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Public Officials' and New Members' Perceptions of Impacts of Selected Rural Water Systems

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PUBLIC OFFICIALS' AND NEW MEMBERS' PERCEPTIONS OF IMPACTS OF SELECTED RURAL WATER SYSTEMS

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INTRODUCTION

The first rural water systems in South Dakota served few customers in relatively small geographic areas. However, in the past few years, an expansion in both size and number of rural water systems has occurred. As a result, potential effects on both the public and private sectors have increased. Planners, public officials, rural water system officials, and financing agencies have become concerned about possible impacts of rural water system construction on land use, public services, and population movement. Concern has been expressed that the introduction of a rural water system into a region will hasten the conversion of agricultural land to nonagricultural uses, in which case, demands for public services in rural areas may increase.

Research was conducted by the Economics Department at SDSU in conjunction with the Water Resources Institute and the North Central Regional Center for Rural Development to determine perceptions of the extent of the impacts of rural water systems in selected regions of the state. Aspects of the research were embodied in two studies. As part of a case study of the Brookings-Deuel Rural Water System (BDRWS), a random sample of area residents and public officials was personally interviewed. In another research project involving the Lincoln County Rural Water System (LCRWS) and the Randall Community Water District (RCWD), public officials of the region and new residential members of the rural water systems were surveyed through mail questionnaires.

Public officials were interviewed to learn their perception of changes which had occurred in their communities in the past ten years. New residents were interviewed to identify the important factors behind their move to the region. The responses among groups living near different sized cities were compared.

The three rural water systems represent different sized systems and proximity to different sized urban centers. The Lincoln System serves about 500 members, covers about one-half of a county (Lincoln County), and is located adjacent to the only SMSA in South Dakota. The Brookings-Deuel System, with about 1100 members, covers two counties (Brookings and Deuel counties) and serves an area near a growing medium-sized city. The Randall System, serving approximately 1500 individual households and 6 small communities, covers parts of Charles Mix and Douglas counties. No municipality larger than 1300 population is located within the area served by the Randall System. The diversity represented by the systems and the areas they serve allows for comparisons among members of the three systems and among regions.

SURVEY OF PUBLIC OFFICIALS

Research Procedures

Lists of public officials in Charles Mix, Douglas, and Lincoln counties were obtained from the respective county auditors. Mail questionnaires were sent to all county commissioners and chairmen of the board of township super-

visors of the townships served by the systems. Of the thirty-eight questionnaires mailed, twenty-one were returned (a response rate of 55%).

Brookings County officials directly involved in providing public services (road maintenance, snow removal, law enforcement, etc.) and Brookings school officials were personally interviewed by use of an open-ended questionnaire. The wording of the questionnaire differed from that of the mail questionnaire sent to public officials in the other counties but the general objective was the same, to elicit officials' viewpoints on changes in the demand for public services.

Comparison of Research Procedures in Two Studies

The open-ended personal interviews of Brookings officials allowed in-depth questioning and clarification of questions. Some of the answers were lengthy and had to be paraphased but a special effort was made to maintain the original intent of the various responses.

Since questions were not uniform between the mail and personal surveys, comparisons in the officials' perceptions of changes within their counties could not be made directly. Numerical ratings were not obtained in Brookings County so could not be scaled or tested statistically.

The procedure used for the Lincoln and Randall officials allowed for comparison and testing within regions as well as between two regions. By numerically scaling statements, an indication of the degree of agreement was obtained. Particularly strong feelings were given greater weight.

In comparing procedures, it appears that the latter procedure was more informative, easier to administer, easier to test responses for significance, and more specific. The first procedure allows for flexibility in questions and for clarification of possible ambiguities.

Survey Results

In the mail survey, public officials were asked if they had perceived any changes in ten factors that could be affected by installation of a rural water system. If so, did they perceive a decrease or an increase with respect to that factor?

Table 1 summarizes the combined responses from all officials and separately by officials of each region served by the LCRWS and RCWD. In only two factors, rural population and school enrollment, did less than 50% of the officials perceive an increase. As might be expected, 95% of the public officials perceived an increase in property taxes and local government expenditures. A stable situation or a modest increase was noted for the remaining factors.

A substantial percent of Lincoln officials perceived an increase in all factors except school enrollment. One hundred percent of the Lincoln County

TABLE 1. Comparison of Officials' Perception of Public Sector Impacts in Communities Served by Lincoln County Rural Water System and Randall Community Water District.

Item	Total				Lincoln System				Randall System			
	Total Resp.	Stable %	Increased %	Decreased %	Total Resp.	Stable %	Increased %	Decreased %	Total Resp.	Stable %	Increased %	Decreased %
1. Rural Population** (for county, township officials)	21	33	43	24	7	0	100	0	14	50	14	36
2. Urban Population (for city officials)	4	50	50	0	1	0	100	0	3	67	33	0
3. Housing Construction	21	14	81	5	7	0	100	0	14	21	72	7
4. Property Taxes	21	5	95	0	7	0	100	0	14	7	93	0
5. Business Volume	19	42	53	5	7	29	71	0	12	50	42	8
6. School Enrollment*	21	29	24	47	7	43	43	14	14	21	14	65
7. Local Government Expenditures	21	5	95	0	7	0	100	0	14	7	93	0
8. Business/Industry Construction	19	42	53	5	7	29	71	0	12	50	42	8
9. Community Programs/ Services	21	33	67	0	7	29	71	0	14	36	64	0
10. Use of Land for Non-Agricultural Purposes	21	43	57	0	7	14	86	0	14	57	43	0

* Significant differences between the responses of the Lincoln System and Randall System officials at the .10 level
** Significant differences between the responses of the Lincoln System and Randall System officials at the .01 level

officials perceived an increase in rural population, urban population, housing construction, property taxes and local government expenditures. A smaller percent of public officials in the Randall System area (but more than 50%) perceived increases in housing construction, property taxes, local government expenditures, and community programs/services. A substantial percent perceived a decrease in school enrollment.

The responses of the public officials from the two areas were tested by means of a chi-square test to determine if there were significant differences between the two groups. There was a statistically significant difference at the 0.01 level in Item 1, rural population; and at the 0.10 level in Item 6, school enrollment. For all other items the differences between the two groups of officials were not significant.

Public officials' responses indicated perceptions of changes in factors similar to the actual occurrence of the changes. Differences between the perceptions of the public officials in the Lincoln System area and the Randall System area supported actual differences between the two regions.

The first group of questions explored factors that a rural water system might be expected to influence but did not suggest a causal relationship between the factors and the systems. In a second group of questions, the officials' perceptions of the role of the rural water systems in effecting these changes as well as their reaction to an expanded list of factors relating to the quality of life were elicited. In the second series of questions, officials were asked to indicate their degree of agreement with a series of 22 statements. Numerical values were assigned to their responses as follows:

1 - strongly agree
2 - agree
3 - disagree
4 - strongly disagree

The responses for each statement were averaged and the mean values are reported in Table 2 by total group and by officials of each rural water system. Mean values of less than 2.5 indicate varying degrees of agreement with the statement while values greater than 2.5 indicate varying degrees of disagreement.

For instance, for Statement 7 the mean response for all officials is 2.19, indicating agreement that the rural subdivisions have expanded in the area recently. For Lincoln officials (mean 1.57) there is agreement that this has occurred, while Randall officials (mean 2.67) slightly disagree with the statement. Results imply that officials have perceived different changes between the two regions.

The statements for which the combined responses of the officials indicated substantial agreement (Statements 1-13) generally involved increases in population and demand for public services. Disagreement was shown with State-

TABLE 2. Comparison of Mean Responses to Selected Statements by Public Officials of Regions Served by Lincoln County Rural Water System and Randall Community Water District.

Statement	Mean of Responses		
	Total N = 21	Lincoln System N = 7	Randall System N = 14
1. Traffic volume on local roads has changed in recent years.	1.72	1.29	2.00
2. New residents in this area are demanding more and better public services (roads, schools, etc.).	2.00	1.60	2.18
3. *The number of previously vacant rural farmsites and residences that are occupied by nonfarm families has increased substantially during the last ten years.	2.06	1.57	2.37
4. There is a difference in value of rural residences if good quality water is available.	2.13	2.20	2.10
5. *The number of local retail businesses has changed since 1970.	2.13	1.60	2.40
6. Property taxes in this area have changed because of a change in quality and quantity of public services provided.	2.16	2.00	2.23
7. *Rural residential subdivisions have expanded in this area recently.	2.19	1.57	2.67
8. The rural water system is the single most important development in this area during the last ten years.	2.24	2.80	2.00
9. Rural law enforcement is becoming a serious problem in this community.	2.30	2.60	2.17
10. The quality of life in this area has improved due to the rural water system.	2.32	2.50	2.23
11. *The rural population has changed in this area due to people moving to a rural environment.	2.37	1.43	2.92
12. Because residential property taxes are lower in rural areas than in urban areas, a number of people have moved to this rural area.	2.37	1.86	2.67
13. The business of water well drillers and haulers has been hurt by the rural water system.	2.41	2.29	2.50
14. Residential property values in this area were affected by the rural water system.	2.59	2.50	2.64
15. Young people have a better chance of finding local employment now than they did ten years ago.	2.68	2.17	2.92
16. *Enrollments in local schools have been increased due to nonfarm families moving into rural areas.	2.71	1.20	3.33
17. *Nonfarm families moving to rural areas have caused increases in local taxes.	2.71	2.00	3.00
18. The number of rural nonfarm residences in this area is causing garbage and sewage problems.	2.75	2.71	2.78
19. There has been a major change in this elected representatives to local units of government recently.	2.82	2.60	2.92
20. A noticeable amount of land in this area has changed from agriculture to residential because of the rural water system.	2.89	2.83	2.92
21. Livestock in this area increased substantially after the rural water system began operation.	3.00	3.17	2.91
22. Consolidation of schools tends to increase the quality of education in rural areas.	3.00	3.00	3.00

* Significant difference between groups at the .05 level.

ments 14-22 indicating a change in the quality of life or that the rural water system had contributed to specific changes.

The difference in the mean responses of the two groups of officials for all statements was tested by means of a t-test. There was a statistically significant difference in the responses to 6 statements; 3, 5, 7, 11, 16, and 17. All of these statements relate to changes in land use and population in rural areas. Two of the statements, 11 and 16, (rural population changes and school enrollments) are similar to Items 1 and 6, in Table 1. There is a significant difference between the two groups in both cases.

Item 5 (Table 1) and Statement 5 (Table 2) relate to business conditions. While the difference between the two groups' responses is not significant for Item 5, it is for Statement 11. Lincoln officials indicated in both cases that business volume had increased (changed) while Randall officials perceived more stability.

Items 9 and 7 relate to Statement 2. Officials from both regions felt that local government expenditures and programs had increased, but Lincoln officials agreed more strongly that new residents were demanding more public services. There was no significant difference between group responses.

Item 10 relates to conversion of agricultural land to nonagricultural uses. The vast majority of Lincoln officials indicate conversion has occurred in their area while a majority of Randall officials believe use of land for nonagricultural purposes has stabilized rather than increased. Statement 20 explicitly addresses the role of rural water systems in the conversion. Officials in both regions disagree that rural water systems were the cause of the change from agricultural to residential use.

The responses to Statements 4, 6, 14, 18, 20, 21, and 22 were very similar for officials from the two areas.

The viewpoints of Brookings County officials (BDRWS) on the impacts of the rural water systems on property values and demands for public services such as road maintenance and snow removal, schools and school busing, waste disposal, and fire protection were obtained via personally administered open-ended questionnaires. While some Brookings officials stated there had been increased demands for public services, none believed the increases were due to the rural water system.

Comparison of Survey Results from Three Regions

Brookings County officials felt that population had increased and demands for public services were up, but attributed none of the changes to the rural water system. The officials' perceptions on population were correct since between 1970 and 1980 population increased 9.8%.

Lincoln County officials generally indicated an increase in rural population, construction, business volume, and use of land for nonagricultural

purposes. Between 1970 and 1980, population increased 18.5% in Lincoln County. In all of these areas except housing construction, Randall officials perceived a stable situation in their region. In fact, population decreased 8.5% in Douglas County and 3.1% in Charles Mix County. During that period, there was a 3.7% increase in population in the state.

Officials of all counties observed an increase in property taxes, local government expenditures, and public services. All counties did experience substantial increases in property taxes between 1970 and 1980--Lincoln County, 103%; Brookings County, 71%; Douglas County, 64%; and Charles Mix County, 29%. All felt new residents were demanding more public services, but did not directly link new residents with the rural water system. Lincoln officials did agree that increases in school enrollments and in local taxes were due to nonfarm families moving to rural areas. Randall officials disagree.

There were no significant differences in the responses of Lincoln and Randall officials to questions on the effects of the rural water systems. Generally, they slightly agreed that the rural water system affected values of property and quality of life.

Lincoln and Randall typify two very different regions in terms of population growth and economic activity. The LCRWS is located near a growing population center which is reflected in the responses. The direct link between this growth and the rural water system is not evident from officials' responses, however. The question is, "Would all of the growth have occurred without the rural water system?"

The Randall region is agricultural, marked by small towns and decreasing rural population. Rural subdivisions and other signs of growth are not a concern as shown by officials' responses.

The configuration of the Brookings region lies somewhere between the other two. It is characterized by agriculture, population growth, and much nonfarm construction in rural areas, but municipalities are generally small.

Results indicate that officials in the regions studied do perceive different changes in their regions. The differences appear to relate to overall regional growth rather than to the existence of a rural water system.

SURVEY OF RESIDENTS

Research Procedures

Names of new members of the LCRWS and the RCWD were obtained from the offices of the systems. Forty-three questionnaires were mailed to new members with 21 returned for a response rate of 51%. The questionnaires were organized into three sections--personal characteristics, residential information, and importance of site characteristics in decision to move to new residences.

In another research project covering the BDRWS, personal and residential information was obtained from residents of the area through a mail questionnaire. A random sample of all residents was interviewed, but results are reported here only for new members of the system. Questionnaires were mailed to 103 new members; 76 were returned for a response rate of 74%.

Both procedures involved a mail questionnaire. For questions common to both studies, differences in responses among the three groups of new residents could be tested. By including new and old residents and members and nonmembers in the Brookings-Deuel sample, considerably more analysis and testing within the sample was possible. The latter procedure does not require preclassification into new and old residents, thus eliminating one time consuming step in the sample selection process.

Survey Results

Table 3 summarizes personal and residential information on new members of the three systems. Personal characteristics for the three groups are similar. The major differences in members across systems (BDRWS information is not available for all of items) are in residential items. New members of the LCRWS tend to have smaller plots of land, reside in nonfarm rural residences, and be more likely to have lived in a city prior to the move to their present location than members of the RCWD. Both the LCRWS and RCWD groups purchased bare land rather than existing residences. A larger proportion of the BDRWS members listed a farm as the location of their previous residence.

Of particular significance is the high proportion of new LCRWS members who have relocated from a city and purchased bare land on which to construct residences. Respondents indicated that a major portion of the land was pasture prior to purchase, implying conversion of agricultural land to residential use. This trend was not as evident in the Randall area.

In the BDRWS, 52% of new members listed their occupation as farming, 37% as nonfarm employment, and 11% retired. While comparable occupational information is not available for Lincoln or Randall new members, over one-half listed their residence as a nonfarm rural home, indicating farming was not their principal occupation.

Importance of site characteristics in the decision to move to their present location was obtained only from Lincoln and Randall new members. Respondents were asked to evaluate the importance of 21 items according to the following scale:

1 - very important and required
2 - important but not required
3 - considered but not important
4 - not considered

In Table 4 the mean values of the responses of the total sample and of the Lincoln and Randall groups are listed. Items very important and required

TABLE 3. Personal and Residential Characteristics of New Members of Lincoln County Rural Water System, Randall Community Water District and Brookings-Deuel Rural Water System.

Characteristic	WATER SYSTEM		
	LINCOLN	RANDALL	BROOKINGS-DEUEL
	Mean Value		
1. Age of head of household	37.8	36.8	40.3
2. Number of children	1.7	1.33	1.59
3. Number of employed adults	1.56	1.75	1.40
4. Miles from job	11	9	NA*
5. Size of land (acres)	3	41.4	NA*
	Percent of Respondents		
6. Type of residence:			
-Farm home	6	40	55
-Nonfarm home	81	60	29
-Other	13	0	16
7. Location of previous residence:			
-City	81	33	40
-Rural nonfarm	19	33	15
-Farm	0	33	45
8. Type of land and/or residence purchased:			
-Bareland	81	50	NA*
-Farm home	0	16	NA*
-Rural nonfarm home	13	16	NA*
-Other	6	16	NA*
9. Occupation:			
-Farm	NA*	NA*	52
-Nonfarm	NA*	NA*	37
-Retired	NA*	NA*	11

* Information not available from questionnaires used with survey of this rural water system.

TABLE 4. Relative Importance of Site Characteristics in Move to Area by Lincoln County Rural Water System and Randall Community Water District Members

Item	Total	Lincoln System N = 16	Randall System N = 5
A. Site Characteristics:			
a. Rural environment (low population density, low traffic volume, peaceful, and tranquility)	1.43[1]	1.44	1.40
b. Attractive site (wooded, river view, etc.)	1.86	1.69	2.40
c. Low cost of purchase	1.91	2.06	1.40
d. Greater than five acres	2.95	3.07	2.60
B. Commuting Distance to Job:			
a. Less than 10 miles	2.11	2.07	2.25
b. Less than 25 miles	3.08	3.00	3.50
c. Less than 50 miles	3.09	3.00	4.00
C. Utilities and Services:			
a. Good quality school	1.29	1.31	1.20
b. Rural water systems*	1.71	1.94	1.00
c. Good road maintenance and snow removal	1.95	1.93	2.00
d. School bus transportation	2.10	1.88	2.80
e. Good fire protection	2.19	2.19	2.20
f. Paved roads	2.24	2.13	2.60
g. Lower electrical rates	2.35	2.53	1.80
h. Good police protection	2.35	2.31	2.50
i. Good garbage pickup	3.05	2.88	3.75
D. Lower Property Tax than City	2.05	2.13	1.80
E. Miscellaneous:			
a. Availability of land for sale	2.05	1.94	2.40
b. Previous experience with living in country	2.29	2.25	2.40
c. Gasoline prices	2.86	2.94	2.60
d. Inexpensive lifestyle	2.90	2.88	3.00

* Significant difference at the .05 level

[1] Indicates mean value of responses using the following weighing scale:
1 = Very important and required
2 = Important, but not required
3 = Considered, but not important
4 = Not considered

for the entire sample, in order of ranking, were good quality schools and rural environment. Attractive site, low cost of purchase, rural water system, and good road maintenance were also important but not required. While the rural water system was important to all of the respondents, it was not the most important factor; rather, it was one of several factors which were important.

One item which did not show up as important at the time of the sruvey (spring 1980) was price of gasoline. As gasoline prices increase, the important of this item may increase.

By means of a t-test the responses of the Lincoln and Randall groups were tested for significant differences. There was a significant difference at the .05 level in only one item, rural water system. All respondents from the Randall system ranked a rural water system as very important and required in their decision to move to their present location. The mean response of Lincoln new members was 1.94, indicating the rural water system was important but not required.

While not statistically significant, differences of greater than .6 were noted in several items. Lincoln members were generally more concerned with attractive site, commuting distance less than 50 miles, school bus transportation, and good garbage pickup than Randall members. Randall members were more concerned with low cost of purchase and lower electrical rates.

Overall, there was not a great deal of difference between the two groups.

A different approach was used in the BDRWS. Most of the items noted in Table 4 relate to public services. In the BDRWS project, respondents were asked their degree of satisfaction with public services rather than the importance of each. Respondents included members, nonmembers, old residents, and new residents. The total sample indicated a high degree of satisfaction with public services. A two-factor analysis of variance revealed no significant differences between old and new residents or members and nonmembers.

Comparison of Survey Results from Three Regions

While the three systems serve different types of regions in terms of population and economic activity, personal characteristics and important factors in their decisions to move to their location (Lincoln and Randall only) are quite similar. More new members of the Lincoln system tend to live on nonfarm rural acreages which have been converted from agricultural to residential use.

Respondents to the BDRWS queries on satisfaction with public services revealed no major dissatisfaction at this time. However, public services were factors of great importance in the selection of site for Lincoln and Randall groups. Therefore, planners should anticipate an increased demand for public services if growth in the regions continues.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Rural water systems appear to be one of several factors which stimulate growth in the rural areas. Public officials perceive greater growth in population, construction, and business in a rural area adjacent to a major metropolitan center than in rural areas without any large urban center, even though both regions are served by rural water systems. Changes in land use were more noticeable in the urban fringe area than in predominantly rural areas. Officials in all areas perceived an increased demand for public services and increased government expenditures.

The question has been posed, "Do public services precede or follow movement to rural areas?" In this case, availability of public services was one of the important factors in new residents' decisions to move to rural areas. However, initially, public services may have been provided for the first influx of rural residents and then more people were attracted to the area because of the availability of services. It would appear to be a self-perpetuating cycle.

Attractive site and rural environment were very important factors in the decision to move to rural areas, too.

Policy Recommendations

Policymakers concerned with the impact of rural water systems on land use and demand for public services might look at those items which are important to the households moving to rural areas. Rural environment, attractive site, and good public services rate high among those households. A rural water system does not appear to be the only factor, although it is important. Policymakers obviously cannot change rural environment or attractive site, but can change access to public services. Denying access to one public service may not be sufficient to halt migration to rural areas; rather, denying provision of all or several services may be necessary.

Officials also might look at the general growth in the area and proximity to large urban centers to predict whether their own region is likely to experience movement of nonfarm residents to rural areas. If their areas appear likely to experience considerable movement to rural areas, officials can plan accordingly. While it may be difficult to deny some public services to existing residents, it may be possible to deny expansion of those public services to new residents. Politically, neither policy may be feasible, however.

Recommendations for Future Research

This study was based on individuals' perceptions and their ex post reasons for undertaking certain actions. After the fact, it becomes difficult for individuals to pinpoint or remember exactly their motivations. Therefore, longitudinal research might establish more precisely actual changes

that have occurred. If possible, base data could be secured for a community prior to active public discussion or installation of a rural water system. A series of inventories over time would more clearly identify changes which have occured. At the very least, base data could be updated upon completion of the system and, perhaps, at five-year intervals thereafter. This would, of course, necessitate a long-term research project.

Cross-sectional analysis of two communities differing only because of the presence of a rural water system in one would help to more effectively isolate the impacts of the rural water system. The difficulty with this research method lies in locating two very similar communities. Each community is bound to possess characteristics unique to itself that would not be found in other communities.

"With" or "without" a rural water system is another approach to research on the impacts of rural water systems. Analyzing the same community without a rural water system and comparing it to an analysis with a rural water system allows identification of the impacts of a rural water system. The effects of normal growth and change would not be attributed to the rural water system. If it were feasible to do this type of research, it would remove one of the main problems in determining the impacts of a rural water system--the problem of attributing changes other than those caused by the system to the area.