



University of  
Massachusetts  
Amherst

## Developing and Deploying Rural Sustainable Tourism Indicators for Improved Destination Management

Item Type	Presentation
Authors	Eades, Daniel;Arbogast, Doug;Han, Luyi;Goetz, Stephen
DOI	<a href="https://doi.org/20.500.14394/54887">20.500.14394/54887</a>
Download date	2026-06-16 09:25:53
Link to Item	<a href="https://hdl.handle.net/20.500.14394/54887">https://hdl.handle.net/20.500.14394/54887</a>

# **Developing and Deploying Rural Sustainable Tourism Indicators for Improved Destination Management**

## **Introduction**

The increasing importance of the recreation economy has been recognized by the USDA as a priority area of national need and an effective means for rural development. While the economic impacts from tourism and recreation are often the most cited, there is increasing recognition from both international organizations (UNWTO) and within the tourism industry (Skift, 2020; Destination Analysts, 2019; Destination International, 2019) that economic benefits should be balanced with social and environmental impacts of visitation as well.

The UNWTO defines sustainable tourism as “tourism that takes full account of its current and future economic, social and environmental impacts, addressing the needs of visitors, the industry, the environment and host communities” (UN Tourism, n.d.). However, how destinations should best operationalize the concept remains elusive. Throughout Europe, several initiatives have worked to facilitate sound environmental, social, cultural and economic management for businesses and destinations including the EU eco-management and audit scheme (EMAS) and the EU Ecolabel, the Tourism and Environment Reporting Mechanism (TOUERM), and the Corporate Social Responsibility initiatives (CSR). In 2013, the European Commission launched the European Tourism Indicator System (ETIS), a combination of primary and secondary indicators designed to help destinations measure and monitor the fundamental aspects of sustainability.

Ideally, all ETIS indicators would be regularly monitored. However, there is an acknowledgement that not all destinations will be able to obtain all the data required. This is especially true for rural and under-resourced destinations. In an examination of rural destinations in Russia, Polukhina, et al., (2021) identified a specific need for a unified system of indicators to balance the benefits and costs of different stakeholders, aimed at stimulating interregional and inter-municipal cooperation to help manage the impacts of the increasing interest in visiting rural areas due to COVID-19. Similarly, while our efforts have identified theoretical models, toolkits, and futures models that can guide rural U.S. destinations, there are few practical examples of research-based performance indicators for rural gateway communities to holistically measure and evaluate their strengths and weaknesses, engage the breadth of tourism actors, or collectively identify where strategic investments should be made. To this end, a multi-state, integrated project team that involves research and extension faculty is developing an integrated process for measuring and evaluating sustainable tourism performance indicators in three northeast U.S. forest gateway communities. By understanding the factors that make these rural destinations resilient the project will produce policy recommendations and guidelines, and inform Extension destination planning activities for improving rural destination and gateway community well-being.

## **Methods**

We used a mixed methods approach that solicited input on relevant rural tourism sustainability indicators from secondary data sources from rural tourism experts in academia and university Extension, and those in leadership roles in rural tourism gateway communities. Following the approach used by Blancas, et al. (2011), proposed indicators were analyzed using principal

component analysis (PCA) to reduce the dimensionality of the number of variables while retaining those identified as most informative.

### **Questionnaire and Data Collection**

A questionnaire was developed based on previous literature (e.g., Durovic & Lovrentjev, 2014; Powell et al., 2017; Vogt, 2021) with input from the research team and invited external reviewers including tourism leadership in targeted destinations. Content focused on secondary indicators drawn from community capital/wealth and sustainable tourism frameworks (Asmelash & Kumar, 2019; Berry, 2006; Emery & Flora, 2020; Federal Lands Livability Initiatives, 2014; Pender, et al., 2012; Romao et al., 2013). Approximately 250 indicators were evaluated by core team members for inclusion in the survey. Sixty-five (65) indicators, organized under economic, social, and environmental domains were selected. An additional four indicators were included to describe destination management organizational capacity. A Qualtrics survey link for the indicator questionnaire was distributed via email to academic team members and leadership in partner destinations. The survey was completed by 10 academic practitioners and 13 destination leaders in three gateway communities in the northeast U.S. in which integrated research and Extension activities are taking place. Participants ranked selected indicators on seven-point Likert scale from very important (7) to not at all important (1). Participants were also given the option to assign the indicator to a different domain and suggest additional indicators for inclusion. The questionnaire was built into Qualtrics and reviewed and approved by university IRB.

### **Data analysis**

Secondary indicators surveys were analyzed using descriptive statistics; interquartile ranges (IQRs) were calculated for each question. Consensus on indicators importance was considered “strong” when at least 75% of respondents reached agreement. IQRs (absolute value of the difference between the 75th and 25th percentiles) were used to calculate the strength of the consensus.

We identified approximately 30 indicators across the three sustainability dimensions (12 economic, 9 social, and 7 environmental). For those variables where county level data were easily obtained and with fewer missing data (13 variables) we used PCA to reduce the number of variables and identify those most important to the respective sustainability dimensions. PCA aims to find a new set of uncorrelated variables (principal components) that capture the maximum variance in the data, effectively reducing the number of variables while retaining most of the information. PCA is useful for building indicators as it is designed to capture the maximum variance in the data using the minimum number of principal components. This aligns with our objective of capturing the maximum variance in the tourism activity indicators. Additionally, the method is appropriate since we have no prior knowledge or theoretical assumptions about the structure of the data or the existence of latent factors. PCA does not assume any underlying structure in the data. Finally, as we plan to use the resulting indexes for further analysis, such as regressions, PCA can be useful in this context as it provides a set of uncorrelated principal components that can be used as input variables for subsequent analyses.

## Results

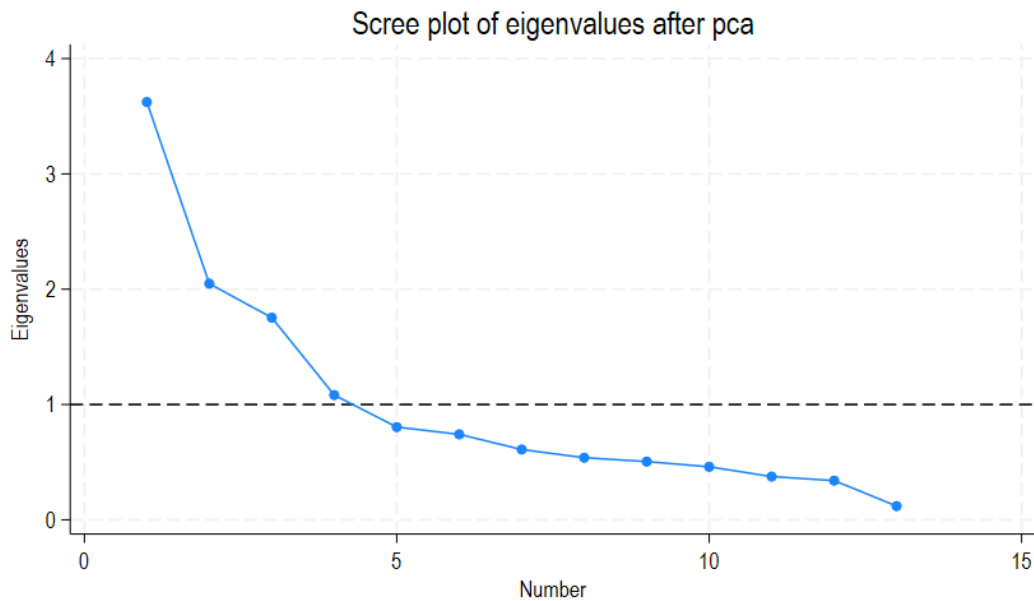
### Questionnaire

Analysis of secondary indicators found disagreement between academic practitioners and destination leaders concerning variables deemed “important.” Specifically, we noted consensus from both groups around economic indicators, but lower importance rankings from local leadership for environmental and social indicators. Additionally, local leadership was more likely to take a narrow view of the respective domains. For example, within the environmental domain, variables describing the natural environment were consistently rated higher than built environment variables.

### PCA Results

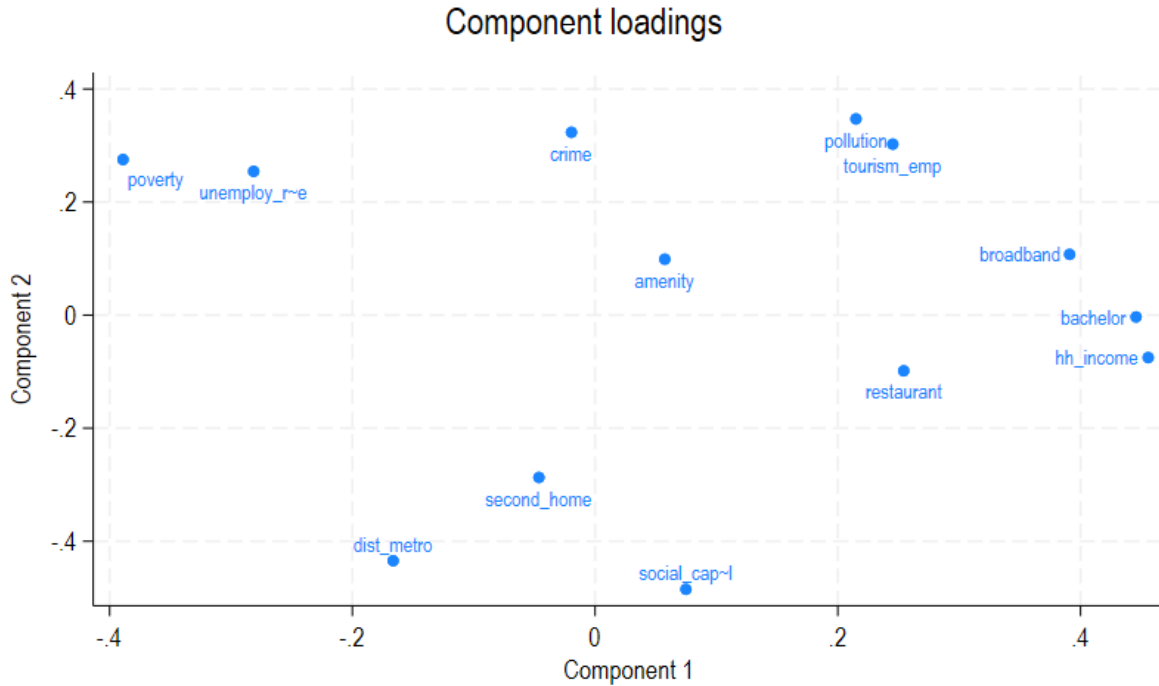
The initial PCA results showed that the first three to four components had eigenvalues greater than 1, suggesting that these components capture a significant amount of variance in the data (see Figure 1 for scree plot of the eigenvalues). Together, these components explain about 65.43% of the total variance using four components and about 57.11% using three components.

**Figure 1 Scree Plot of PCA**



As shown in Figure 2, variables that are close together and far from the origin (0,0) are highly correlated and contribute significantly to the components. For example, median household income and percent with bachelor's degree cluster together and have high positive loadings on component 1, while poverty rate and unemployment rate have high negative loadings on component 1.

**Figure 2 Component Loadings of PCA**



The component loadings (eigenvectors) show which variables contribute the most to each component (Table 1). Component 1 has high positive loadings for median household income, percent with bachelor's degree, and broadband. It has high negative loadings for poverty rate and unemployment rate. This component seems to capture socioeconomic status and community well-being.

Component 2 has high positive loadings for pollution density and quarterly tourism employment, and high negative loadings for social capital and distance to the nearest metro areas. This component might represent environmental factors and accessibility related to tourism.

Component 3 has high positive loadings for the percentage of secondary homes and restaurants per capita, and moderate positive loading for natural amenity score. This component likely captures tourism attractiveness and amenities.

**Table 1.** Principal Components (Eigenvectors)

Variable	Comp 1	Comp 2	Comp 3	Comp 4	Unexplained
Natural amenity score	0.0574	0.0989	0.525	-0.39	0.3202
Pollution	0.215	0.347	-0.0456	0.3943	0.4141
Social Capital Index	0.0749	-0.4851	0.0579	0.4835	0.239
Share Second Homes	-0.0462	-0.2872	0.4887	-0.1871	0.3668
Percent Bachelor's Degree +	0.4458	-0.0033	0.0984	0.006	0.2629
Distance to Metro	-0.1664	-0.4344	0.1867	0.2395	0.39

Broadband	0.391	0.1074	0.0683	0.0028	0.4142
Violent Crime Rate	-0.0195	0.3234	0.2787	0.483	0.3959
Restaurants	0.2543	-0.0986	0.4789	0.1473	0.3203
Tourism Employment	0.2453	0.3024	0.1482	0.0874	0.5479
Median HH Income	0.4558	-0.0752	-0.1252	-0.2355	0.1483
Poverty Rate	-0.389	0.2752	0.1917	0.1501	0.2078
Unemployment Rate	-0.2813	0.2543	0.2227	-0.1604	0.4661

To confirm that data were suitable for PCA we calculated Kaiser-Meyer-Olkin (KMO) values for the individual variables. The KMO measure of sampling adequacy is 0.7207 overall, indicating that the data is suitable for PCA. Values range from from 0.5503 to 0.8851, suggesting varying levels of sampling adequacy for each variable (Table 2).

**Table 2.** Kaiser-Meyer-Olkin Measure of Sampling Adequacy

<b>Variable</b>	<b>KMO</b>
Natural amenity score	0.5653
Pollution	0.7653
Social Capital Index	0.5503
Share Second Homes	0.5522
Percent Bachelor's Degree +	0.7618
Distance to Metro	0.7477
Broadband	0.8851
Violent Crime Rate	0.6941
Restaurants	0.7448
Tourism Employment	0.8363
Median HH Income	0.6911
Poverty Rate	0.6636
Unemployment Rate	0.7836
<b>Overall</b>	<b>0.7207</b>

## Discussion and Conclusions

Sustainable tourism indicators can be used to accomplish multiple tasks including aligning tourism objectives, quantifying those objectives, comparing destinations, and benchmarking practices and interventions (Blancas, et al., 2011). While all these functions are useful as destinations pursue sustainable outcome goals, indicators programs can only be successful if they emphasize both data and process. As evidenced by ETIS pilot efforts, if destinations are not adequately equipped to collect data, or if they lack guidance on how to best deploy indicators for planning purposes, success across geographies can be limited (European Commission, n.d.; Tudorache, et al., 2017). Our current efforts in northeastern U.S. gateway communities seek to build a robust support system that includes both research capacity to identify and monitor shared

measures of sustainability and extension support to facilitate the use of that data in destination management plans. While still in its initial phases, our transdisciplinary approach helps to reconcile opinions across stakeholder groups and across geographies in order to generate not simply agreement on indicators, but agreement on a framework for monitoring and executing rural tourism development.

As noted in our analysis, outside of economic variables, secondary indicator analysis showed little agreement between what academic audiences and local leadership view as important. The lack of agreement between stakeholder groups emphasizes the need for continued education and processes which reconcile the values and perspectives of all stakeholder groups. To that end, monthly meetings with destination leadership participating in research-Extension activities have included educational sessions that explain the tourism lifecycle, the importance of sustainable tourism, and the value of thinking beyond just economic impacts. Discussions with destination leaders demonstrate that participants understand the value of using indicators to guide their work. As one participant noted, “[We are] able to begin understanding the factors and indicators and form guiding principles through an engagement process with all stakeholders... I think this work is absolutely vital to ensure balance between economy, community, visitor and stakeholder as tourism continues to grow and local buy in continues to be fostered. Inclusion is the key.” Other communities have begun implementing their own data collection efforts to supplement the indicators identified by our study. For example, in one rural community, destination leaders have begun monitoring trends in county and municipal tax collections from activities/sales linked to visitation and visitor spending.

As noted by Snyder (2001) destination leaders often have access to an overwhelming amount of information but may not know which data points are the most useful for addressing local challenges. Our analytical method appears useful for reducing the quantity of data in favor of identifying those data points most relevant to measuring and evaluating destinations’ performance in economic, social, and environmental dimensions. Armed with this information, local policy makers and those active in destination development can begin to craft interventions that will improve performance on these measures. Monitoring change in indicators over time allows destinations – and programing efforts led by groups like Cooperative Extension – to evaluate the impacts of their work and policy changes. Information generated in the evaluation process allows interventions to be refined for maximum impact.

Finally, comparing indicator performance between the destination and peer and aspirational destinations provides an opportunity to identify best practices and learn from the successes and mistakes of other destinations. Like Blancas et al. (2011), our team is currently using the methods from this analysis to develop economic, social, and environmental indices that will allow destination leaders to quickly see how indicators vary between places and allow the team and local leaders to evaluate and see how their destination compares to those reacting to similar challenges.

## **References**

Asmelash, A.G., & Kumar, S. (2019). Assessing progress of tourism sustainability: Developing and validating sustainability indicators. *Tourism Management*, 71, 67-83.

Blancas, F. J., Lozano-Oyola, M., Gonzalez, M., Guerrero, F. M., & Caballero, R. (2011). How

- to use sustainability indicators for tourism planning: The case of rural tourism in Andalusia (Spain). *Science of the Total Environment*, 412, 28-45.
- Berry, T. (2006). 15. The predictive potential of the TALC model. In *The tourism area lifecycle* (Vol. 2) (pp. 254-280). Channel view publications
- Destination Analysts. (2019). *State of the American Traveler Destination Management Edition*. <https://mk0destinationajcrrq.kinstacdn.com/wp-content/uploads/2019/12/The-State-of-the-American-Traveler-Fall-2019-002.pdf>
- Destinations International. (2019). *DestinationNEXT Futures Study*. <https://destinationsinternational.org/reports/destinationnext-futures-study>
- Emery, M., & Flora, C. (2020). Spiraling-up: Mapping community transformation with community capitals framework. In *50 Years of Community Development Vol I* (pp. 163-179). Routledge
- European Commission. (n.d.). *European Tourism Indicators System for sustainable destination management*. [https://single-market-economy.ec.europa.eu/sectors/tourism/eu-funding-and-businesses/funded-projects/sustainable/indicators\\_en](https://single-market-economy.ec.europa.eu/sectors/tourism/eu-funding-and-businesses/funded-projects/sustainable/indicators_en)
- Federal Lands Livability Initiative. (2014). Conservation Fund <https://www.conservationfund.org/our-work/conservation-leadership-network/our-services/federal-lands-livability-initiative>
- Polukhina, A., Sheresheva, M., Efremova, M., Suranova, O., Agalakova, O., & Antonov-Ovseenko, A. (2021). The Concept of sustainable rural tourism development in the face of COVID-19 crisis: Evidence from Russia. *Journal of Risk and Financial Management*, 14(1), 38.
- Pender, J., Marré, A., & Reeder, R. (2012). Rural wealth creation concepts, strategies, and measures. *USDA-ERS Economic Research Report*, (131).
- Powell, R.B., Green, T.F., Holladay, P.J., Krafte, K.E., Duda, M., Nguyen, M.T., Spencer, J.H., & Das, P. (2017). Examining community Resilience to assist in sustainable tourism development planning in Dong Van Karst Plateau Geopark, Vietnam. *Tourism Planning & Development*, 15(4),1-22. DOI:10.1080/21568316.2017.1338202
- Romão, J., Guerreiro, J., & Rodrigues, P. (2013). Regional tourism development: Culture, nature, life cycle and attractiveness. *Current Issues in Tourism*, 16(6), 517-534
- Skift. (2020). *Travel Megatrends 2020*. <https://skift.com/megatrends-2020/>
- Snyder, K. (2001). Decision support tools for community planning. *Public Management*, 83(10), 4-9.
- The U.S. Bureau of Economic Analysis. (2020). Outdoor Recreation Satellite Account, U.S. and

States, 2019. <https://www.bea.gov/news/2020/outdoor-recreation-satellite-account-us-and-states-2019>

The U.S. Bureau of Economic Analysis. (2021). Outdoor Recreation Satellite Account, U.S. and States, 2020. <https://www.bea.gov/news/2021/outdoor-recreation-satellite-account-us-and-states-2020>

Tudorache, D. M., Simon, T., Frent, C., & Musteață-Pavel, M. (2017). Difficulties and challenges in applying the european tourism indicators system (ETIS) for sustainable tourist destinations: the case of brașov county in the Romanian carpathians. *Sustainability*, 9(10), 1879.

UN Tourism (n.d.). *Sustainable Development*. <https://www.unwto.org/sustainable-development>

Vogt, B. (2021). Relationships between community resilience and perceived community outcomes. <https://agecon.unl.edu/Cornhusker-Economics/2021/relationships-between-community-resilience-and-perceived-community-outcomes-2>