Georgia Water Series

Issue 3: Evaluating Water System Financial Performance and Financing Options

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ISSUE 3: EVALUATING WATER SYSTEM FINANCIAL PERFORMANCE AND FINANCING OPTIONS

Over the next ten years, the cost of federal and state drinking and surface water regulations will severely test the financial health of community water and wastewater systems. Consequently, public water systems will require methods to monitor their financial condition as they seek funding for treatment system expansion and development.

National compliance costs for new drinking water regulations during the 1990s are estimated to be $18 billion per year, with 69% of these costs accruing to small systems. Of the nearly 60,000 public water systems in the U.S., more than 51,000 of them (82%) serve fewer than 3,300 people (USEDA, FDRS). For small systems serving less than 100 houses (about 63% of all US water systems) monitoring costs are expected to exceed the current cost of water. As these events unfold, it will become necessary to better predict water system financial health.

To evaluate system performance it is necessary first to define a viable system and profile some characteristics of distressed systems. A viable water system is one that is:

- self-sustaining;
- has the commitment; and
- the financial, managerial, and technical capability,

to reliably meet performance requirements on a long-term basis. In short, a viable water system can cope with change (Cromwell, et al, 1992).

Most systems with technical performance problems are small, from fifty to 500 customers, with total revenues of less than $100,000. Potentially non-viable systems also have less than 15% return on equity and net income losses. The amount of fixed capital is normally less than $50,000 and can range up to $500,000. Most non-viable systems are private utilities, owned or operated by developers (Beecher & Dreese, 1992). Consequently, they have little stable management capability, minimal capital and usually their physical assets are in a poor condition. Due to the limits of their revenue and management capability, persistent maintenance problems exist.

Most violations of EPA standards are attributable to small systems: 85% are for monitoring problems, not water quality issues. Violations by systems with less than 1,000 customers make up 81% of all violations with 90% of the violations by the systems serving less than 3,300 customers. Only 15% of the country's large systems are routinely in violation of EPA regulations.

As for financial performance, size and ownership matters. Small systems have greater gross assets per production and operating expenses than do large systems. Many are inefficient and overcapitalized. Also, small systems (particularly non-public systems) are often not well managed. Most such systems are run not by water professionals, but by landlords.

Evaluating the Financial Health of a Utility

The need to keep a water system financially healthy goes beyond viability. A system that can remain in business, but has financial concerns, will face recurring problems. Based on low bond ratings, obtaining capital funding is made more difficult, adding to long-run problems. A financially troubled utility will be unable to fund required maintenance of facilities and unable to expand the system to accommodate new growth. Investments in new equipment will be hindered and increases in productivity will be difficult. Employee training will suffer with the inability to meet regulatory standards. Clarence Warnstaff, the manager of the Virginia Beach Water Department poses a set of six questions to evaluate a system's financial health(Warnstaff, 1993).

Do current revenues cover the cost of service?

In a cash-basis system, there must exist sufficient revenues to cover expenditures for operations and maintenance, new capital purchases such as trucks, equipment and computers, replacement capital, equity funding (pay-as-you-go) for capital programs, debt service and payments to the government's general fund. For municipal owned and operated systems the utility must often make payments to a general fund for direct costs such as computer and legal support and indirect cost reimbursements such as overhead for personnel, administrative offices, purchasing and other services. Where revenue requirements are established on a utility basis, the major elements of cost are operations and maintenance, depreciation, return on investment, and taxes for investor-owned utilities.

Are end-of-year operating balance and retained earnings going up or down?

A steady growth in earnings, rather than wild swings reflects a financially healthy system.

Are there adequate cash reserves to respond to emergencies?

To insure adequate cash reserves, working capital should be on hand to cover forty-five days of operation at a minimum. In addition bond reserve funds must be established in accordance with bond resolution requirements. An emergency fund must also be established to cover system emergencies.

How stable or volatile are revenues?

A system should be experiencing a steady growth in revenues rather than wide variations in earnings.

Is the system in compliance with bond covenants from existing bonds that were previously owned?

What future events are expected to have an impact on revenues or expenditures?

To stay financially healthy, the system must plan for events. What is the level of growth? Are new water users moving into the community? What would happen if a major industry left, or came to town.

Tests to Determine Financial Viability

The State of Washington (1990) developed four simple tests to help a system track financial health.

1. Test 1 - Operating Budget: Revenues minus expenses should be greater than or equal to zero.

   This test guides the utility in projecting revenues and expenses. It ensures that the utility anticipates its expenses, including capital and operating expenses, for Safe Drinking Water Act (SDWA) compliance. This approach establishes whether utility rates and revenues are adequate to cover expenses each year. The test compares remaining expenses with water rate revenues after all other sources of revenue are subtracted. If the utility does not have sufficient revenues to meet all expenses, it must reduce nonessential expenses or raise rates.

2. Test 2 - Operating Cash Reserve: Operating cash reserve should be greater than or equal to 1/8 of annual operating and maintenance expenses.
   Test two is the checkbook balance a utility must maintain to meet seasonal cash-flow requirements and provide contingency funds for unforeseen operating emergencies. This reserve is funded once and adjusted each year to reflect current operations.

3. Test 3 - Capital Cash Reserve: Capital cash reserve should equal capital replacement cost.

   Test three ensures that the system maintains an adequate reserve to cover an emergency or the failure of a major capital facility. Generally, a well, a source of supply, large pumping equipment, or key transmission facilities are the most expensive to replace. Replacement costs for these facilities are used to estimate the reserve amount that is necessary.

4. Test 4 - Household Income Index: Monthly rates should be less than or equal to 1.5 % of median household income.

   Test four measures the overall financial impact of rate increases and increased operating and capital expenses. The test compares the water rate with the median household income in the utility's service area. If rates exceed 1.5% of the median household income, the utility may not be able to raise rates. The utility may then be financially incapable of meeting future cost increases.

Measuring Water Utility Financial Performance

Recent financial research on water systems has focused on the question of what does a water system need to be considered healthy and viable? Amatetti (1994) noted that the financial health of a water system is dependent upon its ability to convince the investor market of its creditworthiness. Managing creditworthiness effectively means managing future financial risk. He concluded that the minimization of risk is accomplished through growth management, effective rate design, and regulatory process.

Financial Ratios: Financial ratios have long been used in many areas, for example the farm sector, to judge the financial health of various industries (Erickson, et al, 1993). At the turn of the 20th century, ratio analysis began with the use of the current ratio: a measure of current liabilities to current assets. Studies since 1935 have shown that failing enterprises exhibit significantly different ratio measurements than continuing entities (Altman, 1968). The purpose of using ratios rather than raw data in a model is to control for the effects of a particular variable, usually size. The recurrent question in the literature is which financial ratios, among the hundreds that can be computed easily, should be analyzed.

The basic literature on enterprise financial performance has dealt with business failure models and predictions of bankruptcy. Most business failure models are empirically derived. There is no theoretical basis for choosing a financial ratio other than the fact that it has been used before and found statistically significant (Dreese and Beecher, 1993). The body of literature on bankruptcy prediction is extremely large: Jones (1987) identified fifty-two major articles on bankruptcy prediction models published between 1966 and 1988. Researchers usually begin with many financial ratios and use various empirical methods to reduce the number to a few key variables. Chen and Shimerda (1981) note that researchers have used more than 100 financial ratios in various studies. Once a set of financial ratios is identified and a data set established, many statistical procedures can be employed including step wise regression, discriminant analysis (Dambolena and Khoury, 1980; Altman, 1968; Altman, Haldeman, and Narayana, 1977), factor analysis (Libby, 1975; Gombola and Ketz, 1983), principle component analysis, univariant analysis, conditional probability models (Ohlson, 1980; Gentry, Newbold and Whitford, 1985; Casey and Bartczak, 1985), logit estimation (Zavgren, 1983), recursive partitioning (Frydman, Altman and Kao, 1985; Marais, Patell and Wolfson, 1984) or pattern recognition techniques. These bankruptcy models normally focus on publicly owned firms with widely traded stock such as manufacturing, retailing, and construction industries. Also, many studies have focused on financial institutions (Martin, 1977; Pinches and Trieschmann, 1974; Sinkey, 1975). The focus is usually limited to large firms; few studies target regulated industries (Altman, 1973), and even fewer focus on the water supply industry with none including small, rural utilities.

Financial distress facing the water industry can be distinguished from bankruptcy in private firms. Few water utilities are in bankruptcy in a technical sense, in that they file for Chapter 11 or Chapter 7 protection. The data available shows that since 1906 there have been twelve water system defaults, with six occurring in Florida. There have been thirty-one bankruptcies, sixteen of which were run by developers rather than public systems. A 1991 survey conducted by the National Regulatory Research Institute of seventeen state utility commissions found that forty-eight water systems closed operations in 1990, 27 in North Carolina, six each in South Carolina and Texas, five in Pennsylvania and three in Connecticut. Florida, Texas and Arkansas had the most systems listed with negative net income in two of three years (Beecher, Dreese and Landers, 1992). Community water supplies rarely go out of business. Yet, financial distress in a water supply firm can drain tax money from a community's general budget, lead to consolidation across communities, or have a negative impact on public health.

Using a system's financial data, a variety of ratios can be constructed to help monitor financial health, these include:

Net Income/Annual Operating Revenue: Profitability: This is one of the most useful and basic measures of a systems ability to operate well. This ratio shows how much the utility earns as net income for every dollar of operating revenue made. This is a bottom line measurement of profitability. As Warnstaff notes, if this percentage is either excessively low or high, a utility may need to evaluate its current rate structure. An exception to this would be if a utility chooses to earn a high net income so that capital funding could be made from operating revenues rather than incurring debt. According to the Resource Center at Fort Worth, Texas, the national average for profitability in 1992 was 12.8%.

Current Assets/Current Liabilities: Liquidity. A viable system will have current assets valued at 1.5 times its liabilities. A system with liabilities in excess of assets, or a liquidity ratio below one, would be considered in technical bankruptcy, although such concepts do not apply to public utilities.

Operating Revenues/Total Assets: Growth and Efficiency: Operating revenues divided by total assets yields a measure of the ability of a utility to generate revenues from its assets. The higher the ratio (the closer the ratio is to 1.0), the higher the productivity of the assets.

Operating Revenues/Interest Income: Operating revenues divided by interest income gauges the rate at which operating revenues and other sources of income are being used to generate interest income.

Operating Revenues/Accounts Receivable: Operating revenues divided by accounts receivable shows how many times the receivables are generated and collected during the year. This ratio gives a sense of speed of the collections. The higher the number the better.

Days of Operating Revenue Tied Up in Receivables: The number of days of operating revenues are tied up in receivables reflects the average number of days between recognition of the sale and the collection of the revenues. The larger the number, the higher the probability of collection problems and delinquencies. It should be noted that the frequency at which meters are read and billings are rendered will influence this number.

Operating Expenses/Operating Revenue: Operating expenses divided by operating revenue indicates the percentage of operating revenues spent on operating expenses. For every dollar of operating revenues it shows how many cents are spent on operating expenses.

Operating Expenses/Operating Income: Operating expenses divided by operating income reflects how many times operating expenses are in excess of operating income.

Operating Expenses/Net Income: Operating expenses divided by net income shows how many times larger are operating expenses to net income.

Interest Income/Operating Revenues: Interest income divided by operating revenues measures income derived from an activity other than the provision of water or sewer services. For most utilities, interest income to operating revenue is a small percentage, although a fund may have substantial interest income.

Interest Expense/Operating Revenues: Interest expense divided by operating revenues measures the cost of debt financing as it relates to operating revenues. Interest expense to operating revenues offers a measure of financial and credit risk. Public utilities can use long-term financing because they tend to stable and predictable revenues. The predictability of revenues and costs enables utilities to rely on large amounts of debt financing.

Interest Coverage (Operating Income/Interest Expense): Interest coverage, which is simply operating income divided by interest expense, yield the number of times a utility can meet its current interest expense with its own operating income.

Cash Flow Coverage (Cash Flow/Interest Expense): Cash flow coverage is cash flow divided by interest expense, and measures the number of times the current cash flows will cover a fund's current interest obligations. This ratio is an even more rigorous measure of credit worthiness than the interest coverage ratio. If a cash flow coverage is less than one, a fund does not generate sufficient cash to meet current interest payments.

Current Assets: A healthy mix of current assets for a utility is 59% in cash, 30% in accounts receivable and 6% in inventory.

Current Ratio: Current assets divided by current liabilities payable from current assets measures a utility's ability to meet its short-term obligations. The higher the current ratio, the greater the solvency of the fund and its ability to pay its current creditors. Sometimes this ratio is called the "working capital ratio," which shows the number of times current assets will pay off current liabilities payable from current assets.

Total Assets to Long-Term Bonded Debt: Total assets divided by long-term bonded debt shows how the value of its total assets covers long-term bonded debt. The larger the number, the better.
Bond Coverage: Bond coverage is a determination of net revenue available for debt service and shows the number of times net operating revenues covers the utility’s debt. For many utilities, net revenues include revenues from all sources, less all operating expenses except depreciation. Most bond covenants requires a bond coverage of 1.25 or higher.

Customer growth per year: The number of new customers in a year divided by the total number of customers. The higher the growth rate, the lower the risk of a financial problem.
Turnover ratio: Operating revenue divided by net capital stock. A high turnover ratio could result from either a small net plant or a high gross income or both.

Operating expense per customer: Total operating expenses divided by total number of customers.

Capital investment ratio: Total capital outlays divided by total revenue, measures how much of its resources the utility is putting into improving and replacing capital assets. For a utility with mostly new assets this may be low without showing financial problems. Compare this ratio with earlier years to follow the trend that should show that the utility is replacing capital rather than waiting for a breakdown.

As a summary, ten items must be tracked to insure financial health:

1. Maintaining an operating cash reserve equal to 12.5% of annual O & M budget.

2. Capital cash reserve equal to replacement cost of critical components of water system (i.e., major pumping or filtration equipment).

3. Rates should not exceed 1.5% of median household income.

4. Accounts payable should be less than thirty days and not more than forty-five days of variable costs.

5. Accounts receivable should be less than thirty days and not more than sixty days of total revenue.

6. Debt to equity (leverage) should be at or below one.

7. Net income should be positive.

8. Working capital should be positive.

9. Financial statements should show consistent trends.

10. Operating ratios (gross revenue/operation and maintenance costs) should be above 120%.

Understanding Financial Health

With all of the financial ratios available to help monitor system health, it is necessary to determine which can predict system problems. Two general weaknesses have been identified regarding non-viable systems. First, they are under capitalized. They lack the necessary equipment to meet SDWA requirements. These systems generally have no reserve or depreciation fund mechanism to provide for capital replacement. Second, non-viable systems inadequately provide for operation and maintenance, leading to SDWA violations (Wade Miller Assoc.). If the utility does not have sufficient revenue to meet all expenses, it must raise either its water rates, reduce nonessential expenses, or risk falling into violation.

These two weaknesses (under capitalization and inadequate provision for operation and maintenance) lead to two vital questions regarding system performance: *Can the system pay for its capital needs? Can the system cover the full cost of water?*

Given that these are the two most important questions facing a water system, then two types of financial analysis must be pursued in any measurement of performance:

1. A method to document the ability to raise capital.
2. A cash-flow analysis to demonstrate revenue sufficiency (Cromwell, et al).

To be financially sound, a system must have the ability to generate sufficient revenue to cover current expenses (cash flow) plus the repayment of loans: the cash flow necessary to meet obligations and pay debt. By meeting its current and future capital needs the system has the capacity to remain healthy and viable.

Utility as a Reservoir: While looking at industrial firms, Beaver (1966) used a water analogy to define financial health. A firm can be viewed as a reservoir of liquid assets, supplied by inflows and drained by outflows. The reservoir serves as a cushion or buffer against variations in flows. Firm solvency is defined in terms of the probability that the reservoir will be exhausted, at which point the firm cannot pay its obligations.

Thus, the financial health of a utility will depend on the size of the reservoir. Liquid assets must be great enough to ensure that it will not run out of cash, inventory, or allow the accounts receivable to dip too low anytime during its operation.

Second, financial health will depend on the inflows supplied to or drained from the reservoir by current operations. Are current operations helping or hurting the cash flow of the system? If they are hurting, then operations will eventually exhaust the assets within the system.

Third, the debt held by the utility is a measure of the potential drain on the reservoir. As the size of the debt held by the system increases, its obligations to outside entities (fixed or overhead costs) are increased.

Finally, the fund expenditures for operation, and liquid assets draining from the reservoir by operating expenditures, will determine the long-term health of a system. If operating expenses are too great then the normal operating procedures of the system will eventually exhaust the cash and liquid assets of the system.

Beaver then stated four propositions:

1. The larger the reservoir, the smaller probability of failure.
2. The larger the net cash flow from operations the smaller the probability of failure.
3. The larger debt held, as a percent of assets, the greater the probability of failure.
4. The larger the fund expenditures for operations, the greater the probability of failure.

These four propositions can be used to develop an understanding of water utility financial health. For each of the four propositions, a class of financial ratios can be identified that can help predict the financial health of a system:

Financial Health = ƒ (Size of Liquid Assets, Cash-flow, Debt, Expenditures).

This relationship includes those indicators that signify whether the utility can meet its financial commitments, the degree to which resources are being used to achieve a desired result (meet capital payments) and the degree of financial security. The model also conforms to the two outstanding needs in utility finance: capital requirements and the resources to meet all obligations.

Indicator of Financial Health: At the 1990 American Water Works Association (AWWA) Seminar on Water Utility Financial Planning an adequate return on assets (ROA) was considered one of the most important indicators of financial health. An adequate return on assets should both cover the risks involved in financial management and be sufficient to meet the acquisition financing cost of new capital. The return on new investments or assets must be equal to that required to attract the financial resources of new investors and cause current investors to maintain their holdings.

Of the countless ratios available to investors, income or operation ratios give the best indication of the utility's profitability. Profitability ratios measure overall financial performance and efficiency in managing assets, liabilities, and equity. These ratios give income in relation to assets so that the profitability can be compared per dollar of invested capital. ROA is a ratio that measures how well the total assets of a utility are performing (AWWA, 1995).

Return on assets is defined as net income divided by total assets. It provides an indication of the ability to earn a reasonable return on all the assets. The ROA ratio describes how effectively the utility is generating income given its asset base. A higher ratio provides some indication of future growth prospects (Pinches, 1984). For public water systems an ever increasing ROA may not be a positive situation. An excessively high ROA ratio due to increasing net income may show that the water system is charging its customers more than is required to run the system. A higher ROA due to decreasing total assets may indicate that the system is not adequately investing in capital replacement from its net income.

Yet, the assets a business owns represent an investment, in spite of the mixture of debt and equity. Those assets should generate a return large enough to justify continuing the investment. Should the return on assets fall too low, funds should be invested elsewhere (Milling, 1991). This is important when evaluating and prioritizing capital projects like water or sewer line extensions.

Data: A recent study was completed that used data obtained from more than 490 water utilities in Georgia from fiscal year (FY) 1993. After eliminating those systems with either incomplete audit statements or combined audit information with other utility services, such as gas and electric, a total of 442 cities and counties were analyzed.

As measured by number of connections, 243 of the utilities had less than 1,000 connections, 156 had between 1,000 and 10,000, 23 had between 10,000 and 50,000 and nine had more than 50,000 connections. As measured by the population served, 270 of the utilities served less than 3,300 customers, 131 served between 3,300 and 25,000 people, twenty-four served between 25,000 and 50,000 people and ten served more than 100,000 people. From the income statements and balance sheets of each utility in the completed data set, twenty-two variables were collected ranging from net income to retained earnings. From these twenty-two variables, more than 150 financial ratios were constructed that fell into the four categories to be used in the model. The first step to condensing this information was to eliminate the ratios that are clearly similar and overlapping. This process reduced the ratio population to ninety-six. The next step was to put these ninety-six ratios into the four different categories shown above: twenty-two ratios represented the size of liquid assets, thirty-two cash flow ratios were identified, along with twenty debt ratios and twenty-two expenditure ratios.

Factor analysis was used to reduce the variable set within each of the four model categories. The factor extraction method employed was principal component analysis: a multivariate technique for examining relationships among several quantitative variables. The results of the principal component analysis produced one ratio for each category that best accounted for the information provided by the ratios in a category. For example, the ratio used for the size of liquid assets best represented all of the twenty-two ratios in that category. Table 1 shows the ratio selected for each category.

Table 1. Financial Ratios Selected to Represent Model Categories

Category	Ratio	Definition
1. Size of liquid assets	Current Ratio	$\frac{Current\ Assets}{Current\ Liabilities}$
2. Debt	Debt to Equity	$\frac{Total\ Debt}{Total\ Equity}$
3. Expenditures	Operating Ratio	$\frac{Gross\ Revenue}{Operating\ \&\ Maintenance\ Charges}$
4. Cash-flow	Cash Flow Coverage	$\frac{Cash\ Flow}{Principal\ \&\ Interest}$

To represent the size of the reservoir the principal component analysis showed the most significant variable was the well-known current ratio. This ratio uses both current assets and current liabilities. Current assets are made up of cash, accounts and notes receivable (less reserves for bad debts), marketable securities, and inventory in the system. Current assets are assets that are expected to be converted into cash and to be available for the operation of the business within one year (Erickson, et al), so they typically demonstrate a high degree of liquidity (Milling). Current liabilities are made up of accounts payable, short-term debt and other items on the balance sheet that are due within some limited period, from forty-five days to one year. This measure provides an easily obtainable indication of how large the liquid assets available to the utility are by comparing what the system owes, and is owed, in the current period. Generally, the higher the current ratio, the greater the cushion between current obligations and a utility's ability to meet those obligations. Very high ratios over a sustained period may suggest that the utility is not exercising the best use of cash or that user fees are artificially high.

The total debt to equity ratio represented the size of debt facing a utility. Debt or leverage ratios measure the relationship between claims on the utility (debt) and either total assets or total equity and are computed entirely from the balance sheet. The debt/equity ratio shows the relative dependence of a utility on debt and its ability to use additional credit without impairing its risk-bearing ability (Erickson, et al). A utility with a high debt to equity ratio often finds that creditors are reluctant to provide additional funds. A lower ratio shows greater long-term financial safety. Firms with a low debt to equity ratio have greater flexibility to borrow in the future.

In private firms a 2:1 debt to equity ratio is the traditional limit to borrowed funds. However, complete comparative analysis of water utilities must recognize the unique industry standards in which systems operate. The equity ratio can be seen from different viewpoints. From a creditor's view, they prefer a high proportion of equity to debt. The equity holder will prefer a high proportion of debt to equity. The debt to equity ratio was identified at the AWWA Seminar on Water Utility Financial Planning as one of the most important ratios to watch for in long and short term financial planning. Equity is the net amount the system owns after deducting amounts owed to creditors. In accounting terms, subtracting liabilities from assets determines equity. Equity includes donated capital (governmental grants or other donations to the system) and retained earnings or deficits (the total amount of gains [or losses]) since the system began operations (Cunningham, et al). The higher the ratio, the larger the risk of financial difficulty.

Factor analysis gave the operating ratio as most significant to represent the level of expenditures. The operating ratio (gross revenue/operating & maintenance charges) measures the costs and revenues associated with providing water. Operating and maintenance expenses include those expenses that arise from the sale, supply and distribution of water including general and administrative expenses. The higher the operating ratio the higher revenue over expenses.

For the cash flow factor, the cash flow coverage ratio was selected. Cash flow coverage, which is cash flow (defined as net income plus depreciation) divided by principal and interest expense, measures the number of times the current cash flow will cover a system's current debt obligations. If a cash flow coverage is less than one, a fund does not generate sufficient cash to meet current principal and interest payments. Cash flow coverage, similar to debt coverage, is an indicator of whether the utility can cover its debt requirements.

As noted in their *Manager's Guide*, the USEPA said if a manager had only fifteen minutes a day, he or she should keep track of debt coverage and the operating ratio. This study broadened that to include a utility's current ratio, debt to equity and return on assets.

Table 2 shows recommended ranges for the above four variables. An adequate return on assets begins at the cost of borrowed funds. If a system must pay 6% interest to fund capital projects, the return on that project should at least cover that expense. Recently long term tax free municipal bond interest rates have trended in the 6% to 10% range. Thus, ROA's at least that high are necessary. The water system manager should maintain coverage enough to service principal and interest expenses and still have enough cash to meet other obligations and continue operation. While the need for ongoing capital expenditures is an important factor in determining what is an appropriate coverage ratio, generally a coverage ratio above 1.5 is adequate for utility health. Moody's Investors Service suggests a debt service coverage of 1.9 for water utilities and 2.3 for sewer and water/wastewater utilities. Debt to equity ratios must be above 1:1 and should typically be between 2:1 and 3:1. Here two-thirds debt to one-third equity produces a healthy system. Such a debt to equity ratio would be equivalent to a healthy debt asset ratio below 75%. Thus, less than three out of four dollars in assets are based on borrowed funds.

Table 2. Ranges of Variables for Healthy Water System: Yardsticks for Utility Quality Service Programs

Return on Assets	6 - 10%
Current Ratio	1.5 - 2:1
Debt/Equity	2:1 - 3:1
Operating Ratio	1.2 and over
Cash Flow Coverage	1.5 and over

Water system managers should maintain a current ratio to at least allow its current assets to cover its current liabilities. Previous researchers have suggested that a viable water system should have a current ratio of at least 1.6 (Dreese & Beecher). A 2:1 current ratio would be appropriate. An operating ratio of 1.00 is the lowest level for a self-supporting utility. A ratio below one means expenses are higher than revenues. If a utility has outstanding debt, an operating ratio above one is required. Usually, the higher the debt/equity ratio, the higher the operating margin required. Moody's suggests an operating ratio of 1.5.

These ratios should be charted over time since the trend is more important than one year's data. A constant trend points to good financial performance preferred to high numbers one year followed by erratic movements over time.

Using Depreciation Funds Wisely

In doing this research on the financial health of Georgia's public water systems, some alarming numbers regarding the use of depreciation funds became evident. Data on the return on assets (ROA) for all of the 442 water systems in the study, found that the average return on assets was only 1%. For every dollar invested in water systems in Georgia, they were generating only one cent in net income. Those systems serving less than 10,000 had an average ROA of 1%, systems serving 10,000 - 50,000 had an ROA of 2%, and the largest systems ROA was 3%. Further investigation found that 207 of the 442 systems, or 47%, had a return on assets that was negative.

Since the value of assets cannot be less than zero, a negative return on assets results from a utility having a negative net income. At first glance, negative net income would leave water systems without cash and unable to continue normal operations. Since the systems were operating, it was necessary to focus on how systems use their depreciation funds. Depreciation is part of operating expenses and in an audit are included in the calculation of net income. However, this is often viewed as an accounting expense rather than a cash expense. So, while an audit shows a negative net income, utilities still have cash. Instead of setting aside depreciation funds for future needs, they are using the funds for day-to-day operation.

Of the 207 systems with negative ROA's, 144 had net income lower than depreciation. For these systems, when the cost of depreciation was added to net income, it became positive.

When cash flow (calculated as net income plus depreciation) over total assets was computed for the 207 systems, the number of systems with a negative ratio dropped to sixty-three systems. The 144 systems that had negative net income but positive cash flow suggest that many water systems do not operate on a net income but on a cash flow basis. This would explain why the mean ROA ratio is only 1%. Water systems can operate in this manner because depreciation funds are often used for operating expenses.

Of the 207 systems with net income less than depreciation (negative net income), 145 were small utilities with less than 1,000 connections. Of the remaining utilities with net income less than depreciation, fifty-four had between 1,000 and 10,000 connections, four systems had between 10,000 and 50,000 connections and none had more than 50,000 connections. When depreciation funds were added to net income, 103 of the 145 smallest utilities, thirty-eight of the fifty-four medium-sized systems, and two of the four large-sized systems had positive cash flow, showing that they are operating on a cash flow basis.

In the short-run, some systems can operate with negative net income and negative net return on assets, if they are using depreciation funds to cover cash expenses. However, on an annual basis this is a recipe for trouble. Each year assets decline in value and use, and must be replaced. A depreciation fund sets aside money equal to the decline in asset value. This fund can be used to upgrade the system. If not done, eventually a system will be faced with breakdowns and massive spending needs that will require debt financing to overcome. Going into long-term debt to meet what should have been yearly depreciation expense is an inefficient use of resources.

Of course, for many systems a negative net income situation does not mean depreciation funds are being used to cover O & M expenses. For many, spending for items like pipe, meters, or other durable assets is part of the regular budget. Some systems expense their capital spending rather than create a capital budget. So from an audit standpoint, it looks like the depreciation fund is being used for O & M when investments are continuing. A better way to keep these items straight is to create a capital budget separately from the expense budget. That way, audits will provide a more accurate portrayal of a systems financial picture.

Financing Water Resources

Once a utility has a system for tracking financial health it can more adequately begin to examine how to finance capital projects. Over the next several years, utilities will face increased costs due to growth, infrastructure rehabilitation and regulations. To finance these costs a utility has many options. Financing can come directly from rates, from the imposition of system development charges, from contributions from the general budget of a community, or from selling bonds to the public. In the process of developing a financial plan a utility must balance system integrity---keeping clean water flowing--with its financial health. The system must also balance new growth with rehabilitation. A crucial question for the utility will be who will pay for growth.

When approaching a financing decision it must be kept in mind that financing alternatives depend on the type of facility in question. Financing may differ based on whether the project is for supply and treatment facilities, transmission and distribution lines, or local facilities like line extensions (McKinley and Nelson, 1993). Financing decisions will also differ depending on the type of capital expenditure. Recurring capital costs should be financed from operating cash flow, while non recurring capital costs should be paid from debt financing, impact fees, grants, or other long term financial options.

Types of Financing

Revenue financing: One form of financing available to a water utility is the use of revenue to pay for programs and projects. The rationale behind this type of financing is "pay for use." If a customer obtains a direct current benefit, that customer should pay the cost. Although using annual revenues to finance capital programs is not the norm, revenues can finance some recurring capital costs. In fact, most year-by-year line and other capital replacements should be financed with revenues. These expenditures, while long-term, are recurring each year and add to the utility's maintenance program. The advantage of using revenues for replacement costs is a match between current beneficiaries of capital spending with current users. Revenue financing should not be used for non-recurring major capital costs. Revenue financing is typically not appropriate for entire project costs because the long term benefits of projects should be recovered over the life of the investment. Trying to cover non-recurring capital costs with yearly revenues would create highly variable levels of user fees.

Debt financing: Using debt to cover long term capital costs fairly recover costs of non-recurring projects over the useful life of the investment. Using debt is not recommended for financing recurring annual costs like line extensions, repairs or replacements.

What kind of debt to use for capital projects depends largely on the time period of the financing needs. For small projects with short-term financing needs a utility can look to a bank for financing. Although interest rates may be higher than tax-free municipal bonds, such short-term projects are best suited to bank-financing. Short term bond rates vary little from bank rates and avoiding bond costs makes up that difference. Another source of short-term financing, particularly for items like trucks, backhoes, or computers, is a vendor finance/lease purchase agreement. For long term financing the utility should look to the capital or bond market for assistance.

Types of Bonds: Many different types of bonds are available to a utility, designed to meet different needs. One of the more common is the general obligation, or GO bond. This is a bond backed by the full faith and credit of the general government and is paid from ad valorem taxes based on property values in a community. General obligation bonds are therefore normally both low risk and low cost. Often such bonds do not require debt revenue reserves or coverage requirements and issuance costs are low compared with revenue bonds (McKinley and Nelson). One drawback to the use of GO bonds is the usual requirement of voter approval. General obligation bonds also affect the overall borrowing capacity of the issuing government.

Many utilities now use revenue bonds backed not by general property taxes but by the revenues of the water system alone. A double-barrel bond is paid from a combination of user fees and tax revenues. These types of bonds are especially attractive to new start-up systems that have no revenue at the beginning but anticipate them over time. Many water departments also use certificates of participation. McKinley and Nelson define certificates of participation as similar to revenue bonds that neither constitute indebtedness to the municipality or require voter approval. Such financing involves the establishment of a separate entity, a transfer of title to that entity, and a lease-back arrangement. Because revenue bonds are backed by the user fees levied on the direct beneficiaries of the project and not the public, they may not require voter approval. These bonds also do not count against the debt of the general government. Revenue bonds are considered riskier and have higher interest costs since they depend just on user fees, which may vary. They also have more restrictive covenants and higher reserve and coverage requirements than GO bonds.

Finally, special assessment bonds are attractive to areas where heavy growth is occurring in certain areas of a community. The bonds are paid for from a special tax and user fee assessments on neighborhoods and areas experiencing growth. A new version of special assessment bonds being used by communities is the sales tax, particularly the special local option sales tax. This is a sales tax, approved by voters, that is for specific projects and self-destructs when the project is finished. Since the tax is collected until the project is paid for, financing costs are low and they require only short-term financing.

System Development Charges: Growing in popularity across the country are system development charges (SDC), also called impact fees, facility charges, plant investment fees, or availability fees. These are front-end charges are designed to recover capacity costs for and from new customers, relieving existing customers from paying for growth costs due to new water demand. An impact fee is any charge unrelated to a direct point of use service charge. The developer is in fact the marginal cost collector, paying the full cost of added equity. Impact fees are a fixed cost to the consumer and thus are not a part of the decision making process regarding water use, and only affect the choice of housing or plant location. In 1986, 35% of utilities in nine southeastern states imposed impact fees. In Florida, 71% of utilities imposed such fees, popular in high growth states. Such charges are often used to keep water rates to the entire community low. In establishing system development charges care must be taken to insure proper legal authorization is obtained and that the application of such charges is uniform across all new growth. The proceeds from the SDC are intended to benefit the properties charged, so that new customers are not simply being used to benefit old customers. Charges should be based on defined costs apportioned commensurate with benefits received.

Another form of financing is a system buy-in approach, where new customers are charged for system "equity." This is common when adequate capacity is already available for new customers in existing facilities. An incremental cost approach can also be used. Here, new customers are charged for the most recent or new plant addition where the new construction provides a significant portion of the capacity. This can be summed up as the "growth pays for growth" philosophy.

Other Financing Considerations: A remaining option for water financing has been federal or state grants. Such grants however are becoming rare. The US Department of Agriculture still has some rural water funding available but it is limited.

Most states now have some sort of agency that provides low-cost loans, designed for small communities whose needs are inadequate for bond market financing. Such loan operations are usually funded from bonds sold by the state at their credit rating. State Revolving Funds are also available and have become an important part of the 1996 Safe Drinking Water Act, where $1 billion each fiscal year from 1995 to 2003 has been authorized. States may use a part of their federal grant to support administration of the drinking water program, including new capacity development, operator certification and source water protection. Governors can transfer 33% of SDWA revolving loan funds between the Clean Water and Drinking Water state revolving funds for five years.

Funding for water projects can also be achieved by using what have been called "environmental charges." These are assessments on property specifically for providing environmental infrastructure.

In looking for ways to fund such an expensive undertaking, communities should look to other governmental or regional jurisdictions to share costs and provide a regional solution to water problems. Since water does not respect political boundaries, regional or multi jurisdictional solutions are often the most economic. Finally, communities have been looking to private firms and have experimented with privatization initiatives for meeting water financing needs.

Extension Policy

Annually, most capital decisions are about the financing of extending lines to new areas of a community. As the utility approaches this issue, they need to be careful to define who bears the cost recovery responsibility --- new customers, the entire rate base, or some combination.

Line extension contracts are often used to define the costs and rates for new line extension projects. Often developers of new subdivisions or areas contribute directly to a line extension program, or pay for it completely and include those costs in the land or house price. Some communities are using a benefit area idea where the entire area is improved by line extensions, and both old and new customers finance the project.

Financing Local Facility Capital Costs

Before considering what form of long term capital markets may be most appropriate, utilities should establish other kinds of capital revenues to be used for projects. For example, utilities may wish to consider imposing import fees and developer contributions to items like local distribution mains, valves and hydrants. Typically, utilities set tap fees to pay for the individual costs of providing a tap to a property.

A utility can also charge a meter setting fee and other turn-on and turn-off fees for the individual property owner. Utilities should explore the possibility for grants and low interest government loans particularly if a community has been designated as a low-income area. Also, some capital programs can be paid for out of operating cost.

The amortization structure determines the cost of capital (the rate of interest that will be paid). For a twenty-year project, bonds can be constructed so that some bond holders are paid-off in the first few years at a low interest rate. Other payments spread over the entire length of the bond, at progressively higher interest rates as the bond time lengthens. Prepayment provisions will also affect the cost for capital. Some bonds provide for a penalty if paid off early. As with a house mortgage, capital costs will be affected by whether the interest rate is fixed or variable.

One major item affecting the interest rate to be charged will be the credit worthiness of the utility. If bonds are to be backed by the local or state government, the interest rate assessed will be affected by its credit rating. A new start-up water utility with no track record will pay higher interest rates based on the risk of the investment project. The liquidity of the project and whether it is a private placement or a public offering will also affect costs.

Bond Financing Steps

The steps to enter the bond market to finance a local water project include:

1. Identify capital needs by developing a long term capital improvement plan--CIP.

2. Obtain preliminary engineering and cost estimates. Along with revenue estimates, this is the time to do a benefit/cost analysis of the project.

3. Determine the debt capacity of the utility and match that with the feasibility of doing the project.

4. Prepare the financing documents. These include the engineers report, the bond resolution and official statement of the project and the community.

5. Secure a credit rating from one of the major credit rating firms. Often, if the credit rating is not high, credit enhancement insurance can be bought allowing bonds to be sold at AAA ratings.

6. Market bonds to pubic and private investors.

7. Deliver funds and begin construction.

8. The final step in going into the bond market continues over the entire life of the bonds. Utilities must keep their budgets and rates to maintain their credit rating. Also, relations with the investors must be maintained.

Credit Rating Criteria

For any utility, its credit rating is often the difference between a successful project and one that never gets off the ground. Both Moody's Investors Service and Standard and Poor's require a collection of information to enable them to establish a credit rating. From three to five years of financial statements must be provided, along with the engineer's report on the technical aspects of the project. The bond resolution, stating the covenants, and an official statement also must be submitted. The official statement includes information about the demographic and economic nature of the community and service area.

In establishing a rating, the investor services review the legal provisions of the proposed bond. These include the pledged revenues, the rate covenants, the flow of funds, additional bond tests, and the types of reserves and investments permitted under the program.

With the official statement, the credit rating also depends on the economic environment of the community. Population, income and employment trends, and the diversity of the employment base are noted. The credit rating services will pay close attention to operating factors of the utility itself, including the quality and training of the management of the utility. The political environment surrounding the project is also important. Does it have wide political support in the community? Is this a controversial program that may be derailed in court or in the next election? The trend and composition of water sales shows how vulnerable a utility may be to economic changes. Are most of the revenues coming from one or two large industries? How stable are they? What happens if they move or close? For expansion projects, the condition of the current facilities are investigated, along with the regulatory compliance record of the utility. Finally the utility's rate structure and policies are examined to determine whether rates will be sufficient to cover costs.

Debt Service Coverage

According to many credit analysts, the best measure of system financial performance is debt service or bond coverage. Bond coverage is the net revenue available for debt service divided by interest and principal (net revenue is equal to gross revenue from water services minus operating and maintenance expenses but before depreciation). Moody's identifies the coverage ratio as the most important item to watch for system financial performance. The coverage ratio is calculated by totaling all revenues received during a year, from all sources. Then, all nondebt expenses for the year are totaled (all operating expenses excluding principal and interest payments). The nondebt operating expenses are subtracted from revenues and the result is divided by the yearly debt service expenses (principal and interest). As shown in table 3, after determining all revenues and costs, the example utility has $4,250,000 available for debt service. The utility's debt service is $3,000,000 leaving

$1,250,000 for other capital projects. A debt coverage of 1.42, as shown in the example, indicates the utility is operating on a sound financial basis.

Table 3. Debt Coverage Calculations

A.	Gross revenues	$10,000,000
B.	Operating expenses (before depreciation)	6,000,000
C.	Operating income	4,000,000
D.	Non operating income	250,000
E.	Net revenue available for debt	4,250,000
F.	Bond debt service	3,000,000
G.	Debt coverage ratio	1.42X
H.	Funds available for renewals & extensions	1,250,000

As noted in EPA training manuals (Farmer and Rollins, 1991), while bond requirements differ, a coverage ratio of 1.25 is common. However, many utilities have policies requiring even higher coverage ratios. The coverage ratio measures whether the utility has revenue to pay debt service and still has money remaining to cover contingencies or other unexpected problems. Sufficient coverage shows whether a system conforms to its rate covenant and if there is a sufficient financial cushion for renewals and replacements. A system with a debt service coverage ratio at or above 1.25, has not only the resources to pay its debt, but has the cash flow to pay all its expenses and sufficient funds for system renewal. A system with a low coverage ratio not only will have trouble selling or repaying bonds, but will find it difficult to keep the system adequately maintained. Thus, financial health is tied directly to a systems ability to meet its coverage requirements.

Using coverage as the measure of utility performance addresses one of the systems' primary financial obligations: can it pay for its debt-funded capital needs? A significant portion of capital should also be funded from current operating revenues or cash reserves. A system, to be financially sound, must demonstrate the ability to generate sufficient revenue to cover current operating and maintenance obligations, the cash required to fund pay-as-you-go capital improvements, plus the repayment of loans. In meeting its coverage requirements, the second major function of a systems finances is addressed: the cash flow necessary to meet operation and maintenance obligations and pay debt.

Conclusions

Water utilities face an uncertain future as the cost of providing clean water rises. However, it is clear that environmental sensitivity is such that the public will rightfully demand improved water service at a time of limited resources and aging facilities. As continued urbanization affects rural areas, all parts of the country will be faced with the need to find ways to finance water projects. Gone are the days when water can be treated as an essentially free good.

While the need for water financing increases, so does the competition for capital. Government borrowing continues to compete with private sector borrowing. As capital flows freely across international boundaries it becomes harder to find sources of funds for water projects.

Water utilities must become more sophisticated and knowledgeable about finances. Long term planning and fiscal management are no longer just for the large or wealthy utilities, but must be practiced by all water managers. If for no other reason, the public is demanding accountability for all public spending.

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