Balancing environmental and economic priorities in rural western U.S. communities

By Kaitlyn Spangler, Riana Gayle, and Don E. Albrecht; Western Rural Development Center

"This study provides evidence that individuals from the rural western U.S. do place a heavy emphasis on environmental quality, particularly higher-educated women. This study also shows that men with less education are more likely to prioritize economic over environmental goals."

Introduction

The tradeoffs of economic growth and environmental conservation have long been a topic of debate and research (Den Butter & Verbruggen, 1994; Ekins, 2000; Wu & Flynn, 1995). Debates range from the argument that economic growth does not need to come at the cost of environmental sustainability (Cohen, 2020; Figge & Hahn, 2012; Mountford & Jaeger, 2017) to these two objectives are fundamentally at odds with each other and thus impossible to achieve in tandem (Demaria, 2018). These debates are made even more urgent by the economic plight of small, rural towns in the U.S. and the inequitable economic growth of U.S. cities (Porter, 2018).

Despite this urban-rural divide and contrary to popular assumptions, individuals in rural communities do hold strong environmental values. Particularly important are those related to sense of place, farmland conservation, and moral responsibility, and these communities are comparatively knowledgeable about environmental concerns (Bonnie et al., 2020). However, such values may be unfairly pitted against sources of reliable income and job security via economic growth (Foster & McBeth, 1996).

The Area Sector Analysis Process (ASAP), formed by a collaborative group of institutions across the Intermountain West and coordinated by the Western Rural Development Center, reflects the importance of community goals and objectives alongside economic development planning efforts (Bordigioni et al., 2020). This unique process utilizes a range of primary data sources including Community Goals Surveys (CGS), as well as various secondary data sources including the U.S. Census Bureau and Bureau of Labor Statistics.

Within this process, individuals within communities that complete ASAP are asked to express their opinions and preferences for their community, specifically regarding economic growth and its potential tradeoffs with environmental goals. This provides a unique, multiyear data source to contribute to this growing concern over balancing economic and environmental priorities in rural U.S. communities With these survey data, we sought to address the following question: how do demographic factors (age, income, gender, and education) predict economic versus environmental community priorities?

Data

Our subsequent analysis focuses on the relative importance of economic and environmental goals to ASAP participants within the CGS. There are three goal categories presented by the CGS: economic, environmental, and social, as well as coinciding questions that ask respondents to rank these goals against each other. Additionally, demographic variables (age, income, gender, and education) are collected (Bordigioni et al., 2020). To achieve a clean, reliable dataset for analysis, we selected responses from 2010 and beyond where data collection procedures were more reliable and consistent from year to year. The resulting dataset included responses between 2014 and 2020. Communities spanned across 26 counties from the following states: Alaska, Arizona, Colorado, Hawaii, Idaho, Nevada, New Mexico, and Utah. The sample size included a total of 2,990 individuals with an age range of 16 to 91.

The response variables were constructed from a survey question that asked respondents to rank the relative importance of economic compared to environmental goals in their community. Respondents could choose "1" indicating that both environmental and economic quality are equally as important, or they could choose "2-9" on either the environmental or economic side to indicate moderate to extreme relative importance. For analysis purposes, we condensed these responses into a categorical variable with five categories: 1 = Equal (when respondents chose "1"), 2 = Moderate Economic ("2-5" toward Economic Quality), 3 = Strong Economic ("6-9" toward Economic Quality), 4 = Moderate Environmental ("2-5" toward Environmental Quality), and 5 = Strong Environmental ("6-9" toward Environmental Quality).

For the binary logistic regression models, we constructed three binary response variables: 1) Equal, 2) Strong Economic, and 3) Strong Environmental. These variables capture respondents who felt most strongly about their choice, as well as those who could not choose one as more important than another.

We utilized four predictor variables: education, income, age, and gender. Education, income, and gender were all collected as categorical variables, while age was continuous. These variables were chosen from the CGS as the most complete and comparable predictor variables. The distribution of these variables across the dataset are visualized in Figures 1a-d. Education (1a) is a categorical variable with six categories starting from completing eighth grade to graduate school. Income (1b) is also a categorical variable with nine categories starting from earning less than $15,000 annually to greater than $200,000 annually. Age (1c) is a continuous variable (range = 16 – 91), and gender (1d)

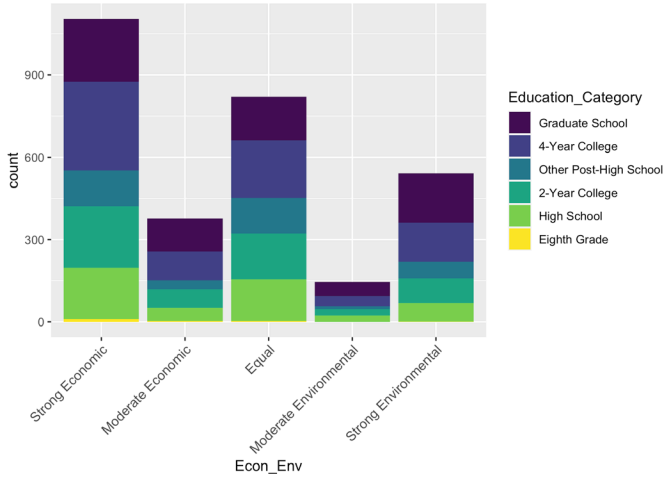

Figure 1a: Distribution of Education across response categories.

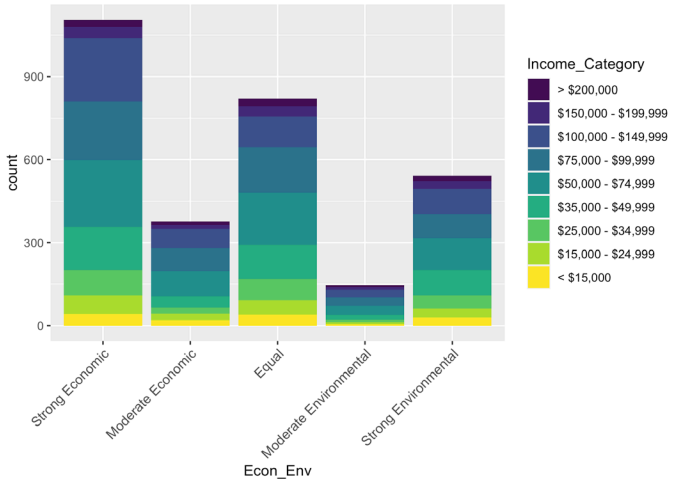

Figure 1b: Distribution of Income across response categories.

comprises two categories: man or woman (despite the existence of multiple non-binary gender identities). Education and income were treated as continuous in the model given the ordinal nature of both variables.

Analysis

After testing the sensitivity of multinomial and ordinal logistic regression models, we estimated a series of binary logistic regression models to understand the relationships between "Strong Environmental," "Strong Economic," or "Equal," and the demographic factors of education, age, income, and gender. These models performed significantly better than the multinomial and ordinal logistic regression models. First, we built models on 70% of the full dataset, holding out 30% to predict on. Then, we filtered for all respondents over the age of 65 to compare if and how the same model results may vary for those of retirement age. Model performance was measured in two ways: 1) a misclassification rate of predicting held out data (30%) from the original dataset, and 2) the area under the Receiver Operator Characteristic (ROC) curve, which summarizes the tradeoff between the true and false positive rates of the predictive model. We also accounted for the spatial autocorrelation—or if and how the spatial structure of the data affects the results—by holding out and predicting on two different counties, as well as two different states, and by including the state variable in the model to compare model performance.

Results

Strong Environmental Preference

Individuals who chose Strong Environmental (6-9) can be strongly predicted by just Gender and Education level; dropping Income and Age from the model does not reduce model performance significantly. Those with a higher education level were 1.2 times more likely ($p < 0.0001$) and women were 1.4 times more likely ($p < 0.001$) to choose Strong Environmental. The reduced model performs just as well as the full model; it misclassifies the response variable on held out data (30%) only 18.6% of the time (the same misclassification rate as the full model). The area under the ROC is 0.547. If we filter for all respondents over 65 years of age, we see the same variable trends, and the misclassification rate for Strong Environmental is still 18.6% with similar Odds Ratios and significance levels.

Strong Economic Preference

Individuals who chose Strong Economic (6-9) can be strongly predicted by just Gender and Education level. Similar to the other models, dropping Income and Age does not reduce model performance significantly. Those with a lower education level were 0.9 times more likely ($p < 0.01$) and men were 0.75 times more likely ($p < 0.001$) to choose Strong Economic. The reduced model misclassifies the response variable on held out data (30%) 36.3% of the time (the same misclassification rate as the full model), although this is nearly twice as high as

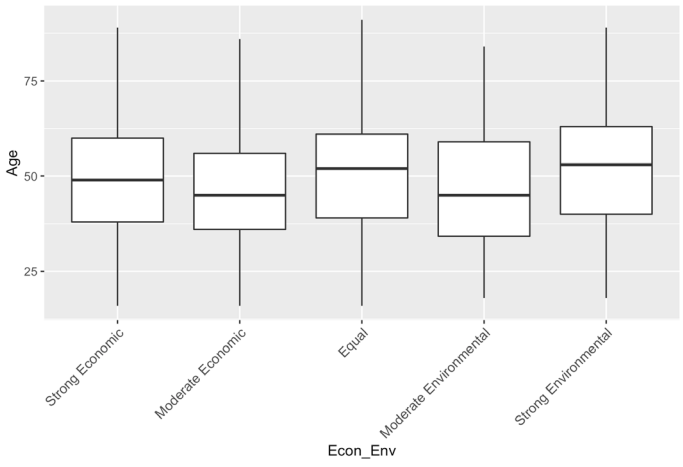

Figure 1c: Distribution of Age across response categories.

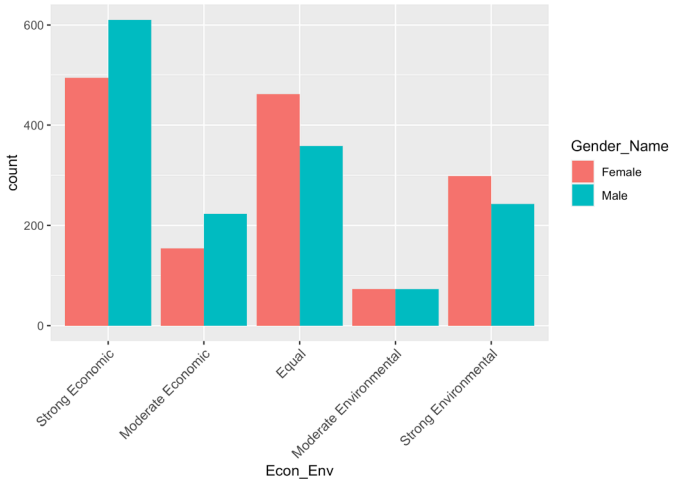

Figure 1d: Distribution of Gender across response categories.

the Strong Environmental model. The area under the ROC is 0.5746. Filtering for respondents over 65, we see a similar pattern to the full model: the lower the education level and being male increase the likelihood of choosing Strong Economic, and the misclassification rate is much lower than the full model at 18.6%.

Equal Environmental-Economic Preference

Individuals who chose Environmental and Economic as Equal can also be strongly predicted by just Gender and Education level, just as well as the full model. Those with a lower education level were 0.89 times more likely ($p < 0.0001$) and women were 1.4 times more likely ($p < 0.001$) to choose Equal. The reduced model misclassifies the response variable on held out data (30%) 26.1% of the time (the same misclassification rate as the full model), and the area under the ROC is 0.5775.

Spatial Autocorrelation

For Strong Environmental, if we hold out GEOID 49005 (Cache County, which is the most recent county in our sample with a comparatively high number of respondents) to train the model, the misclassification rate of predicting on Cache County is 35.5%. This is almost twice as high as the original misclassification rate of 18.6%. If we hold out GEOID 35006 (Cibola County, New Mexico, which is from 2015 as one of the oldest counties with a comparatively high number of respondents in our sample) to train the model and predict on Cibola County, the misclassification rate is only 18.3% with a low ROC of 0.3762.

For Strong Economic, if we hold out Cache County to train the model and predict on Cache County, it performs much better than the original model did predicting on a random 30% of data: the misclassification rate is only 18.7% and a higher ROC than the original model of 0.677. However, the misclassification rate increases to 30% when we hold out Cibola County, New Mexico for the training model and predict on this county.

By including the factor variable of the STATE_FIPS code (or a unique code for each state), with STATE_FIPS 2 (Alaska) as the reference variable, STATE_FIPS 49 (Utah) and 4 (Arizona) are the most significant when predicting Strong Environmental. The misclassification rate is 36.3%, and seemingly none of the STATE_FIPS are significant in predicting Strong Economic. This indicates a spatial structure of survey responses may be influencing who prefers Strong Environmental but not necessarily Strong Economic.

Furthermore, for Strong Environmental, when we hold out STATE_FIPS 49 (Utah) and predict on it, the misclassification rate is only 19.3%. When we hold out STATE_FIPS 4 (Arizona), the misclassification rate is only 8.6%; this means that the model can predict better for Arizona than it can for Utah, meaning that the spatial structure of counties and responses in Utah may play a bigger role in predicting who chooses this response. None of these trends were identified for Strong Economic.

Discussion

In summary, gender and education are the most important predictors of choosing economic or environmental preferences. As educational attainment increases, particularly for women, they are more likely to indicate a strong environmental preference, whereas being a man with lower education leads to a higher likelihood of a strong economic preference. Contrastingly, lower educational attainment for women means they are more likely to indicate equal preference between environmental and economic. The spatial structure of surveyed communities indicates a likelihood of spatial autocorrelation in predicting who chooses Strong Environmental, but not Strong Economic. The differences in how well the three models predict on two counties in separate states shows that where communities are located, particularly if they are within the same state, may play a significant role in understanding who prioritizes environmental community goals over economic ones.

The results of these analysis support the notion that economic growth and environmental sustainability are far from complementary in the U.S. (Cumming & von Cramon-Taubadel, 2018; Figge & Hahn, 2012), often placing marginalized rural communities in a seemingly unfair quandary: reliable income or environmental health. Moreover, rural communities

"This analysis presents findings from years of ASAP survey responses and concludes that the relative importance of economic and environmental goals can be determined by the diversity of residents, which concurrently has the potential to shape the future planning and development of an area."

are often given the least power in policymaking that influences these economic-environmental dynamics (Foster & McBeth, 1996). This study provides evidence that individuals from the rural western U.S. do place a heavy emphasis on environmental quality, particularly higher-educated women. This study also shows that men with less education are more likely to prioritize economic over environmental goals, which is corroborated by prior research showing that men are more sensitive to personal economic outlook when it comes to supporting environmental policies (Arbuckle & Mercer, 2020). Overall, the majority of respondents chose Strong Economic or Equal over any of the "Moderate" choices or Strong Environmental, highlighting the need of economic stability in these rural communities. However, this preference does not necessarily indicate a lack of environmental values (Bonnie et al., 2020). It also highlights the potential importance of higher education in disseminating environmentally-related information, which may be inaccessible to many marginalized populations (Banks & Dohy, 2019; Schuetze & Slowey, 2002; Templeton et al., 2016).

Through ASAP, rural communities explore the goals and objectives of their residents while also receiving current data on regional economic trends and quality of life factors. All of these data are considered in creating targeted implementation and development plans for the city, county, or region. This analysis presents findings from years of ASAP survey responses and concludes that the relative importance of economic and environmental goals can be determined by the diversity of residents, which concurrently has the potential to shape the future planning and development of an area. Thus, demographic characteristics of the populace should be considered and included in the planning and development process, particularly those of education and gender identity and including factors beyond this study, such as race and ethnicity. This is especially important in rural communities because often residents are looking to uphold specific values of the existing community, while ensuring economic and social opportunities for the future. ●

About the Authors

Kaitlyn Spangler
Summer Intern - WRDC
Presidential Doctoral Research Fellow
Environment and Society Department
Utah State University
kspangler@aggiemail.usu.edu

Riana Gayle
Data Analyst
Western Rural Development Center
Utah State University
riana.gayle@usu.edu

Don E. Albrecht
Executive Director
Western Rural Development Center
Utah State University
don.albrecht@usu.edu

References

Arbuckle, M., & Mercer, M. (2020). Economic outlook and the gender gap in attitudes about climate change. Population and Environment, 41(4), 422–451. https://doi.org/10.1007/s11111-020-00343-9.

Banks, T., & Dohy, J. (2019). Mitigating Barriers to Persistence: A Review of Efforts to Improve Retention and Graduation Rates for Students of Color in Higher Education. Higher Education Studies, 9(1), 118. https://doi.org/10.5539/hes.v9n1p118.

Bonnie, R., Diamond, E. P., & Rowe, E. (2020). Understanding Rural Attitudes Toward the Environment and Conservation in America (NI R 20-03; p. 40). Duke University.

Bordigioni, M., Koirala, S., Kobayashi, M., & Jakus, P. M. (2020). Area Sector Analysis Process: Technical Documentation (p. 80). Western Rural Development Center. https://www.usu.edu/wrdc/files/news-publications/ASAP-Technical-Documentation-2.pdf.

Cohen, S. (2020, January 27). Economic Growth and Environmental Sustainability. State of the Planet: Earth Institute, Columbia University. https://blogs.ei.columbia.edu/2020/01/27/economic-growth-environmental-sustainability/.

Cumming, G. S., & von Cramon-Taubadel, S. (2018). Linking economic growth pathways and environmental sustainability by understanding development as alternate social–ecological regimes. Proceedings of the National Academy of Sciences, 115(38), 9533–9538. https://doi.org/10.1073/pnas.1807026115.

Demaria, F. (2018, February 22). Why economic growth is not compatible with environmental sustainability. Ecologist: The Journal for the Post-Industrial Age, 5.

Den Butter, F. A. G., & Verbruggen, H. (1994). Measuring the trade-off between economic growth and a clean environment. Environmental and Resource Economics, 4(2), 187–208. https://doi.org/10.1007/BF00692203.

Ekins, P. (2000). Economic Growth and Environmental Sustainability: The prospects for green growth. Routledge.

Figge, F., & Hahn, T. (2012). Is green and profitable sustainable? Assessing the trade-off between economic and environmental aspects. International Journal of Production Economics, 140(1), 92–102. https://doi.org/10.1016/j.ijpe.2012.02.001.

Foster, R. H., & McBeth, M. K. (1996). Urban-rural influences in U.S. environmental and economic development policy. Journal of Rural Studies, 12(4), 387–397. https://doi.org/10.1016/S0743-0167(96)00051-4.

Mountford, H., & Jaeger, J. (2017). America Doesn't Have to Choose Between the Economy and the Climate. World Resources Institute: The Trump Administration. https://www.wri.org/blog/2017/03/america-doesnt-have-choose-between-economy-and-climate#:~:text=It's%20a%20logical%20connection%3A%20a,other%20technologies%20continue%20to%20drop.

Porter, E. (2018, December 14). The Hard Truths of Trying to 'Save' the Rural Economy. The New York Times. https://www.nytimes.com/interactive/2018/12/14/opinion/rural-america-trump-decline.html.

Schuetze, H. G., & Slowey, M. (2002). Participation and exclusion: A comparative analysis of non-traditional students and lifelong learners in higher education. Higher Education, 44, 309–327.

Templeton, E., Love, B., Davis, B. H., & Davis Jr., M. (2016). Illusion of inclusion: University policies that perpetuate exclusion of students of color. Journal Committed to Social Change on Race and Ethnicity, 2(1), 29.

Wu, B., & Flynn, A. (1995). Sustainable development in China: Seeking a balance between economic growth and environmental protection. Sustainable Development, 3(1), 1–8. https://doi.org/10.1002/sd.3460030102.

ASAP AREA SECTOR ANALYSIS PROCESS

Helping communities identify targeted, sustainable economic development.

The Western Rural Development Center's Area Sector Analysis Process is a tool to help communities achieve targeted, sustainable economic development. ASAP is used in collaboration with rural community leaders to promote economic development. The process is based on the understanding that sustainable community development strategies should reflect the preferences of community residents and also the extent to which community assets can meet the operational needs of businesses that allow them to be successful. To watch a video featuring an ASAP community and for more information, visit **https://www.usu.edu/wrdc/asap**.

WESTERN RURAL DEVELOPMENT CENTER

The Western Rural Development Center collaborates with western land-grant universities and public and private sector partners to promote excellence in research, education, and extension for the prosperity of western rural communities. The ASAP RESEARCH BRIEFS are published by the Western Rural Devleopment Center to deliver timely, research-based information on topics of importance to the western United States. The Western Rural Development Center (WRDC) is one of four regional centers funded by the United States Department of Agriculture (USDA) National Institute of Food and Agriculture (NIFA) to strengthen the capacity of local citizens to guide the future of their rural communities. Each Center links the research and Extension capacity of regional land-grant universities with local decision-makers to address a wide range of rural development issues. The Western Rural Development Center is hosted by Utah State University and receives support from Utah State University Extension and the Utah Agricultural Experiment Station. Any opinions, findings, conclusions or recommendations expressed in this publication are those of the authors and do not necessarily reflect the views of the U.S. Department of Agriculture or other funders. The Western Rural Development Center does not discriminate on the basis of race, color, religion, national origin, sex, age, disability or veteran status. This material is based upon work that is supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under award number 2019-51150-29875. For more resources and infomration, visit the WRDC's website at https://wrdc.usu.edu.