

ECONOMIC IMPACT OF SOUTH DAKOTA'S REGIONAL WATER SYSTEMS

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ABOUT THE Regional Water System Research Consortium

The Regional Water System Research Consortium (RWSRC) was formed to support research and development projects to develop management and operational tools to sustain the development and service life of regional rural water systems. RWSRC is supported by funds contributed by South Dakota regional rural water systems, the South Dakota Association of Rural Water Systems, and several water development districts in South Dakota. Administrative support and project management are provided through the Water and Environmental Engineering Research Center in the College of Engineering at South Dakota State University.

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PART 1 INTRODUCTION

Background

Regional water systems are a primary conduit of water supply for much of South Dakota's rural and small community populations. As of 2006, greater than one-third of South Dakota's population was served by water supplied from regional water systems, and when Lewis and Clark Rural Water delivers water to Sioux Falls, over one-half of South Dakota's population will be served by regional water systems. Greater than 75% of incorporated communities with public water supplies are served by regional water systems, either as bulk communities or as individual customers.

Many farms and agricultural industries use rural water for domestic use, livestock watering, and industrial processing. These users have connected to regional water systems to obtain a reliable, safe, and high quality water source.

Regional water systems contribute beneficial economic and societal impacts. These systems directly and indirectly contribute to South Dakota's and the nation's economy through:

- Construction projects (both initial construction and upgrade/expansions),
- Employment of management, staff and operations personnel,
- Purchase of operations and maintenance supplies and equipment
- Purchase of utilities (gas, communications, electric),
- Private investment in locations where good quality water was formerly not available,
- Delivery of water used for producing goods and services (livestock production, manufacturing, value-added industry), and
- Improved property values and associated increased property tax revenue.

Additionally, the water delivered through regional water systems contributes to the betterment of society through:

- Improved health and welfare of people (as a result of better water quality),
- More efficient water use (less waste as a result of improved water delivery efficiency),
- Improved agricultural productivity (lower livestock illness and higher weight gain from improved water quality), and
- Increased reliability of water supply as a result of skilled management and operations personnel.

Objective

This report summarizes the results of a study of the economic impacts of regional water systems in South Dakota. The scope of this study was limited to soliciting financial information from South Dakota's regional rural water systems using this information to quantify direct, indirect, and induced economic impacts of these systems as a result of their construction and annual operations.

Approaches To This Study

Survey

A survey was conducted to obtain economic and business information from regional water systems. The survey was initiated in late 2007, and included financial information and other system characteristic information exhibited by the systems as of the end of calendar year 2006. The survey requested typical business and financial information available from annual business reports and budgets, including annual construction costs, operations and maintenance costs, number and types of employees and salary costs, annual water sales (volume), and water rate structures/revenues from water. These data were summarized and extrapolated to account for systems not responded to the survey. Totalized values for business income, construction costs in 2006 and total un-depreciated capital assets were used to conduct estimate the economic impact.

Estimating Economic Impact

At the basic level, the direct economic impact of regional water systems lies in the business of creating and running a system – including the value of construction and in the continued operations and maintenance of these systems. The systems use a natural resource, the acquisition value of which has more costs to some systems than others. Systems must build facilities to treat this water to a desired quality and then distribute it to users. Systems use combinations of grants and loans to fund the cost of these facilities. They then charge fees to users for loan repayment, to hire employees for management, operations and maintenance, and additional capital expenditures.

The business of regional water systems creates a multiplier effect in the economy when the dollars associated with new construction and operation of the enterprise create additional economic activity as income created by water supply systems is spent on goods and services. The multiplier effect includes impacts on output (or additional production activities), value-added (income generation), and employment effects. In turn, each of these effects are disaggregated into direct, indirect, and induced effects on the economy. The multiplicative economic impact can be assessed in various ways, but a common analytical tool used to do this is a software package called IMPLAN (IMPact analysis for PLANning). This product is commonly used by universities and governmental agencies to conduct economic analysis. The 2006 version of IMPLAN was used to estimate the direct, indirect and induced effects of total output, value-added, and employment impacts of regional water systems on the South Dakota economy.

PART 2

CHARACTERISTICS OF SOUTH DAKOTA'S REGIONAL RURAL WATER SYSTEMS

Twenty systems provided complete responses to the system characteristic and financial surveys and additional systems provided partial responses. Data from these surveys were used to describe the characteristics of South Dakota's rural water systems. Since the survey did not receive 100 percent response, the summary of the survey responses provided below should be viewed as a description of the general scope of South Dakota's systems.

Water Sources

Ten rural water systems treat surface water (primarily the Missouri River) for their water source. These systems include some of the largest systems (WEB Rural Water, Mid-Dakota Rural Water, B-Y Rural Water and the Mni Wiconi Rural Water Supply System). Based on data from water systems responding to the survey, approximately 54 percent of the water distributed by South Dakota's systems was from surface water sources. Several of these systems distribute their water to consecutive rural water systems.

Ground water is the main source of supply for most of the regional water systems along the eastern corridor of South Dakota.

System Coverage

Rural water systems have grown in numbers from two systems in the early 1970's (Butte-Meade Sanitary Water District and Rapid Valley Water Service Company) to the 33 systems that currently in planning, construction, and/or operation. As shown in Figure 1, most of South Dakota's area is included in rural water system service boundaries. Summarizing the data from 17 systems providing system coverage information in the survey, water distribution areas served by these systems range from 7 square miles to 13,900 square miles, and average about 3,000 square miles. Average length of pipeline in these systems is 1,300 miles, and on average they provide water to approximately 2,250 hookups.

System Water Production

The 26 systems reporting water production in 2006 produced 13.9 billion gallons of water, averaging about 500 million gallons per system.

Customers

Fifteen systems provided water sales data to various customers in their systems. Based on these data, 46 percent of the water was delivered to farm customers, 38 percent to bulk community users, 15 percent to individual customers, and 1 percent to non-farm industries. Regional water systems have become a major water supplier to cities, towns, and other public water systems (Hutterite colonies and residential subdivisions). Based on data received from 26 systems, more than 260 of South Dakota's public water supply systems (cities, towns, subdivisions, etc.) were served by South Dakota's regional water systems in 2006. More than 70 percent of the city or town public water supply systems in South Dakota are served by South Dakota regional water supply systems.

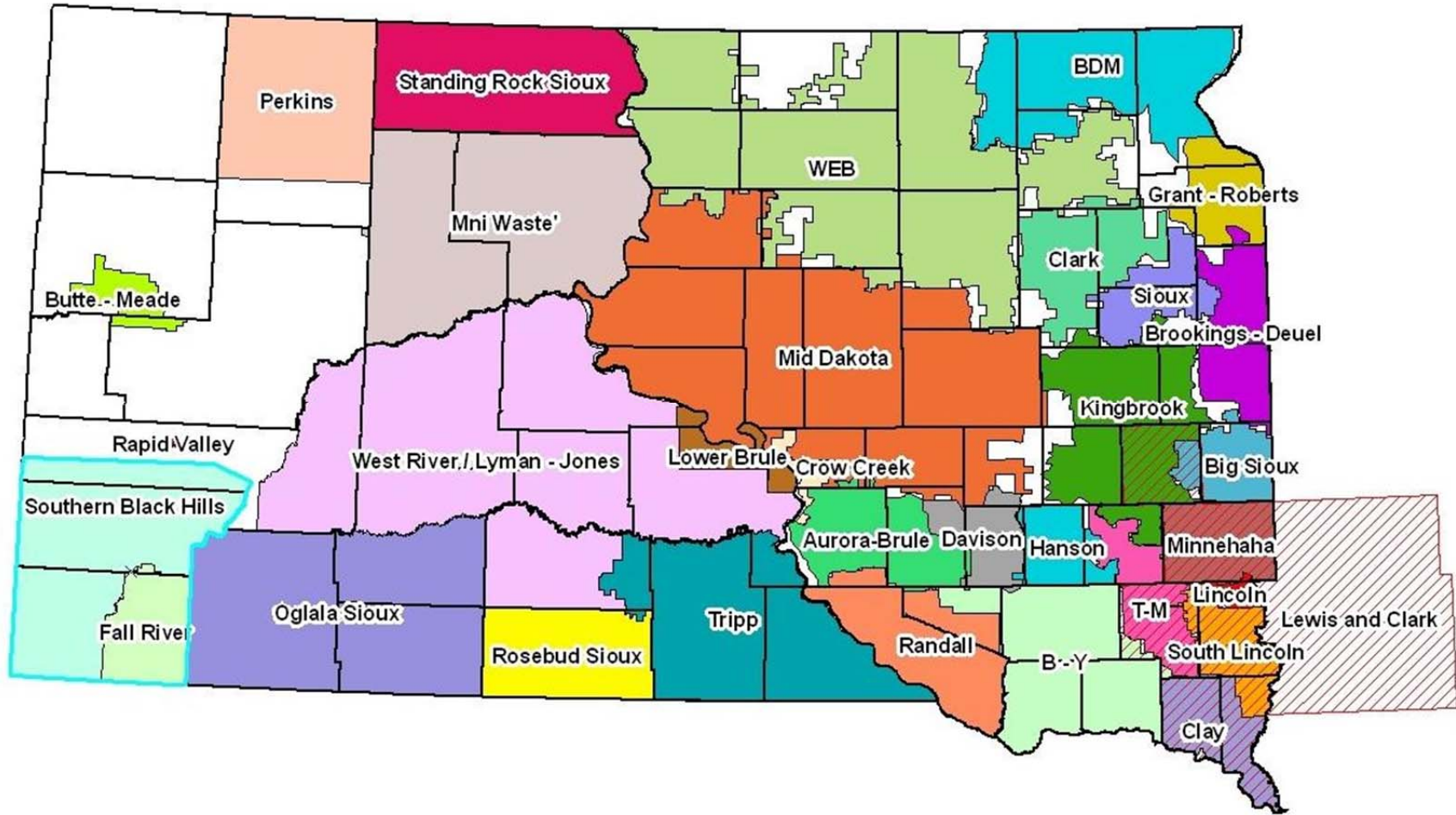


Figure 1. Regional Rural Water Systems in South Dakota

Employment

Regional rural water systems employ managers, office staff, water treatment plant operators, and distribution system operators in their enterprises. Twenty four systems responding to the 2006 survey employed a total of 219 personnel, averaging about 9 employees per system. Many of the systems offer a complete array of services, including treatment plant and distribution system operation, maintenance and construction of new service connections, and financial/managerial services including billing customers for water use.

Financial Characteristics

The major source of revenue for day to day operation of regional water systems is from water sold to system customers. Twenty-four systems responding to the 2006 survey reported a total operating income of \$45.6 Million, averaging about \$1.9 Million per system. These same systems reported an average of \$1.75 Million total operating expenses.

The major categories of operating expenses are salaries/benefits, utilities, treatment chemicals, purchased water, depreciation and payment on indebtedness. Table 1 provides a breakdown of these expenses.

Table 1. Regional Water System Operating Expenses

Expense Category	Total	Average	% of System Expenses	Systems Reporting
Salaries & Benefits	\$7,586,490	\$379,324	24	20
Utilities	\$2,657,423	\$132,871	7	20
Treatment Chemicals	\$1,243,770	\$62,189	4	16
Purchased Water	\$2,443,190	\$112,160	18	11
Depreciation	\$10,583,028	\$557,002	28	19
Payment on Indebtedness	\$7,233,037	\$425,473	20	17

Salaries and benefits (24%), depreciation (28%), and payment on indebtedness (20%) are the leading expenses for these systems. Purchased water is a significant expense for systems that do not have their own source of supply or who supplement their source of supply with water purchased from neighboring rural water systems.

PART 3 ECONOMIC IMPACT ANALYSIS

This study estimates the economic effect of the current rural water systems on the state. Three different effects were examined, the effect of constructing pipelines and other facilities, the effect of the annual operations of the systems, and the effect of the value of the total assets that are owned by the systems.

The analysis tool used to estimate the economic impact was IMPLAN Pro, a regional economic impact modeling software program originally developed by the U.S. Forest Service. It is currently managed by the Minnesota IMPLAN Group in Stillwater, MN. The U.S. economy is broken down into 509 separate sectors and production functions which describe the economic interactions between the sectors are imbedded within the program. The results of these interactions can then be calculated and a number of different economic impacts can be quantified. Multipliers are also calculated so that the effect of additional investment in any sector may be determined.

Data from the financial survey (previously summarized) were used create input values to the IMPLAN tool. Any manipulation need to assess the economic impacts of regional water systems in South Dakota are described for each impact category. The analyses are split into three impacts – impacts of 2006 construction expenditures, impacts of system operations in 2006, and the overall impact of total assets constructed through the year 2006. Three impacts for each of the analyses are examined, the direct output impact, employment impact, and the impact of indirect business taxes. Each of these impacts are summarized in tabular format.

Construction Impacts

Actual regional water system construction expenditures reported by the regional water systems for the year 2006 were summed and used to estimate the direct output impact of construction. Construction costs for the Lewis and Clark Regional Water System are included in the \$89,580,000 total construction spending reported for the year 2006, even though the Lewis and Clark system was not distributing water at that time. In conducting the IMPLAN analysis, it was assumed that the vast majority of the construction impact remained in South Dakota or the nearby region. The results of the IMPLAN analysis are summarized in Table 2.

Table 2. South Dakota Economic Impacts of Year 2006 Regional Water System Construction

	Output Impact	Employment Impact	Indirect Business Taxes
Impact	2006 Dollars	Number of Employees	2006 Dollars
Direct	\$89,580,000	831	\$524,000
Indirect	\$21,071,000	199	\$940,000
Induced	\$29,150,000	303	\$1,831,000
TOTAL	\$139,801,000	1333	\$3,295,000

Considering the output impacts in Table 2, the direct effect is the actual value of the construction projects. The indirect effects are the business to business activities generated by firms restocking after sales. The induced effects result from the extra spending in the area that is encouraged by the additional economic activity in the area. (The explanation of each of these

effects is the same for the output impacts of 2006 construction, system operations, and value of the total assets, so it will not be repeated.) As seen from Table 2, each dollar spent on construction in 2006 also produced \$0.235 of indirect effects and induced \$0.325 of induced spending. Each dollar spent on construction resulted in \$1.56 of output impact in the economy.

The direct effect of construction on employment would be the actual number of employees involved in the construction process. The indirect effect is the additional employment in the construction support industries, and the induced effect is the additional jobs resulting from the increased economic activity in the state. As shown in Table 2, IMPLAN estimated the 2006 construction activities directly employed 831 persons, and the total employment impact of the 2006 construction (including direct, indirect, and induced effects) was estimated at 1,333 people. Another way to view this information is that, not only did the \$89.6 Million directly create new rural water system infrastructure, but it also created a net effect of \$139.8 Million in the regional economy and employed 1,300 people in construction and related jobs. On the basis of total output impact on employment, approximately \$105,000 of output impact as a result of construction also provided employment for 1 person.

The indirect business taxes resulting from construction include all of the taxes paid by businesses, (ie, contractor excise taxes, sales taxes, fuel taxes, etc, but exclude income taxes, since income taxes are not paid in South Dakota). The direct effect is the taxes paid by the construction industry. The indirect effect is the taxes paid by the support industries, and the induced effect is the taxes resulting from the increased economic activity in the area. IMPLAN estimated the economic activity resulting from \$89.5 Million of direct construction expenses in 2006 produced a total of approximately \$3.3 Million in indirect business tax impacts.

Operating Income

The operating income is the actual revenue generated by the regional rural water systems in 2006. As noted in the Financial Characteristics section of this report, the regional rural water system operating expenses virtually equal operating income. Thus income translates to dollars that are injected into South Dakota's economy. Operating income was estimated for systems not reporting their income in the survey to enable a projection of the impact of the regional water system industry annual operations on South Dakota's economy. Based on discussions with rural water system managers, the sum total of revenue was reduced by a factor to account for depreciation expense that is not covered by system revenues. Considering these assumptions, the estimated direct income for South Dakota's regional rural water systems in 2006 is approximately \$42.3 Million. The results of the IMPLAN analysis are summarized in Table 3.

Table 3. South Dakota Economic Impacts of Year 2006 Regional Water System Operations

	Output Impact	Employment Impact	Indirect Business Taxes
Impact	2006 Dollars	Number of Employees	2006 Dollars
Direct	\$42,297,000	354	\$1,647,000
Indirect	\$5,210,000	58	\$203,000
Induced	\$15,673,000	163	\$984,000
TOTAL	\$63,180,000	575	\$2,834,000

As shown in Table 3, operations of South Dakota's regional water systems produced \$42.3 Million in direct output impact, from which IMPLAN estimated 354 people were employed and \$1.65 Million in business taxes were paid. (Interestingly, the 354 jobs estimated by IMPLAN is a reasonable approximation of the number of employees reported by the water systems, if adjusted for employees of systems that did not report their numbers of employees.) When adjusted for indirect in induced effects, the total output economic impact of system operations was \$63.1 M, the total employment impact of system operations was 575 employees, and a total of \$2.8 M of business taxes were paid.

Total Assets

The total assets are the value of the assets of the rural water systems that have accumulated over time, dominated by water treatment and water distribution system infrastructure. To estimate the value of the addition of this infrastructure to the state of South Dakota, the total value of un-depreciated assets as of the end of 2006 was aggregated from the 27 systems that responded to this question in the system surveys. The value of assets of systems that did not report their un-depreciated capital assets was not estimated. The value of the Lewis and Clark regional water system assets was included in the total. The results of the IMPLAN analysis are summarized in Table 4.

Table 4. Economic Impacts of South Dakota's Regional Water System Accumulated Assets

	Output Impact	Employment Impact	Indirect Business Taxes
Impact	2006 Dollars	Number of Employees	2006 Dollars
Direct	\$950,222,000	7,765	\$36,155,000
Indirect	\$114,351,00	1,269	\$4,449,000
Induced	\$343,967,000	3,570	\$21,603,000
TOTAL	\$1,408,540,000	12,604	\$62,207,000

Total reported un-depreciated capital assets of reporting South Dakota regional water systems was \$950 Million. (The value of non-reporting systems likely pushes this total to over \$1 Billion). According to the IMPLAN analyses, the construction of these assets has resulted in total economic impact of greater than \$1.4 Billion, employed 12,600 people, and created \$62.2 Million in business taxes.

Conclusions

It is quite clear through this analysis that the rural water systems in South Dakota have a very significant impact on the economy. The construction activity in 2006 generated \$139.8 Million in output, 1,333 jobs, and \$3.3 Million in indirect business taxes. Annual operations in 2006 generated \$63.2 Million in output, accounted for 574 jobs and \$2.8 Million in indirect business taxes. The total accumulated assets constructed by the systems generated more than \$1.4 Billion in output, accounted for 12,600 jobs, and generated \$62.2 Million in indirect business taxes. These dollar amounts are very significant in a state economy that generates approximately \$40 billion in Gross State Product.