peak of nearly $6 billion in 1977, EPA spending has fallen to $2.4 billion per year in recent years (fig. 1). The program had paid 75 percent of the "eligible" costs associated with building a new community treatment system, or upgrading an existing one. In the early years, virtually all system costs were eligible. Communities using innovative treatment technologies could receive an additional 10-percent subsidy.

The program encountered a number of problems and setbacks over the years. Communities hoping for a Federal subsidy delayed constructing new facilities on their own. Generous Federal and State cost sharing left local governments with little incentive to cut costs. Systems were built that were too big, maintenance was deferred. Political issues and economic development became as important as pollution control in determining where investments would be made.

In response, the 1981 Clean Water Act (CWA) amendments reduced the Federal share to 55 percent of "core" system needs; that is, treatment plants and interceptor lines. The subsidy for innovative and alternative technologies, primarily of benefit to small communities, was raised to 20 percent. These changes did not take effect until 1984. Yet even before their effect could be assessed, a fundamentally different approach was adopted.

Figure 1
Federal spending on water pollution now declining after two decades of growth



SOURCE: Congressional Budget Office from data in *Historical Tables, Budget of the United States Government,* and in Department of Commerce, Bureau of the Census *Annual Survey of Government Finances.*
[1] Excludes spending by Department of Housing and Urban Development, Farmers Home Administration, and Economic Development Administration.
[2] Data for spending on wastewater treatment by states before fiscal year 1978 are not available.

The CWA amendments of 1987 call for phasing out the construction grants program and authorize $20 billion in Federal spending over the next 8 years. EPA will dispense $9.6 billion in the first 4 years through its traditional grants program, while $8.4 billion will become available in fiscal years 1990-94 to establish State revolving loan programs. Under such a scheme, local sewage systems will be financed by low- or no-interest State loans, which must be repaid in full to maintain the fund. Another $2 billion is earmarked for special projects, such as lake restorations. By 1995, State and local governments will be completely responsible for financing, building, maintaining, and operating municipal sewage treatment systems.

Rural Needs Account For A Third Of The National Backlog

According to EPA, in 1984 the Nation still needed to build nearly $62 billion worth of sewage treatment infrastructure to meet Federal water quality standards. USDA estimated that a third of this investment, $20.2 billion, was needed in rural America. Six years earlier, the national needs had been assessed at $84.2 billion, while rural needs were $26.8 billion. Thus, construction in the intervening 6 years reduced the total needed by about a quarter. That reflects real progress, but progress that has slowed dramatically since 1980 (table 1).

Rural systems are "structurally" different, as can be seen in a breakdown of 1984 costs by system component (table 2). Rural areas have a proportionally greater need for new collectors, primarily due to population growth and lower density settlement. Nonrural areas bear virtually the entire expense of repairing existing sewer lines (interceptors and collectors), a problem generally associated with the "urban

Table 1—Backlog of municipal sewage treatment systems down by a fourth since 1978

Year	National needs	Rural needs
	Billions of 1984 dollars	
1978	84.2	26.8
1980	69.1	21.2
1982	63.1	18.6
1984	61.8	20.3

About the Study...

This article is based on an Economic Research Service (ERS) staff report, *"Estimates of the Wastewater Treatment Capital Requirements in Rural America."* The study is an extension of another ERS undertaking known as the National Rural Community Facilities Assessment Study (NRCFAS), which examined the availability of selected public facilities in rural communities. Sampling methods and estimation techniques developed for the NRCFAS study were used to assess the condition of sewage treatment in rural areas.

"Rural" here refers to any incorporated or unincorporated place outside of an urbanized area, except communities with a 1978 population of 50,000 persons or more. Within the 48 contiguous States, 45,766 communities fit this description (see table). Eighty-two percent of all unincorporated places have fewer than 2,500 residents; only 2 percent have more than 10,000. Similarly, 80 percent of all incorporated places have fewer than 2,500 residents, while only 5 percent have more than 10,000.

Distribution of rural population, by region

Item	North-east	North Central	South	West	Rural total
			Millions		
Population:					
Incorporated	4.3	13.2	14.8	6.1	38.5
Unincorporated	9.1	11.9	20.6	5.5	47.1
Total population	13.4	25.1	35.4	11.6	85.6
			Number		
Communities:					
Incorporated	1,368	7,476	5,557	1,648	16,049
Unincorporated	3,598	16,145	8,009	1,965	29,717
Total communities	4,966	23,621	13,566	3,613	45,766

Source: National Planning Data Corp., Universe of Rural Communities, 1980.

A statistical sample of 2,176 communities was used as the basis for calculations. Data were taken from the Environmental Protection Agency's Needs Assessment Survey. Adjustments were made for inflation, which, according to EPA estimates, increased construction costs 23 percent between 1978 and 1980, 15.5 percent from 1980-82, and 11 percent from 1982-84. Information on estimation procedures and sampling errors are in the full report.

Table 2—Community growth and lower population density lead to high demand for new collector systems in rural areas

System component	National backlog		Rural backlog	
	Billion dollars	*Percent of need*	*Billion dollars*	*Percent of need*
Treatment plants	27.1	43.9	8.28	40.9
New collectors	18.0	29.1	7.65	37.7
New interceptors	10.7	17.3	3.18	15.7
Sewer line repair	6.0	9.7	1.16	5.7

1984 data. Interceptors are the main trunk lines radiating out from a plant into general areas of a community. Collectors are sewer lines that branch off interceptors to connect individual neighborhoods and residences within neighborhoods.

decay" of the older, larger cities. Treatment plants and collectors make up three-quarters of the $20.2-billion rural backlog. Nearly all of the $6.6-billion reduction in rural needs occurred in these two categories, again primarily during the first 2-year period,

The decline in sewage treatment backlogs was accompanied by a rise in service to rural residents. The population served by rural treatment systems grew by 16.6 million between 1978 and 1984, raising the total number of rural Americans receiving service to 51.5 million (table 3). The most dramatic increase occurred in unincorporated places, where the number of people served rose by 300 percent, nearly 10 million persons. Since the number of operating facilities increased only slightly during the period, the growth in service was presumably the result of a few very large systems beginning operations.

Smallest Communities Have Greatest Needs

Over time, the rural sector reduced its sewage treatment system needs at the same pace as the entire Nation. Yet among rural communities, performance varied widely depending upon the community's size and political organization.

Unincorporated places and cities with fewer than 2,500 people accounted for nearly two-thirds of the $20.2-billion rural backlog (fig. 2), primarily to construct new facilities. Wastewater treatment funds tended to be spent upgrading or expanding existing facilities of larger incorporated places, as shown in the reduction in need. Between 1978 and 1984 the largest cities made the largest reduction in need (37 percent), while the smallest cities saw the least (21 percent). In unincorporated areas, need was reduced by only 17 percent, compared with a 28-percent drop for incorporated places. Nevertheless, all sizes of rural communities made progress in reducing their investment needs over the 1978-84 period.

Figure 2
Sewage treatment needs declined for all rural communities, but at a slower rate in very small cities, and unincorporated places

Rural Backlogs and Service Vary By Region

Rural communities in the Northeast and West generally require sewage treatment systems more often than communities in the South or North Central region. Nevertheless 38 percent of the investment in rural sewage treatment is needed in the South ($7.7 billion—fig. 3) reflecting its large number of rural communities. Despite fewer rural communities in the Northeast, the combination of a high proportion of communities needing systems and these systems being expensive leaves that region with a disproportionate share of the rural backlog ($5.4 billion). The North Central region is the next largest at $4.2 billion, down 43 percent from 1978. The West's backlog of nearly $3 billion remained virtually unchanged over the 6-year period. The North Central region and South combined accounted for 90

The People and Places Behind the Numbers

Often lost among the tables and graphs is an appreciation for individual communities, their problems, and the civic leaders who try to solve them. The experiences of three rural Minnesota communities are briefly described below to show how small towns cope with change.

Dorothy Youngblood, mayor of Grand Meadows, MN, is concerned about the region's troubled agricultural economy, the town's nitrate-contaminated groundwater, and, these days most of all, about the community's wastewater treatment system, which is no longer adequate. This retirement community of 951 people in southeastern Minnesota has been told by the State pollution control agency that a $3.4-million facility renovation is required to meet water quality standards. The community's entire assessed value is only $2.7 million.

In addition to the usual State and Federal subsidies, the community qualifies, because of its size and low income, for assistance from the Farmers Home Administration's (FmHA) water and sewer loan and grant program. All together, $2.6 million is being offered in direct grants, with the remaining $800,000 financed by a 30-year low-interest FmHA loan. At roughly $34 a month, however, the cost of repayment is too high for the average household to accept.

A major reason for the system's inability to reach compliance is the infiltration of groundwater into its aging sewer lines. One engineer suggested the town fix this problem first, then test to see if the standards are met. All agreed it was a good idea, but delaying the full project as approved, State and Federal officials proclaimed, would cost the town its $2.6-million grant.

Nisswa is a resort town of 1,300 in central Minnesota that has wrestled with the problems of growth, pollution, and politics for the last 10 years. Councilman Roger Miller, who has led the fight for a central sewage treatment system, is no stranger to the pollution control bureaucracy or the programs they administer. "Time and time again," he laments, "we gain the community's support to proceed, and the (Federal) program changes."

Shallow wells and sandy soil contribute to the community's problem, as does the

Table 3—Service to rural residents rose by 16.6 million in only 6 years, with tremendous growth in unincorporated areas

Year	*Incorporated areas by population* 20,000–49,000	10,000–19,999	5,500–9,999	2,500–5,499	1–2,499	Total	Unincorporated Total	Rural Total
	Million rural residents served							
1978	7.53	6.90	5.74	5.62	5.97	31.76	3.14	34.90
1984	9.63	8.11	6.74	6.49	7.91	38.88	12.59	51.47

Table 4—Population served in rural South grew by nearly 50 percent while that in West nearly doubled

Year	Northeast	North Central	South	West	Rural total
	Million rural residents receiving treatment				
1978	3.94	13.33	11.35	6.27	34.90
1984	5.14	17.16	17.25	11.92	51.47

seasonal nature of its existence. One solution is to build a new central treatment system, serving all but the most remote parts of the community, where onsite upgrading is more feasible. What began as a joint effort among five neighboring communities, in the largest system plan of its kind in Minnesota history, has deteriorated into a fragmented attempt to make do.

The town's $4.2-million project is on hold once more, while State officials in St. Paul debate the implications of Federal policy changes. In the meantime, the walleye lakes on which Nisswa's tourism industry depend grow more polluted, and councilman Miller faces increasingly vocal opposition to the system's development.

Albany, MN, a community of 1,600 in the State's dairy region is one of the success stories. Since 1954, with the introduction of shallow-water stabilization ponds to the harsh climate of Minnesota, the town has fancied itself an innovator. Led by an active, progressive city council, members like Clyde Weivoda are determined to keep the tradition alive.

Weivoda praises the pollution control bureaucrats for their efforts to transfer the technological advancements in small-scale sewage treatment to all who are interested. He has attended conferences, seminars, and workshops from coast to coast, and even earned a degree in Systems Operations by correspondence from the University of California, Sacramento.

The hard work and attention to detail paid off when the town undertook a $3.4-million system upgrade in 1984. Phosphorus had been a recurring problem, which traditional technology solved by an energy-intensive mechanical process. Albany chose instead to adopt a Canadian practice of adding alm, an aluminum extract, to its stabilization ponds to precipitate out the excess phosphorus. Further demonstrating Albany's nontraditional flare, the alm is spread by pontoon boat, a familiar pleasure craft on Minnesota lakes. The system now shows a profit, treating domestic sewage at 60 cents per 1,000 gallons, about a third of the cost experienced by neighboring systems. The project's completion in 1984 was capped by a festive gathering of townspeople and pollution control officials: not the typical ribbon-cutting ceremony, but rather a celebration among friends.

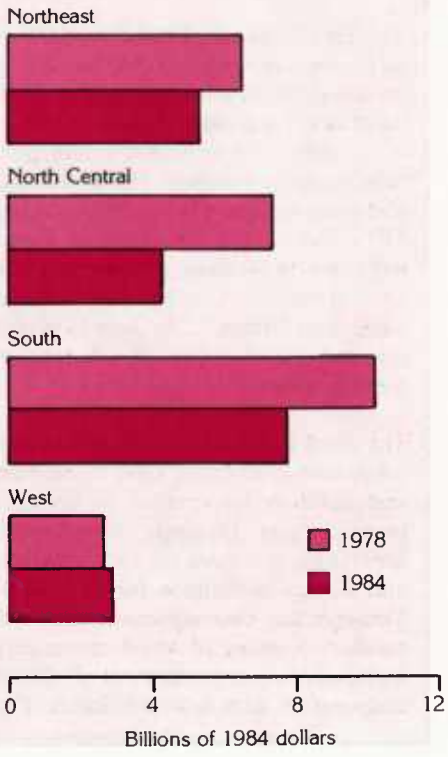
percent of the $6.6-billion reduction in total rural needs.

Two-thirds of the expansion in rural treatment services between 1978 and 1984 came in the South and West (table 4). In the West, nearly 12 million persons were being served by sewage treatment facilities in 1984, double the number of 1978. The South and North Central region, where most rural people live, each saw substantial increases in service. The Northeast, with its many unincorporated places, experienced only a slight increase in the serviced population.

First Step—Identify Rural Problem Areas

The sewage treatment needs of rural America are large and varied. Funding them will become the sole responsibility of State and local governments by 1995. A myriad of solutions will undoubtedly emerge. Whatever the approach, three basic steps should guide rural policymakers. The first step is to identify, with precision and in detail, rural problem

Figure 3
South and North Central region make most progress in constructing rural water treatment facilities



areas. Information is the key to effective decisionmaking. Studies such as the one on which this article is based (p. 25) can provide planners with facts on which to base decisions.

The second step in addressing rural needs is to rank each project according to its direct and immediate results. Pollution control should be the first consideration, followed closely by equity and affordability. The third and final step is to target available funds to the priority projects.

This seemingly obvious progression to decisionmaking requires two scarce commodities: timely information and political consensus. Each will play a critical role in rural America's remedying its infrastructure problems. RDP

For Additional Reading...

Environmental Protection Agency, *Study of the Future Federal Role in Municipal Wastewater Treatment,* Report to the Administrator, December 1984.

J. Norman Reid and others, *Availability of Selected Public Facilities in Rural Communities,* U.S. Dept. of Agriculture, Economic Research Service, Staff Report No. AGES840113, March 1984.

Barry Ryan, *Estimates of Wastewater Treatment Capital Requirements in Rural America,* U.S. Dept. of Agriculture, Economic Research Service, Staff Report No. AGES861218, April 1987.

What Is EPA Doing To Help?

The goal of the Clean Water Act is to have all communities in compliance with their wastewater discharge limitations by July 1 of this year. Many small communities need to construct wastewater facilities on the assumption that little or no Federal funding assistance will be available.

Communities with populations under 10,000 face special problems in planning, building, and managing wastewater treatment facilities. These communities usually have more difficulty financing facilities and have limited expertise in contracting, supervising construction, arranging financing, and operating and maintaining the facility.

To help communities, the Environmental Protection Agency (EPA) has begun an outreach program, a combination of information and assistance. Information in the form of brochures, videotapes, handbooks, newsletters, journal articles, and presentations is being distributed by EPA, States, the Small Flows Clearinghouse (West Virginia University), the Environmental Quality Instructional Resources Center (Ohio State University), and State Cooperative Extension Service offices.

The Small Flows Clearinghouse will play a key role in assisting EPA to develop and distribute information on low-cost technologies through videotapes, brochures, seminars for local officials, and design workshops for engineers. Through the clearinghouse, EPA will conduct a series of small-community wastewater seminars for local officials in cooperation with selected States. For more information about the clearinghouse, call 1-800-624-8301.

The clearinghouse can help communities find out about low-cost technologies, such as managed onsite systems (septic systems, for example), sand filters, small-diameter gravity sewers, land treatment, trickling filters, and lagoons. To reduce project costs, communities should also work to eliminate expensive frills, such as excessive capacity and costly or complex operating systems.

EPA encourages States to play a greater role in assisting small communities. Successful outreach approaches can be built upon more effective targeting of current State resources and greater coordination with allied programs of other State or sub-State organizations.

States can play an especially helpful role in helping communities resolve engineering questions. Communities should consult their own engineers first. But, if the engineer cannot answer officials' questions or resolve their problems, the community should contact the State construction grant or water pollution control agency. The State may be able to provide assistance itself or refer the community to other groups that can.

USDA's Extension Service is participating in EPA's outreach program by distributing materials (through State Cooperative Extension Service agencies) and by planning and conducting seminars. The Extension Service will also make available materials from some States, promote training of extension agents in wastewater management, and refer small communities to technical assistance agencies.

The Water Quality Act of 1987 provides for a gradual transition from EPA grants to new revolving loan programs run by the States. Many small communities have limited prospects for receiving a grant or loan. With EPA funding drying up, communities should consider possible funding from other Federal agencies. In addition, most States have loan-grant or debt-financing assistance programs (bond banks, credit insurance).

Some communities even claim to have found a silver lining in the lack of EPA funding. Without the delays and extra costs sometimes associated with Federal grant requirements, communities can realize significantly lower total project costs and complete their projects more quickly.

Two EPA brochures may also interest small communities.
Is Your Proposed Wastewater Project Too Costly? Options for Small Communities, May 1984, 7 pages.
Less Costly Wastewater Treatment for Your Town, rev. Sept. 1983, 8 pages.
For a copy of either, or a free newsletter, "Small Flows Managements," write to Small Flows Clearinghouse, West Virginia University, 258 Stewart Street, Morgantown, WV 26506.

—By Don Niehus, community planner, Office of Municipal Pollution Control, with the U.S. Environmental Protection Agency