



Environmental Finance Center at Wichita State University Hugo Wall School of Public Affairs

MISSOURI RURAL COMMUNITY SUSTAINABILITY ASSESSMENT

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Issue

Environmental infrastructure provides communities with water supply, waste disposal and pollution control services. These municipal works serve to protect human health and safeguard environmental quality. The cost of maintaining water and wastewater infrastructure is an on-going concern, particularly for rural communities that are declining in population. As people move out of rural communities, they leave behind an infrastructure of fixed size with fewer customers to support it. Rural communities across the Midwest are confronted with declining populations and a decreasing ability to pay for water and wastewater infrastructure. As the Missouri Department of Natural Resources (MDNR) continues to work with rural communities on new infrastructure and improvement investments, declining rural populations and the resulting impact on their ability to pay is an important issue for consideration. To better understand current and future population changes in Missouri's 745 rural communities and their impact on financial sustainability, MDNR contracted with the Environmental Finance Center (EFC) at Wichita State University Hugo Wall School of Public Affairs to study this issue.

This issue is not unique to Missouri and the same challenges apply to Kansas. The opportunities for further study of this issue in Kansas and other Midwest state are readily available and would help provide additional information for decision making for the regulatory agencies and communities in Kansas and other states who are facing the challenges associated population declines and necessary infrastructure investments.

Research Process/Protocol

This project was conducted in two phases with a total of 6 output reports and tools as follows:

Phase I

1.) Factor Identification Report and Data Source Report

This report identified significant factors through a review of over 60 recent academic literature pieces focusing on rural population growth and decline in the United States. Studies using statistical analysis to test the impact of various factors on rural population change were of interest. Of the factors that were identified as impacting rural population changes, These factors were grouped into the following areas: 1.) Population Factors included overall population growth, migration patterns and natural population increase and decrease;

2.) Spatial and Geographic Factors included natural amenities, proximity to metropolitan and micropolitan areas and population density; 3.) Economic Structure and Income Factors included sector employment, income sources and poverty rate; and 4.) Educational Attainment included high school and college graduation rates.

Available data sources were also identified to operationalize the factors as measures of rural population change. The report also identified available data sources to operationalize the factors as measures of rural population change. Data sources included the U.S. Census Bureau, the Bureau of Economic Analysis, the Missouri Department of Economic Development, the Missouri Department of Revenue, the Missouri State Auditor's Office and the Missouri Department of Health and Senior Services.

Phase II

2.) Significant Factors Report

This report describes the statistical methods and procedures used to identify the significant factors that specifically predict population growth and decline in rural Missouri communities. Using 45 factors identified from the literature in Phase I, changes over a ten year period from 2000 to 2010 were computed for each factor. These change factors were statistically correlated with the overall population change for each of the identified 745 rural Missouri community. The analysis identified thirty-two statistically significant factors that correlate with overall population change in rural Missouri communities. These thirty-two factors were subsequently input into a linear regression model. Twenty statistically significant factors emerged from the model as the most influential in determining population change in rural Missouri communities. These twenty factors formed that basis for development of a rural population sustainability tool. The twenty factors included population by age groups, immigrants and migration, population density, income recipients from retirement and social services, population employed in various economic sectors and natural amenities. The report also outlined the process of assigning a weighting value to each factor based on the degree to which they influence rural population change in Missouri. Regression analysis was used to determine weighting values for each factor.

3.) Sustainability Assessment Tool

The sustainability assessment tool was developed using a Microsoft Excel workbook. Data for years 2000 and 2010 were compiled for the twenty factors in every rural Missouri community. Using these data the tool computes changes over the ten year period for each factor and standardizes these values for the selected rural community. Weighting values are applied and a weighted score for each factor is computed. The tool also computes an overall sustainability score from the individual weighted factor scores. This score provides an overall measure of population sustainability for assessment and decision making purposes.

4.) Community Category Summary

This report describes the method for collapsing the overall sustainability scores into five categories based on score range criteria developed by the EFC and the MDNR. The categories indicate the likelihood that a rural community will be able to sustain their population and afford water and wastewater infrastructure in the future. The score categories can be used to assess a community's need for MDNR assistance.

5.) Validation Report

This report presents validity evidence of the utility of the Rural Population Sustainability Assessment Tool in predicting population growth and decline in rural Missouri communities. The capability of the assessment tool is predicated on the validity of the factor inputs in predicting rural population change. The report describes how the review of previous rural population studies and the statistical modeling established a set of factors as best predictors of population growth and decline in rural Missouri communities.

6.) Community Supplemental Survey

This survey was developed to gather additional information from communities that would be more subjective in nature to supplement the data and outputs from the assessment tool. The survey was designed to be easy to use for any level local government official. The questions include gather information related to transportation, employment, educational centers, financial capacity, and population change including recreational or seasonal population changes.

Findings/Outputs

Significant Factors: Through correlation and linear regression analysis, the following factors were deemed to be significant for Missouri rural communities and were used to build the Community Sustainability Assessment Tool:

- Change in the population group aged 18 to 29 years from 2000 to 2010
- Change in the population group aged 50 and over from 2000 to 2010
- Change in the number of persons employed in construction from 2000 to 2010
- Change in the number of public assistance income recipients from 2000 to 2010
- Change in the number of bachelor's or higher degree recipients from 2000 to 2010
- Change in employment in entertainment, recreation and food service from 2000 to 2010
- Change in the number of retirement income recipients from 2000 to 2010
- Change in the number of Social Security income recipients from 2000 to 2010
- Change in employment in professional services and management from 2000 to 2010
- Change in the number of high school graduates from 2000 to 2010
- Change in the number of persons employed in manufacturing from 2000 to 2010
- Change in the number of persons employed in finance, insurance and real estate from 2000 to 2010
- Change in the number of persons employed in wholesale trade from 2000 to 2010
- Change in the number of persons employed in information technologies from 2000 to 2010
- Change in population density (per square mile) from 2000 to 2010
- Natural Amenity Scale Rank (1=Low, 7=High)
- Change in the number of rural immigrants from 2000 to 2010
- Change in the number of persons migrating into the town or village from 2006 to 2010
- Change in the number of persons employed in retail trade from 2000 to 2010

Overall Scores: To reduce the complexity of evaluating the large number of rural Missouri communities and to provide a summary of rural sustainability; five categories of towns were developed from the range of overall scores across all rural towns to give sufficient differentiation while maintaining a manageable number of groups. The sustainability categories in order from less likely sustainable to most likely sustainable are:

Category	Overall Score Range	Number of Towns
Category 1 Towns	Towns with scores less than or equal to -25.0	133
Category 2 Towns	Towns with scores from -24.9 through -10.0	177
Category 3 Towns	Towns with scores from -10.1 through 10.0	219
Category 4 Towns	Towns with scores from 10.1 through 25.0	56
Category 5 Towns	Towns with scores greater than 25.0	160

Results/Summary

The research and the sustainability assessment tool and reports provide the Missouri Department of Natural Resources with additional knowledge about the likely future of each of Missouri's 745 rural communities and their ability to pay for environmental infrastructure. The sustainability tool permits them to evaluate and incorporate a collection of factors into the decision-making process that would otherwise be quite difficult to consider objectively. This information aids MDNR in the community assessment process for infrastructure projects and new program initiatives.

The resulting community assessment scores provide MDNR with the knowledge that there are approximately 133 communities that face immediate concerns with population sustainability and will likely need the most assistance in meeting environmental regulations that will include significant infrastructure investment. In addition, there are mid-level tiers of communities in categories 2 and 3 that may be in concern with population decline and additional assistance that need to be further evaluated. To date, MDNR has been developing programs that provide additional discharge variances to communities in category 1 to allow for more flexibility. Additional programs will likely be developed that will have impacts on enforcement as well as proactive outreach as MDNR works with the newly provided information.

Rural community population declines are a fact of the current and future landscape of community challenges. Federal agencies such as the Environmental Protection Agency should consider this reality and the resulting ability to pay when making regulation changes. In addition, states can use studies like this one to determine the communities most in need of assistance moving forward and work with them to develop innovative solutions to protect public health and the environment while also making improvements within the financial ability of the community.