Young Adult Perceptions of Climate Change and Natural Resource Sustainability

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1. Introduction

For many, there is an unspoken assumption that a barrier exists between how rural and urban residents conceptualize and act on important issues (Mittenzwei et al., 2023). As climate change and its effects on natural resources become more prevalent, understanding how different demographics interact with these issues becomes integral to effective communication, extension, and policy development (Jensen, 2022; Masri et al. 2020).

While past research indicates differences in how rural and urban individuals perceive climate change and natural resource sustainability, the perceptions of young adults attaining higher education have largely been overlooked (Aczel & Makuch, 2023; Kulcar & Juen, 2022). As climate change becomes an unavoidable component of our future, it will soon be these young adults who are responsible for enacting change. As a result, it is essential to understand how they conceptualize climate change and natural resource sustainability issues.

This study examines how young, degree-seeking Kansans perceive climate change and natural resource sustainability, as well as the effect of rurality on these perceptions. The study addresses three specific research objectives: 1) Explore the perceptions of climate change issues among college students in Kansas; 2) Explore college students' attitudes and beliefs about the sustainability of local natural resources in the face of climate change; and 3) Examine how place of origin influences these perceptions. The following section explores current literature on climate change perceptions and the sustainability of local natural resources. Subsequent sections include a description of the methodology employed in this study, the findings, and a discussion of these findings in relation to existing research.

2. Literature Review

To understand how young adults perceive issues of climate change and natural resources, and the effect of place of origin on these perceptions, existing research must first be analyzed. An exploration of current research on the rural/urban divide within environmental issues, and the socioeconomic and environmental impacts of climate change on the Midwest, will allow for a better understanding of this study's focus.

2.1. Socioeconomic Considerations

2.1.1. *Agriculture Productivity*

With higher temperatures, weeds are expected to flourish, premature plant development and blooming may occur, resulting in exposure to late-season frosts, increased intensity of precipitation, longer drought periods, and lower dairy cow productivity (Lal et al., 2011). These factors collectively contribute to challenges in herbicide management, increased erosion, and reduced agricultural yield. Lant et al. (2016) explore how climate change alters rural land-use patterns, with significant implications for agricultural livelihoods. Their findings suggest that while certain crops may benefit from shifting climate conditions, many others will face declining viability, creating a need for adaptive agricultural practices and policy interventions.

For young adults, these vulnerabilities translate into concerns about economic stability and career prospects in rural areas. As the viability of traditional livelihoods shifts due to climate change, young people may perceive these changes as threats or opportunities for innovation. The interplay between economic pressures and a growing awareness of sustainable development needs likely shapes their perceptions.

2.1.2. *Vulnerabilities*

Rural communities are uniquely vulnerable to the socio-economic impacts of climate change, as outlined by Lal et al. (2011). Their study identifies key rural sectors—such as agriculture, forestry, and tourism—as particularly susceptible to climate disruptions, emphasizing the need for adaptive strategies that integrate rural perspectives into broader policy decisions.

Urban and rural communities have differing demographics and thus differing vulnerabilities to climate change-related effects. Rural communities tend to differ from their urban counterparts in general demographics, occupations, earnings, literacy, poverty rates, and dependency on government funds (Lal et al., 2011). There has been an increasing urban and rural income gap, making the vulnerability of rural communities to climate change events greater, seeing as impoverished groups feel the impacts of economic swings more severely (Lal et al., 2011).

2.1.3. *Health Impacts and Climate Justice in Rural Areas*

The health impacts of climate change on rural communities are a growing concern. Gutierrez and LePrevost (2016) highlight the disproportionate burden faced by rural, low-income, and minority populations in the southeastern United States. They argue that achieving climate justice requires targeted interventions that address these communities' unique vulnerabilities. These disparities underscore the importance of addressing health and equity concerns in climate adaptation efforts.

Smith et al. (2023) further emphasize the health challenges climate change poses in rural areas, identifying gaps in existing intervention strategies. Their systematic review calls for a one-

health approach that integrates human, animal, and environmental health, focusing on community-based solutions to build resilience.

Young adults in rural areas may perceive these health risks as urgent and personal, particularly if they have witnessed climate-related health challenges within their communities. Their perspectives can inform efforts to promote climate justice by amplifying the voices of those most affected by environmental and socio-economic disparities.

2.1.4. *Mental Heath*

While climate change has clear implications for those impacted and displaced by natural disasters, Cianconi et al. (2020) explore the slow-burn wear of climate change on populations. Mental health effects are divided into three general levels- acute, sub-acute, and long-term (Cianconi et al., 2020). While acute mental health effects are the result of direct experience with significant natural disasters, subacute effects involve the intense emotions of witnessing these natural disasters indirectly, and long-term impacts include an increase in violence, and struggle over limited resources, among other social/community impacts (Cianconi et al., 2020). It was found that "hotter cities were more violent than cooler cities. The increase in heat-related violence is greater in hot summers and showed increased rates in hotter years" (p.5).

In a study covering public health agency awareness of climate change's impact on public health, researchers found that when representatives of these organizations were asked what the health issues are related to climate change that they perceive as increasing in their community and what they are most concerned about, four out of the seven Midwest agencies mentioned depression and suicide, with equal representation from the urban and rural-based agencies (Zust & Jost, 2022). All seven agencies reported concerns with property damage and/or property

damage (Zust & Jost, 2022). Rural and urban agencies also found similarities when asked about the barriers preventing the agencies from addressing their climate change concerns. Five out of seven of these agencies answered with "community opposition," six out of seven replied with "lack of interest," and all agencies responded with "lack of funding" (Zust & Jost, 2022).

2.1.5. *Physical Health*

While both urban and rural communities feel physical health effects from climate change, rural communities are at a higher vulnerability. Lal et al. (2011) write "Many rural communities tend to reflect an increasingly vulnerable demographic of very old and very young people, placing them more at risk for climate change effects than urban communities" (p. 826). In addition to this increased vulnerability from demographics, rural communities' emergency response services are less accessible, and they face higher financial and travel costs to get health care (Lal et al., 2011). Rural communities face greater consequences for the adverse health outcomes of climate change. These negative health impact sources include increased heat temperatures, water quality degradation, and pollution (Lal et al., 2011).

2.2. Rural/Urban Climate Change Perceptions

Climate change perceptions are closely linked to numerous factors, including geographic location. While climate change awareness exists in both rural and urban communities, there often is a divide between how these groups interact with perceptions of climate change risk and concern (Boon, 2016; Le & Kelly, 2024). Factors like place attachment and personal experience are also determinants of these perceptions.

2.2.1. *Risk and Vulnerability Perceptions*

Risk perceptions affect how people understand and respond to the dangers of climate change (Lorenzoni et al., 2005). In rural areas, heavy agricultural reliance creates unique vulnerabilities that uniquely shape climate change risk perceptions. This reliance correlates with a strong understanding of climate change risk associated with agriculture and natural resources (George et al., 2024). In rural Taiwanese communities, for example, residents and their agriculture-based livelihoods are more directly exposed to climate hazards and as a result, are likely to exhibit more comprehensive climate risk assessments (Lai et al., 2021). By comparison, urban residents may have access to infrastructure and resources that reduce urban vulnerability, and as a result, risk perceptions (Zhou et al., 2022).

However, this agriculture and natural resource-oriented perspective can contribute to an uncomprehensive awareness of broad-scale climate risk. Research indicates that rural residents are marginally less likely than urban residents to consider all the risks associated with climate change (Sivonen, 2023). In support of this, a study by Bausch and Kozoil (2020) concluded that limited strategic climate change planning in rural areas may indicate an inadequate understanding of the risks climate change poses (Bausch & Koziol, 2020).

2.2.2. *Climate Change Anxiety*

Climate change concern, sometimes referred to as climate change anxiety, is another key component of climate change perceptions. Youth in urban areas often experience climate change anxiety more frequently than rural youth (Le & Kelly, 2024). Because the urban heat island effect often causes more heat stress in urban areas, mental health issues, including elevated anxiety, are exacerbated in urban residents (Fischer et al., 2012). That being said, the immediate

proximity of rural youth to climate-related natural disasters can be a serious stressor that is sometimes overlooked (Boyd et al., n.d.).

2.2.3. *Place Attachment*

Place attachment is the complex and unique connection one feels to a certain geographic location based on personal characteristics, psychological components of attachment, and the characteristics of the place (Scannell & Gifford, 2010). Past research suggests those living in rural areas exhibit stronger place attachment to their residential areas, possibly because they rely more heavily on the surrounding ecosystems (Tenbrink & Willcock, 2023). This strong attachment can influence perceptions of climate change, with rural areas tending to view climate change as less of a threat (Tenbrink & Willcock, 2023). Tenbrink and Willcock (2023) hypothesize that this limited climate change concern could be due to a stronger understanding of ecosystem services and greater resilience (Tenbrink & Willcock, 2023).

2.2.4. *Traditional Knowledge and Experience*

While difficult to quantify, unique personal experiences and generational knowledge also influence how rural residents interact with climate change issues. Because they interact more closely with the environment, rural residents often rely heavily on natural cues to inform their decision-making (Moghariya & Smardon, 2014). This individual connection to the natural environment is passed down to younger generations as traditional knowledge that then shapes perceptions of the natural world and by extension, climate change (Moghariya & Smardon, 2014).

White (n.d.) explores perceptions among Kansas farmers, revealing a tension between concern for community vitality and uncertainty about addressing climate change. Young adults,

particularly those connected to farming communities, may share similar concerns or adopt distinct viewpoints influenced by their aspirations for sustainable agricultural practices. Investigating these generational differences could offer valuable insights into how rural youth perceive climate change's impact on their futures.

2.2.5. *Rural Influence*

Researchers found that rural residents understand climate change effects, but do not discuss the topic with their neighbors because of the perceived partisan divide (Zust & Jost, 2022). Rural people generally are more likely to doubt climate change's existence, significance, and their role in climate change-related effects because they assume urban areas are much more responsible for causing pollution that contributes to climate change. They also do not identify with the pressing climate change events (i.e. rising sea levels, melting ice caps, and increased tropical storms) (Zust & Jost, 2022).

Research highlights significant variation in how rural communities perceive and respond to climate change. For example, Harrington (2001) examines attitudes of decision-makers in southwestern Kansas, finding widespread skepticism about human-induced climate change. This skepticism underscores the challenges young adults might face when advocating for proactive climate action within communities shaped by entrenched doubts about climate science.

2.3. Rural/Urban Natural Resource Perceptions

One's connection to, and understanding of, natural resources is inherently personal and unique. Past research indicates that there are key differences between how rural and urban residents perceive natural resources and their sustainability (Le & Kelly, 2024; Sivonen, 2023).

2.3.1. *Ecosystem Goods and Services*

Urban and rural residents are equally likely to understand the value of natural resources in the context of ecosystem goods and services (Sousa et al., 2024). However, rural areas tend to be more dependent on the material outputs and regulating services ecosystems provide. As a result, these ecosystem benefits are more valued by those living in rural areas (Racevskis & Lupi, 2006). By comparison, those living in urban areas highly value the recreational benefits of natural areas (Racevskis & Lupi, 2006). Economically speaking, urban residents also exhibit a higher willingness to pay (WTP) for ecosystem services (Baykalı & Şen, 2024). Amongst other things, this may indicate that urban residents highly value improving urban quality of life.

2.3.2. *Proximity*

Proximity to areas rich in natural resources also influences perceptions. In one study, Barrutia et al. (2022) found that youth living in rural areas of Spain and France were able to recall a greater number of wild flora and fauna species native to their area than their urban counterparts. These results indicate that the proximity of rural youth to natural areas influences their connections with nature and natural resources (Barrutia et al., 2022). Similarly, adults who directly interact with nature regularly are more likely to perceive the natural resources a given ecosystem provides (Sousa et al., 2024).

2.3.3. *Personal Experience*

One's personal experiences with the natural world shape how one perceives and interacts with their surrounding environment. When these experiences are not uniform across a population, perceptual gaps arise between those with varying levels of experience. Kato et al. (2019) found that urban dwellers often perceive natural resources in an abstract manner, with

little personal connection or in-depth understanding. By comparison, rural individuals typically have direct experience with natural resources, which creates stronger positive or negative perceptions (Kato et al., 2019).

2.3.4. *Adaptation Through Local Knowledge and Resilience*

Rural communities often approach climate change adaptation through frameworks that prioritize local knowledge and resilience. Brugger and Crimmins (2013) critique the IPCC's definition of adaptation, arguing that it overly emphasizes economic and technical solutions, which often neglect rural communities' cultural and social dimensions. Their study in the American Southwest highlights how rural residents adapt by integrating a deep understanding of their local environment with strategies that align with their place-based values. Similarly, Ristino (n.d.) advocates for a rural resilience framework that integrates social and environmental sustainability into national policy efforts. This framework underscores the need for policies like the Farm Bill to acknowledge rural interdependence with natural systems, reflecting the values and priorities of these communities. Both studies suggest that rural perspectives must be central to designing effective climate change policies.

This emphasis on localized, socially grounded approaches to adaptation has parallels in how young adults in rural areas perceive and engage with climate change. Research suggests that younger generations are increasingly aware of the need for sustainable practices, often advocating for solutions that combine technical innovation with community-oriented strategies. Understanding how young adults navigate the tension between traditional rural values and modern sustainability efforts can reveal insights into their climate change perceptions.

2.4. Barriers to Implementing Social Change

Identification of the issues is the easier half of the climate change and sustainability issues. Social change is at the heart of fixing these problems. O'Brien and Sygna (2013) developed three spheres of transformation (Figure 1) that are needed to address social problems, writing, "a regime shift cannot occur without changing worldviews, institutions, and technologies together, as an integrated system" (p.4). Within this model, change within one sphere leads to change in the remaining spheres. Each sphere is affecting and being affected by the others. To adapt the sustainable and regenerative agriculture practices needed, an approach from the political sphere, under policymaking, or approaching the personal sphere, can be effective tools.

Figure 1. *Three Spheres of Transformation (O'Brien and Sygna, 2013)*

Day and Cramer (2020) expand upon O'Brien and Sygna's model. Within the consideration of each sphere are "traction" events, which inspire movement towards change, or "friction" events, which are a pullback towards more traditional practices and paradigms. These friction and traction events occur within all spheres. Day and Cramer (2020) discuss policy, stating, "Policies that value multifunctionality, including ecological services, social benefits, and economic resilience, are needed to increase the traction for regenerative methods" (p.595). Researchers also suggest making sustainable changes in collaboration with agriculture producers to minimize friction with the target population.

2.5. Considerations for the Future

As we move into the future, careful consideration needs to be given to the approach to sustainable agriculture practices. Lal et al. (2011) recommend using ecosystem services for regional planning to create better avenues for fostering understanding across disciplines and addressing policy needs. Additionally, increasing stakeholder involvement would increase community confidence in newer, sustainable agriculture practices (Lal et al., 2011).

Adaptation of modern practices can be stimulated through policy in multiple ways; financial incentives such as subsidizing practices and providing low-cost financing and grants, setting standards and regulations, and providing accessible educational materials and planning and technical assistance, among other methods of identifying and removing obstacles to adaptation (Arunanondchai et al., 2018). Adaptation is often constrained by available funds, with an extensive gap between current and needed funding to make adaptation a reality. Arunanondchai et al. (2018) predict "about 28–67 billion USD funding is needed per year to adapt CC for all sectors. More specifically, by year 2030, an annual estimate of global public funding needs for agriculture adaptation is about 2.3 billion U.S dollars per year" (p.10).

While funding needs are evident, they are not the only barrier to modern practice adaptation. Other constraints include knowledge and awareness, technology availability, human capabilities, physical and biological limits, social and cultural opposition, and governance (Arunanondchai et al., 2018).

2.5.1. *Co-Production of Knowledge and the Importance of Multilevel Governance*

Homsy and Warner (2013) propose a co-production model of climate change knowledge, emphasizing the integration of scientific expertise with local input. This model addresses the limitations of purely top-down or bottom-up approaches, instead calling for multilevel governance frameworks that balance local autonomy with coordinated action. Their research provides a blueprint for how rural communities can effectively participate in climate adaptation planning while benefiting from broader institutional support.

In the context of young adults, this approach highlights the importance of participatory climate education and governance models that empower them to contribute to local adaptation efforts. The co-production of knowledge can facilitate the integration of young adults' perspectives into broader community strategies, fostering intergenerational collaboration on climate issues.

3. Methods

3.1. Survey Design and Platform

This study utilized an online survey to investigate young adults' perceptions of climate change in Kansas counties. The survey was administered through the Qualtrics platform, chosen for its accessibility and user-friendly interface. Questions were primarily structured using a

Likert scale to gauge the strength of respondents' views on climate change and its impacts on natural resources and communities. Preliminary screening questions were included to confirm demographic eligibility, ensuring the survey targeted the intended population.

3.2. Participants and Demographic Criteria

Participants were limited to individuals aged 18 to 25 who would describe themselves as being from Kansas. Additional screening questions were implemented to gather information on educational affiliation, specifically whether participants were students at Kansas State University (KSU), and, if applicable, their college within the university. These filters allowed for a focused analysis of young adults in the region, including urban and rural demographic variables. Out of the 311 total respondents who accessed the survey, 158 met participation criteria and were included in data analysis.

Urban and rural counties were determined based on population thresholds as specified by Rural Definition #3, as specified by the U.S. Census Bureau. According to this definition, urban counties are those that contain census places with populations of 50,000 or more, while rural counties include all areas outside these census places (U.S. Census Bureau, 2020). Based on this criterion, six counties were identified in Kansas as urban- Douglas, Johnson, Riley, Sedgwick, Shawnee, and Wyandotte. This classification allowed us to categorize counties based on significant population concentrations *(see Appendix C, map 3.1)*, facilitating a clear comparison of survey data between urban and rural areas.

3.3. Data Collection

The survey was live from September 17, 2024, to October 24, 2024. The survey was available to access through a QR code and a URL. Recruitment strategies included a mixed-method approach to maximize reach and engagement across Kansas. Initial outreach targeted academic networks, including peers and mentors at Kansas State University (KSU), ensuring that the survey reached individuals closely connected to educational communities. Social media channels, including platforms like Instagram, and Snapchat, were utilized to tap into a broader audience, particularly young adults aged 18-25, who are more likely to engage with digital content (Mude & Undale, 2023).

Additionally, informational posters with a QR code for participants to scan were strategically placed in high-traffic locations on the KSU campus and in various community spaces, aiming to attract participants who might not have encountered the survey online. The survey was also distributed in K-State Today online newspaper. These distribution methods provided a balanced approach, integrating both digital and in-person recruitment to capture diverse responses. The use of multiple outreach channels aimed to generate widespread participation from students and young adults in different regions of Kansas, fostering a representative sample of urban and rural respondents for robust analysis.

3.3.1. *Ethical Considerations*

The study obtained Institutional Review Board (IRB) approval under a "non-research" designation, indicating that the data collected was for classroom purposes only and would not be used for publication. The survey adhered to ethical guidelines prohibiting the collection of

responses from individuals under 18 years of age. Participants were informed of their anonymity and confidentiality in a statement at the beginning of the survey and their consent was implied upon voluntary survey completion. All responses were anonymized to protect privacy.

3.3.2. *Questionnaire*

The survey was designed to evaluate participant's perceptions and perspectives of climate change and natural resource sustainability through a quantitative approach. Special attention was paid to how these issues affect their communities. However, open response on the topic was encouraged at the end of the survey. Through this research, the following objectives were addressed:

- Explore the perceptions of climate change issues among college students in Kansas.
- Explore college students' attitudes and beliefs about the sustainability of local natural resources in the face of climate change.
- Examine how place of origin influences these perceptions.

To address these objectives, the survey prompted participants with statements to rate on a five-point Likert scale, from "Strongly Agree" to "Strongly Disagree."

3.4. Data Analysis

After the survey collection period ended, responses were downloaded, cleaned, and organized in Microsoft Excel. Values were assigned to each of the Likert scale values for quantitative data analysis, where (1) "Strongly disagree", (2) "Disagree", (3) "Neither agree nor disagree", (4) "Agree", and (5) "Strongly agree". Mapping techniques and descriptive statistics

were employed to analyze the data. In addition, indexes were developed to simplify responses and better examine the data through specific themes. The analysis emphasizes the participants' county of residence to facilitate the identification of possible correlations between climate change and natural resource perceptions and the participants' rural or urban residency.

3.4.1. *Excel Workbook Organization*

Data preparation and categorization were conducted in an Excel workbook. The workbook included separate sheets for urban and rural county responses, with Likert scale data averaged for each county. This approach allowed for a clear comparison of climate change perceptions between urban and rural groups.

3.4.2. *Mapping and County Categorization*

To analyze regional trends, survey responses were mapped using ArcGIS Pro. Participants indicated their county of residence, and responses were averaged at the county level using Likert scale scores to represent overall attitudes within each location *(see Appendix B, Maps 1.1-1.8 and 2.1-2.5)*.

3.4.3. *Index Categorization*

To gain a nuanced understanding of participants' responses, the survey's Likert statements were sorted into four thematic indices. These indices were determined using principal component analysis (loading >0.80) and validated using Cronbach's alpha ($\alpha > 0.70$) to ensure internal consistency and reliability. Evaluation of the potential improvements in Cronbach's alpha, under the conditions of a statement being dropped, was conducted to further refine the indices. For example, the findings suggested that if the statements "*I feel that there is enough*

information available about climate change and its effects on local communities" and "*I believe that my actions can make a difference in addressing climate change*" were removed from their respective groups, the index has improved reliability (higher Cronbach's alpha). After the set of statements in each index was finalized, statement response values were combined into a single "score" for each participant. This score was derived by averaging response values and categorizing them into three categories using cutoff points set at one standard deviation above and below the mean. This process was followed for all four indices. The process resulted in the following index categories:

- Index 1: High Belief, Moderate Belief, Skeptical

- Index 2: Well-Prepared, Somewhat Prepared, Unprepared

- Index 3: Highly Concerned, Somewhat Concerned, Unconcerned

- Index 4: High Priority, Moderate Priority, Low Priority

After all four indexes were scored, the responses were compared. At this point, all index scores are combined into one dataset, from which significance between rural and urban participants can be compared using the Kruskal-Wallis Test, where a p-value less than 0.05 is significant. By assigning each participant to one of these categories per index, the analysis draws meaningful comparisons across participants' beliefs, preparedness levels, concerns, and sustainability priorities. These classifications facilitated a nuanced understanding of young adults' attitudes toward climate change across urban and rural contexts in Kansas. Table 1 provides details on each index's composition.

Table 1. *An outline of each of the four indexes with descriptions and the survey statements that align with each index.*

Index	Description	Corresponding Survey Statements
Index 1: Climate Change Perceptions and Beliefs	Assessing general attitudes toward and perceptions of climate change.	**(Q14_1)** I believe that climate change is occurring. **(Q14_2)** I believe that human activities are a major contributor to climate change. **(Q14_3)** I believe that climate change is a significant issue for my community. **(Q14_4)** My community is affected by climate change related events (e.g., extreme weather, droughts, etc.).
Index 2: Community Preparedness	Measuring perceptions of community preparedness to address climate change impacts.	**(Q14_5)** I feel that my community is adequately prepared to address the impacts of climate change. **(Q15_4)** My community is well-prepared to deal with the challenges posed by climate change.
Index 3: Natural Resource and Community Concerns	Gauging concerns about local resources and community vulnerability.	**(Q15_1)** The sustainability of natural resources (water, soil, plants, fossil fuels, etc.) in my community is threatened by climate change. **(Q15_3)** I am concerned about the long-term availability of natural resources in my community due to climate change. **(Q14_6)** I am concerned about the future impact of climate change on my community.
Index 4: Sustainability Priorities	Evaluating priorities around sustainability initiatives.	**(Q15_2)** Protecting local natural resources should be a priority in addressing climate change. **(Q15_5)** Sustaining natural resources is essential for the long-term well-being of my community.

3.4.4. *Visualization and Objective-Specific Graphing*

Data was visualized in Excel to illustrate findings for the study's three main objectives. These included graphs for:

1. Climate Change Perceptions: Visualized perceptions and beliefs among college students in Kansas, identifying prevailing attitudes and areas of consensus or concern.

2. Sustainability of Local Natural Resources: Examined students' beliefs about the sustainability of resources in the context of climate change, highlighting varying levels of concern.

3. Place of Origin Influence: Compared rural and urban participants to assess how place of origin shaped climate change and sustainability perceptions.

Each visualization provided insights into response trends, helping clarify the impact of demographic and geographic factors on young adults' views on climate change.

4. Results

4.1. Participant Demographics

The survey had 158 participants that met the filter criteria. All respondents were enrolled at KSU and between 18-25 years of age. Roughly 57% of students come from urban areas in Kansas and 43% come from rural areas. Of these participants, 44% were from the College of Business Administration, 28% from the College of Agriculture, 15% from the College of Arts and Sciences, and the remaining 13% came from other colleges across campus. Table 2 outlines the demographics of all survey participants that were included in the study.

Table 2. Participant Demographics (n=158)

| Characteristic	Number
Rural/Urban County Designation	
Rural	68
Urban	90
KSU College Enrollment	
Architecture, Planning and Design	7
Agriculture	44
Arts and Sciences	24
Business Administration	70
Education	1
Engineering	6
Graduate School	1
Health and Human Sciences	5
Veterinary Medicine	0
Age	
18-25	158

4.2. Climate Change Perceptions

Degree-seeking young adults in Kansas were found to strongly agree (average Likert score greater than 4) with many realities of climate change. Responses indicate that most degree-seeking young adults in Kansas believe climate change is occurring and that human activities are a major contributor to climate change. Many respondents also possessed concerns about the danger climate change may pose to their communities, indicated by an average Likert score of 3.6.

Survey responses also indicate that this demographic feels unsure or concerned about community preparedness and information availability. Many respondents said there isn't enough information available about how climate change will impact local communities. Another trend based on survey responses showed many respondents don't believe their local community is adequately prepared to address the effects of climate change.

Figure 2 shows the average Likert response scores for each question from the survey regarding climate change perceptions. A score of greater than three indicates agreement with the statement, with five being the highest possible score and greatest degree of agreement. A score of less than three indicates disagreement with the statement, with one being the lowest possible score and lowest degree of agreement. *(Refer to Appendix A for the survey statements and corresponding codes, e.g. (Q14_1) corresponds with the statement "I believe that climate change is occurring.")*

Figure 2. *Averaged Likert scores of survey questions referring to climate change perceptions.*
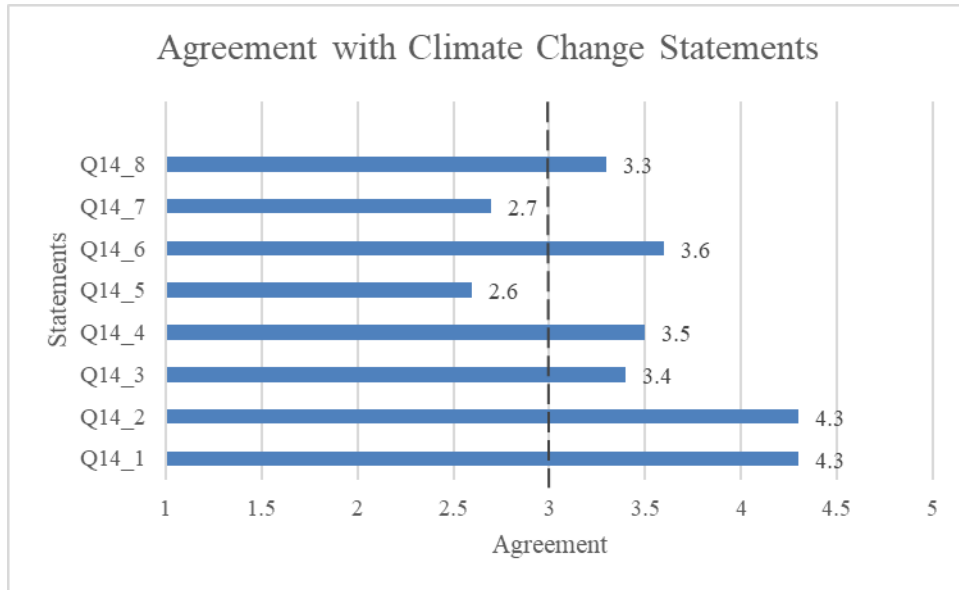

4.3. Natural Resource Sustainability Perceptions

College-aged students in Kansas were found to have strong beliefs about protecting and sustaining natural resources. Most respondents indicated that protecting local natural resources should be prioritized when addressing climate change, represented with a Likert average score of 4.1. Respondents also indicated that sustaining natural resources into the future is important for the overall wellbeing of their communities. When asked about community preparedness, respondents tended to believe their communities are not prepared to deal with the impacts climate change has on natural resource sustainability.

Figure 3 shows the average Likert response scores for each question from the survey regarding natural resource sustainability perceptions. A score of greater than three indicates agreement with the statement, with five being the highest possible score and greatest degree of agreement. A score of less than three indicates disagreement with the statement, with one being the lowest possible score and lowest degree of agreement.

Figure 3. *Averaged Likert scores of survey questions referring to natural resource sustainability perceptions.*
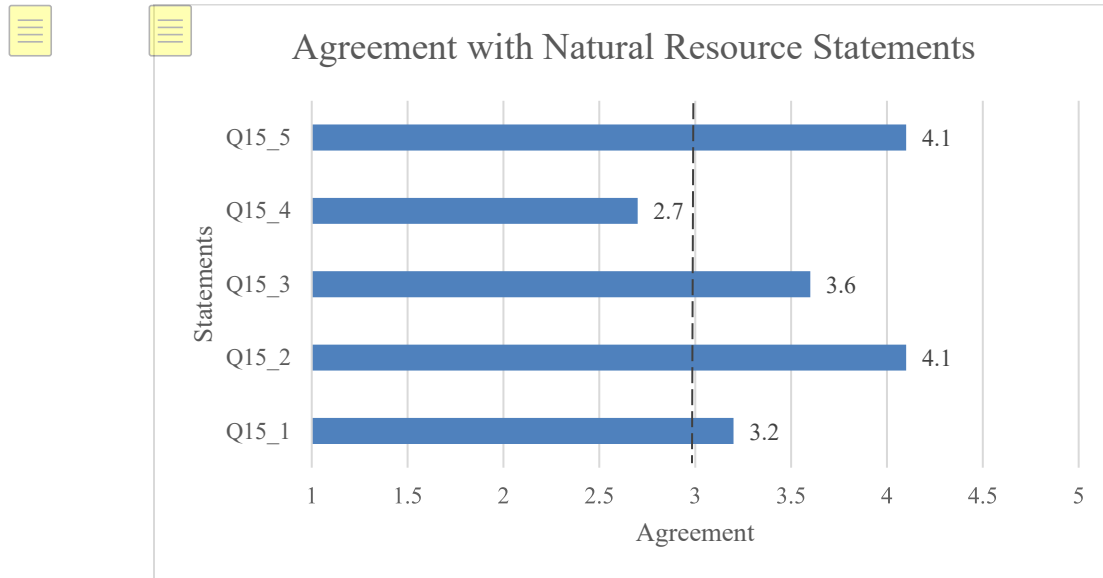
4.4. Influence of Place of Origin

Using the Kruskal-Wallis, chi-square, and p-value tests, it was revealed that differences in perception between rural and urban students were not significantly different. As displayed in Figure 4, rural and urban participants responded similarly, with the greatest discrepancies in the statements "I believe climate change is a significant issue for my community" and "My community is well-prepared to deal with the challenges posed by climate change." However, these differences in response were not significant enough to draw a conclusion.

Figure 4. *A comparison of average Likert response scores between rural and urban residents to statements of climate change and natural resource sustainability.*
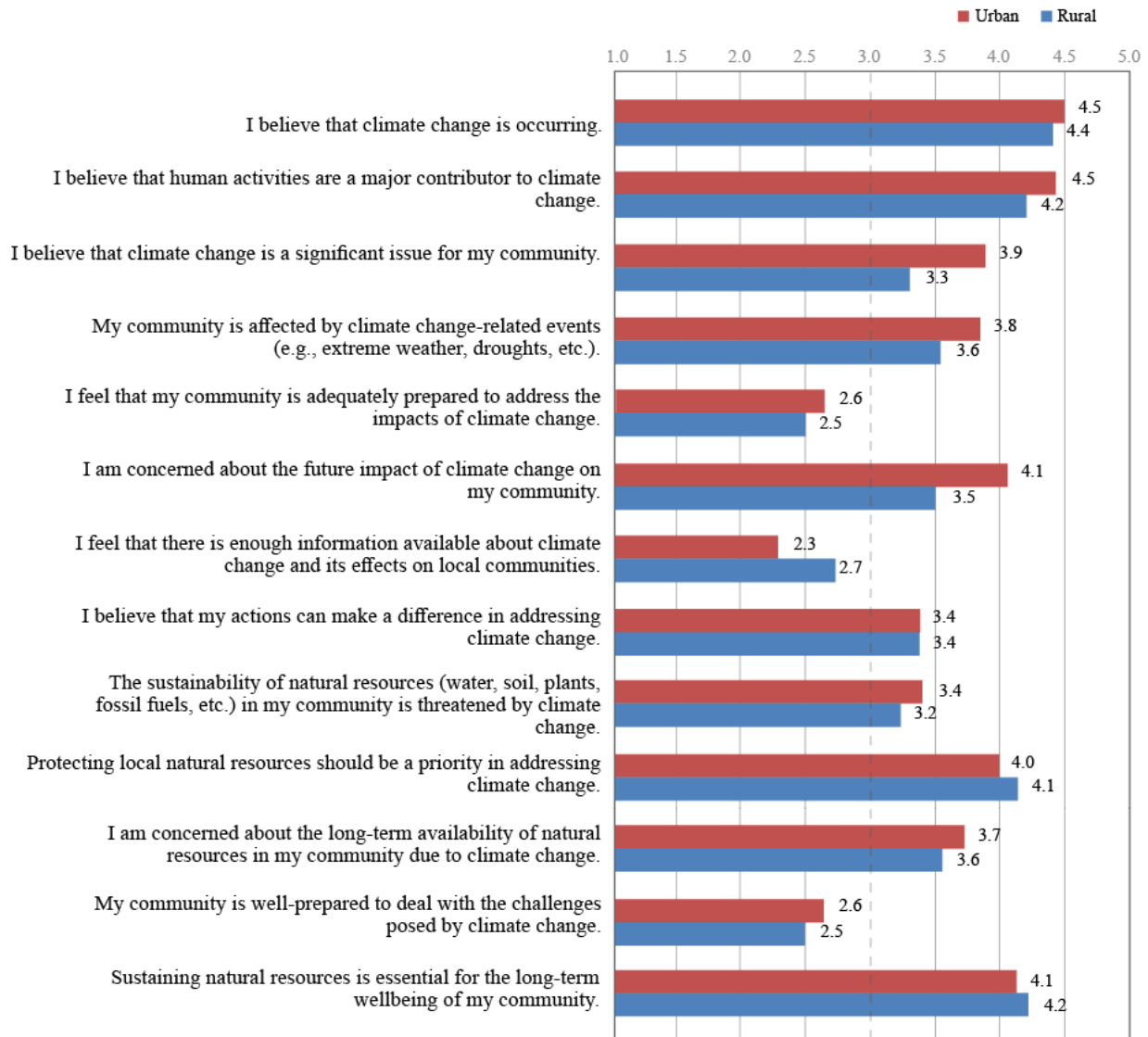

Under further investigation using the indexes outlined in the Methods section, the Climate Change Perceptions and Beliefs index revealed a moderate difference in strength of belief between rural and urban students. The index results indicate that rural students tend to hold more moderate beliefs about climate change, while urban students are more likely to have strong

beliefs about the same climate change issues. Figure 5 illustrates how strength of belief varies between rural and urban participants.

An examination of the other three indexes- Community Preparedness, Natural Resource and Community Concerns, and Sustainability Priorities- showed no significant differences between rural and urban students *(refer to Appendix B).*

Figure 5. *Differences in strength of belief about climate change statements between rural and urban students.*
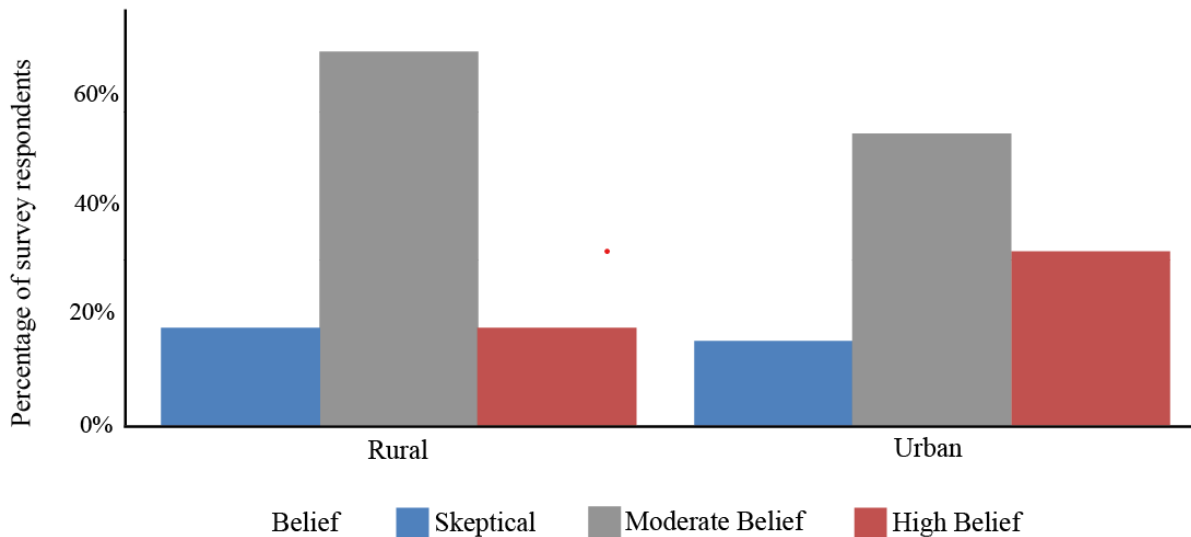
5. Discussion

Young adults in Kansas perceive climate change as a threat to the well-being of their communities and local natural resources. Many feel that their communities aren't well-prepared to address localized climate change impacts. While no significant difference between the perceptions of rural and urban residents was found, place of origin may play a role in how strongly individuals feel about these issues.

This study's results indicate that young, degree-seeking adults in Kansas are concerned about climate change and its current and projected impacts on their communities and natural resources. They also believe humans are a major contributor to climate change. These findings align with past research on young adult perceptions of climate change and natural resource sustainability (Erhabor & Femi, 2020). This consensus of concern among young adults provides opportunities for them to become stewards of natural resources and proponents of change. As the future generation of change-makers, these young adults have the potential to manage the natural world better if this concern for it can be understood and targeted.

These young adults do not believe their local communities are adequately prepared to address the impacts of climate change. They also do not feel there is enough information available about these impacts. This may indicate a gap between current methods of science communication about climate change and methods that would be most effective in reaching this demographic. This perceived lack of information about climate change may also deter adoption of climate mitigation and adaptation strategies (Freeburg, 2022). Comprehensive climate solutions require adoption from everyone and without the involvement of young adults, the effectiveness of these solutions will suffer.

This study found that there are no significant differences between how rural and urban students perceive issues of climate change and natural resource sustainability. This aligns with past research that finds both rural and urban young adults are aware of and concerned about these issues (Zust & Jost, 2022).

While there are no statistical differences in perception, results indicate that urban residents may be more likely to hold strong beliefs about climate change, while rural residents lean toward more moderate beliefs. There are many potential causes for this difference in

strength of beliefs. Because most rural residents do not deal directly with many climate change impacts (sea level rise, extreme tropical storms, glacial melting, etc.), it's possible they don't view climate change as an immediate threat (Zust & Jost, 2022). Stronger place attachment in rural areas may also play a role, where rural residents are less threatened by climate change because of greater perceived resilience (Tenbrink & Willcock, 2023).

Science communicators may be able to capitalize on the stronger beliefs of urban residents to encourage behavior change. For rural residents, their predisposition toward moderate or neutral beliefs should be accounted for in extension and outreach.

5.1. Looking to the Future

5.1.1. *Actionable Steps*

The results of this study illustrate the perceived gap young adults have between many current components of environmental management and ideal levels. Addressing these perceived deficits will become integral for efforts to mitigate climate change and steward natural resources. Without these additional measures to bring young adults on board, they are less likely to adopt sustainable practices. As a result, increased funding and policy change may be necessary to address these gaps (Arunanondchai et al., 2018).

Because the need for regional solutions to climate change is essential in rural areas, many young adults in Kansas are key stakeholders in these solutions. Understanding the beliefs and perceptions these young adults have about climate change and natural resource sustainability is essential to developing well-tailored, localized solutions for these issues. Eventually, the accountancy of young adult perceptions may even lead to enhanced capacity for rural communities to cope with future climate issues (Lal, Alavalapati & Mercer, 2011).

5.1.2. *Future Research Opportunities*

This study established that young adults in Kansas perceive an information deficit concerning localized climate change impacts. Future research could analyze the impact of information distribution, social media, and social and political influencers on these perceptions. This would allow an in-depth examination of best practices for sharing information about climate change and natural resources through digital media and influencers.

While this study explored the impact of place of origin on perceptions of climate change and natural resource sustainability in young adults, other factors may also play a role in these perceptions. Future research could explore how economic, cultural, and social factors influence these perceptions. Considerations for historical minority perspectives could also be taken into account.

5.2. Limitations

The demographics of the KSU student population are not directly proportional with the demographic breakdown of this study's participants. The majority of study participants were enrolled in the College of Business Administration (70/158 participants), the College of Agriculture (44/158 participants), or the College of Arts and Sciences (24/158 participants). Participants studying education, engineering, health and human sciences, or veterinary medicine were under-represented in this study, even though these majors make up a large portion of the overall campus population. To attain as diverse a participant pool as possible, survey materials were distributed across campus and shared on platforms all KSU students have access to.

Additionally, the number of participants within each county was inconsistent. As a result, responses from rural counties with fewer participants had a larger impact on the county's overall

average score than in urban counties. For example, participants from rural counties with only two or three other participants could hold a 30-50% weight on the county's overall score, but a single response out of many from an urban county would have significantly less weight on the county's average response scores. However, this difference in response weight is representative of the county-by-county population variation in Kansas where a few voices in a rural county could represent county-wide sentiment.

6. Conclusions

Most degree-seeking young adults are concerned about climate change and understand the role humans play in causing it. They view climate change as a threat to natural resource sustainability and the viability of their communities but do not believe their communities are adequately prepared to address this threat. These young adults find the amount of current information available about climate change's localized impacts inadequate. Urban residents are also more likely to hold strong beliefs about climate change than their rural counterparts.

The results of this study highlight the need for strategic science communication and outreach for young adults. While young adults are concerned about natural resource and climate change issues, disregarding their perceptions of community preparedness and information availability may detract from climate change mitigation efforts. If policymakers, scientists, and other relevant stakeholders account for these perceptions in decision-making, comprehensive solutions to environmental issues can be developed.

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8. Appendix A: Survey Questions

Demographic Information:

- Are you between the ages of 18-25?

- Are you a Kansas State University student?

- Are you from Kansas?

- What college are you in in? Select all that apply.

  o Agriculture

  o Architecture, Planning and Design

  o Arts and Sciences

  o Business Administration

  o Education

  o Engineering

  o Graduate School

  o Health and Human Sciences

  o Veterinary Medicine

- What county are you from?

Likert Scale Statements:

- Rate these statements on how much you agree or disagree with each.

  o **(Q14_1)** I believe climate change is occurring.

  o **(Q14_2)** I believe that human activities are a major contributor to climate change.

  o **(Q14_3)** I believe that climate change is a significant issue for my community.

  o **(Q14_4)** My community is affected by climate change related events.

- o **(Q14_5)** I feel that my community is adequately prepared to address the impacts of climate change.

- o **(Q14_6)** I am concerned about the future impact of climate change on my community.

- o **(Q14_7)** I feel that there is enough information available about climate change and its effects on local communities.

- o **(Q14_8)** I believe that my actions can make a difference in addressing climate change.

- Rate these statements on how much you agree or disagree with each.

  - o **(Q15_1)** The sustainability of natural resources in my community is threatened by climate change.

  - o **(Q15_2)** Protecting local natural resources should be a priority in addressing climate change.

  - o **(Q15_3)** I am concerned about the long-term availability of natural resources in my community due to climate change.

  - o **(Q15_4)** My community is well-prepared to deal with the challenges posed by climate change.

  - o **(Q15_5)** Sustaining natural resources is essential for the long-term wellbeing of my community.

Free Response:

- Where have you gotten your information about climate change and natural resource sustainability?

- Do you have any more thoughts to share on how climate change and natural resource issues impact you and your community?

9. Appendix B: Tables and Figures

Figure 6. *Differences in perceptions of community preparedness statements between rural and urban students.*
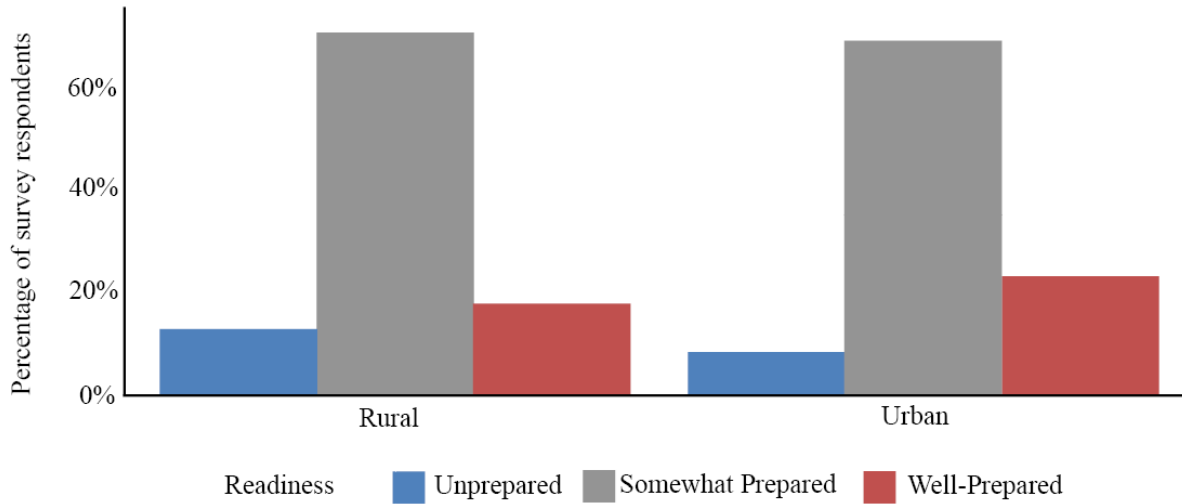

Figure 7. *Differences in levels of concern about community well-being and natural resource sustainability in the face of climate change between rural and urban students.*

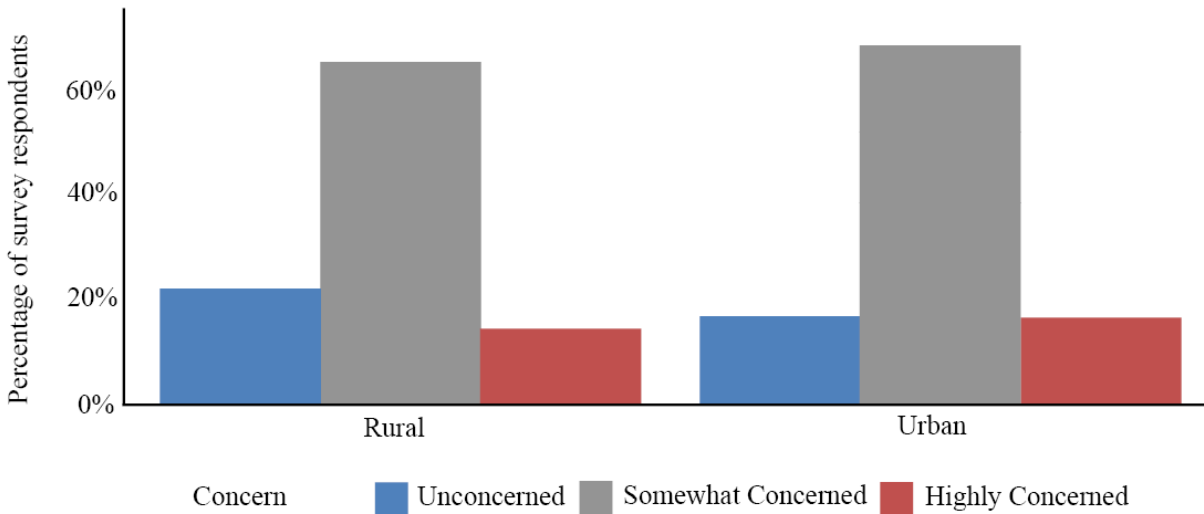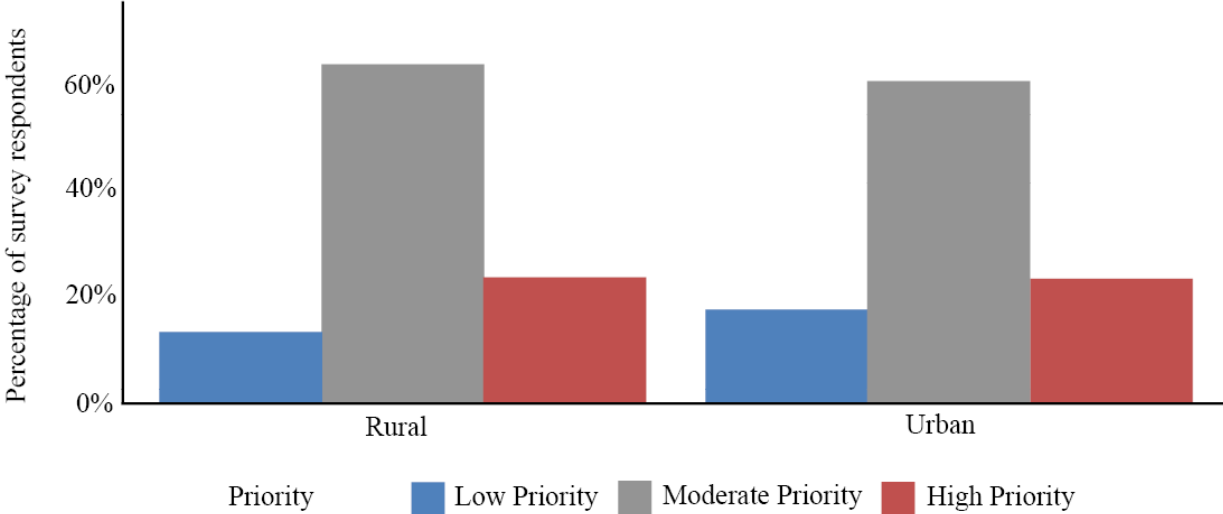**Figure 8.** *Differences in prioritization of sustainability efforts between rural and urban students.*

Map 1.1

Question 14_1

I believe that climate change is occurring.

Urban Counties
- Strongly Disagree
- Somewhat Disagree
- Neither
- Somewhat Agree
- Strongly Agree

Rural Counties
- Strongly Disagree
- Somewhat Disagree
- Neither
- Somewhat Agree
- Strongly Agree

0   25   50   100 Miles
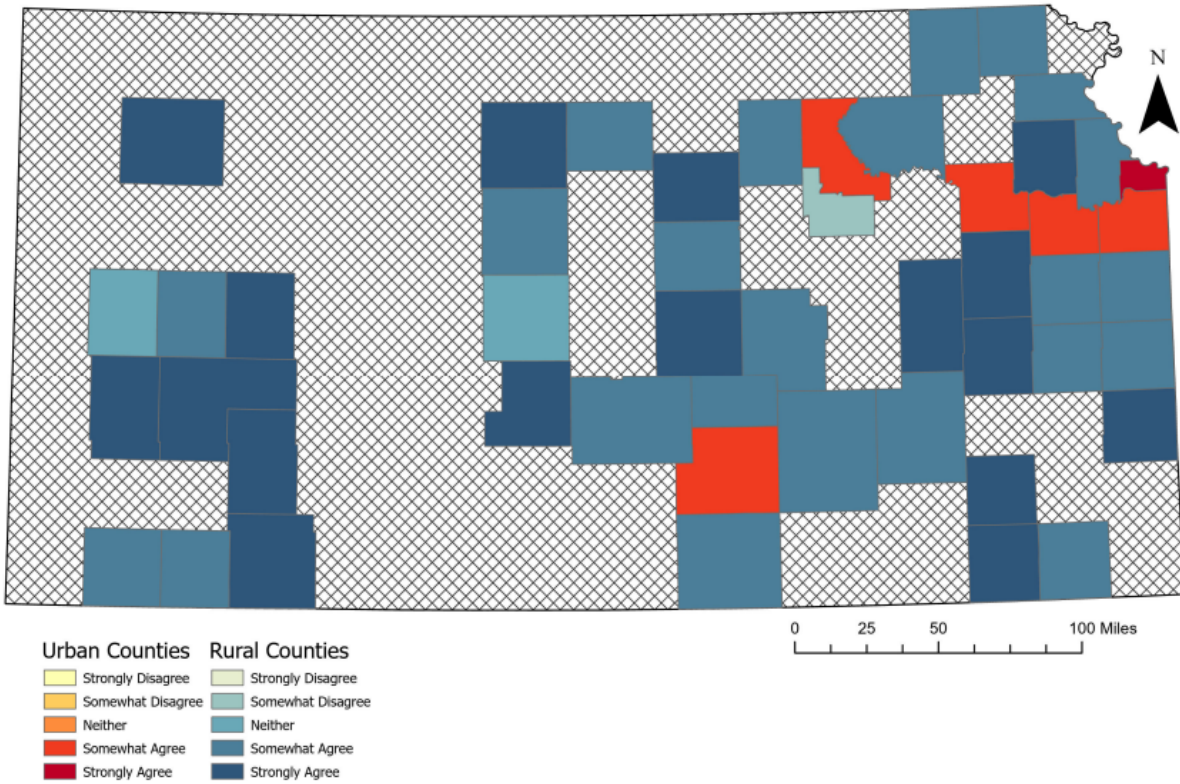
Map 1.2

Question 14_2

I believe that human activities are a major contributor to climate change.

Urban Counties   Rural Counties

	Strongly Disagree		Strongly Disagree
	Somewhat Disagree		Somewhat Disagree
	Neither		Neither
	Somewhat Agree		Somewhat Agree
	Strongly Agree		Strongly Agree

0   25   50   100 Miles
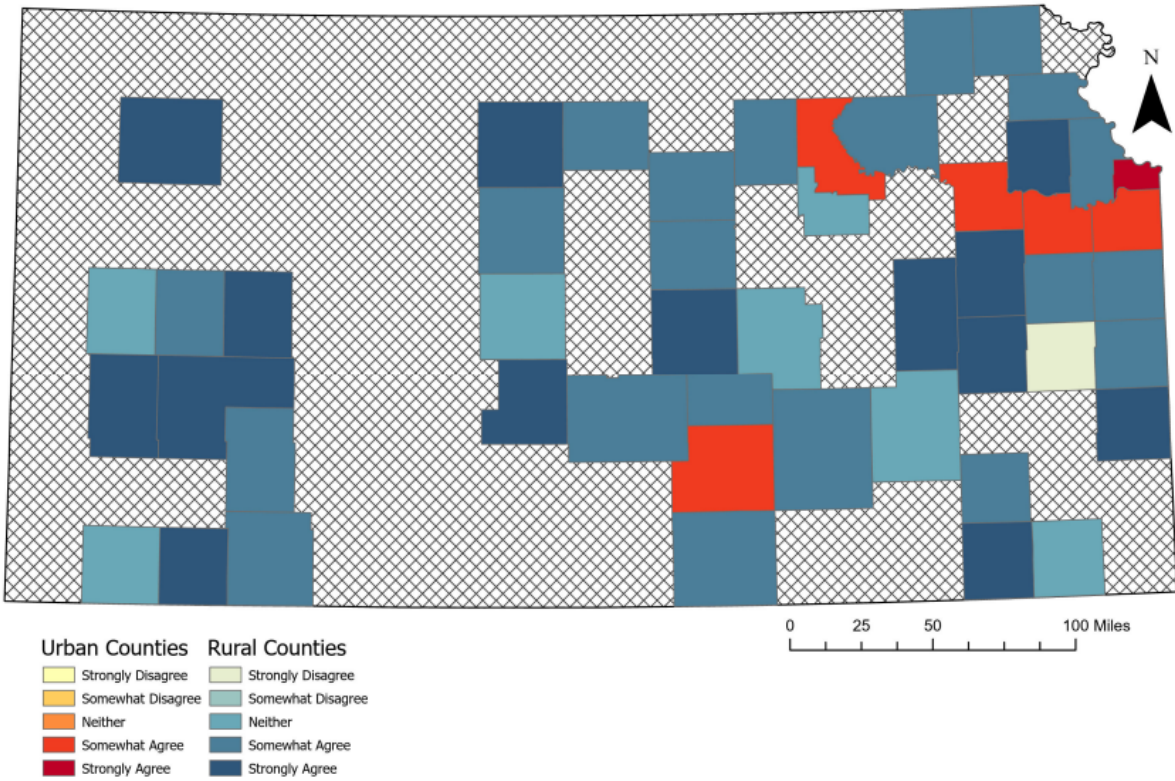
Map 1.3

Question 14_3

I believe that climate change is a
significant issue for my community.

N

0   25   50   100 Miles

Urban Counties   Rural Counties

Strongly Disagree   Strongly Disagree
Somewhat Disagree   Somewhat Disagree
Neither   Neither
Somewhat Agree   Somewhat Agree
Strongly Agree   Strongly Agree
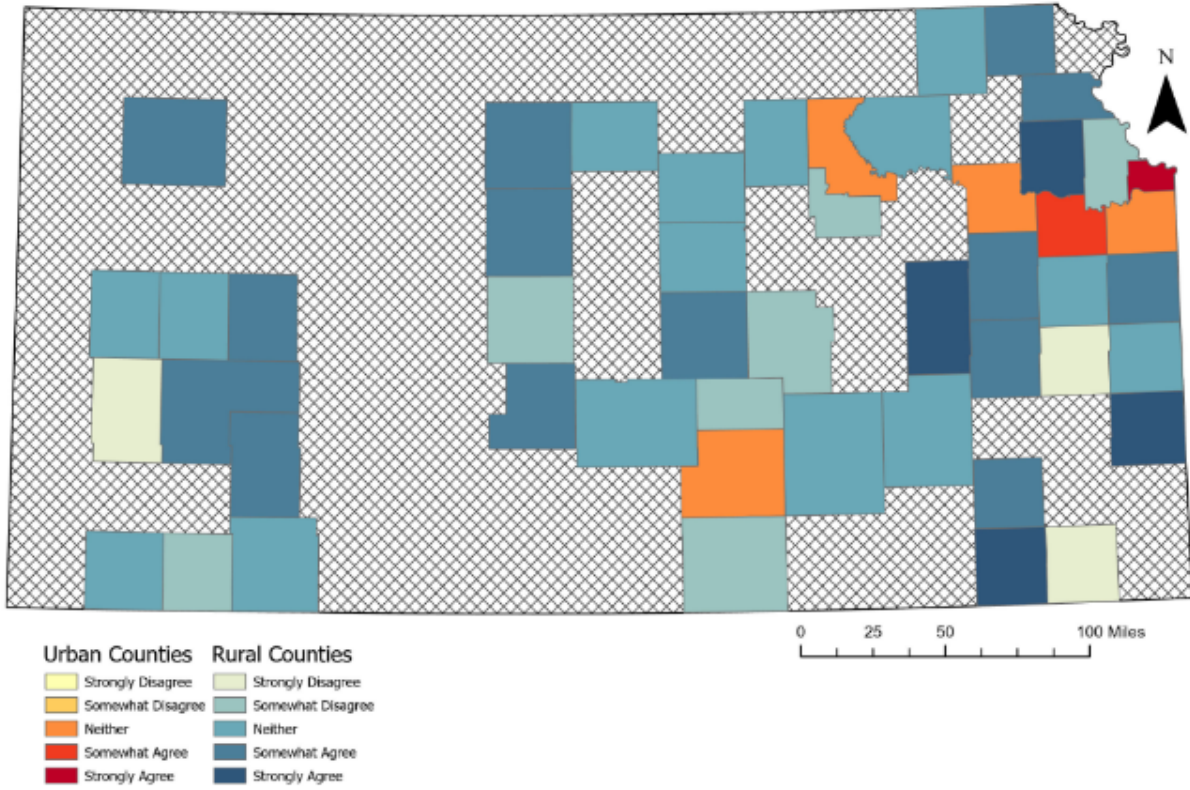
Map 1.4

Question 14_4

My community is affected by climate change related events (e.g., extreme weather, droughts, etc...).

Urban Counties
- Strongly Disagree
- Somewhat Disagree
- Neither
- Somewhat Agree
- Strongly Agree

Rural Counties
- Strongly Disagree
- Somewhat Disagree
- Neither
- Somewhat Agree
- Strongly Agree

0   25   50   100 Miles
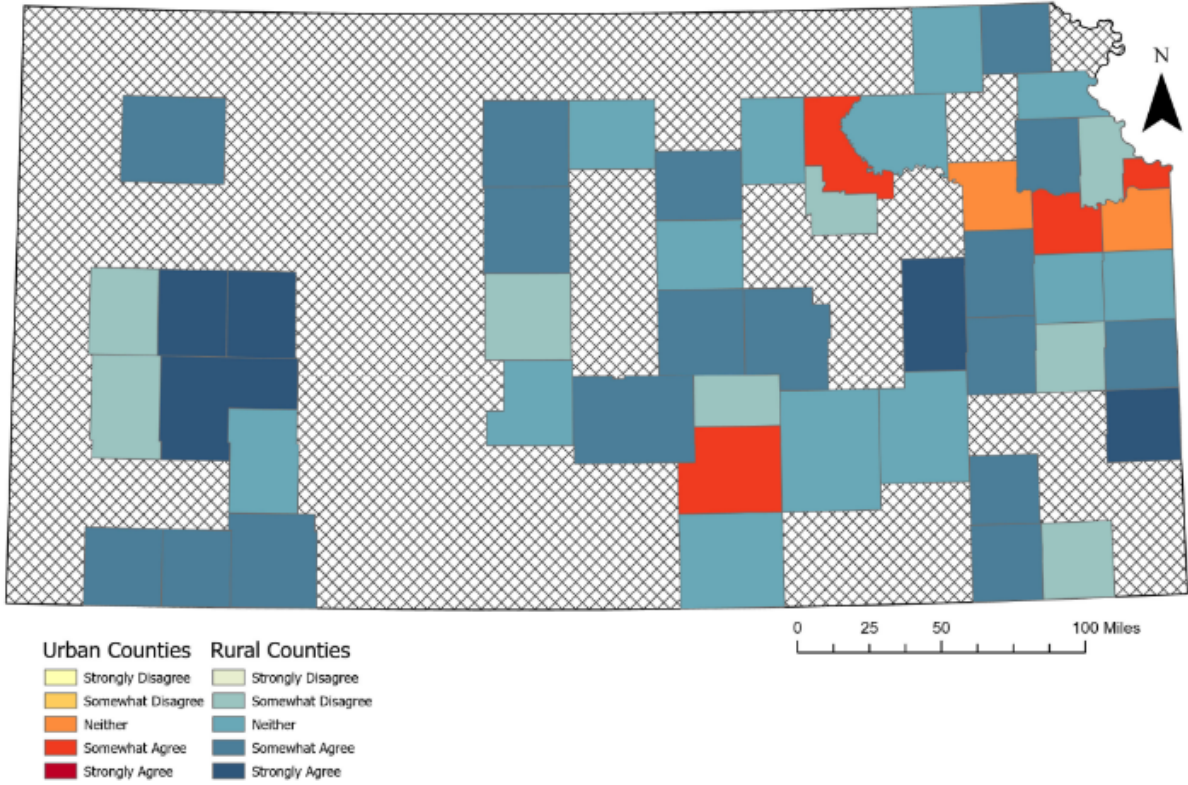
Map 1.5

Question 14_5

I feel that my community is adequately prepared to address the impacts of climate change.

Urban Counties
- Strongly Disagree
- Somewhat Disagree
- Neither
- Somewhat Agree
- Strongly Agree

Rural Counties
- Strongly Disagree
- Somewhat Disagree
- Neither
- Somewhat Agree
- Strongly Agree

Map 1.6

I am concerned about the future impact of climate change on my community.

Urban Counties	Rural Counties
Strongly Disagree	Strongly Disagree
Somewhat Disagree	Somewhat Disagree
Neither	Neither
Somewhat Agree	Somewhat Agree
Strongly Agree	Strongly Agree

0   25   50   100 Miles
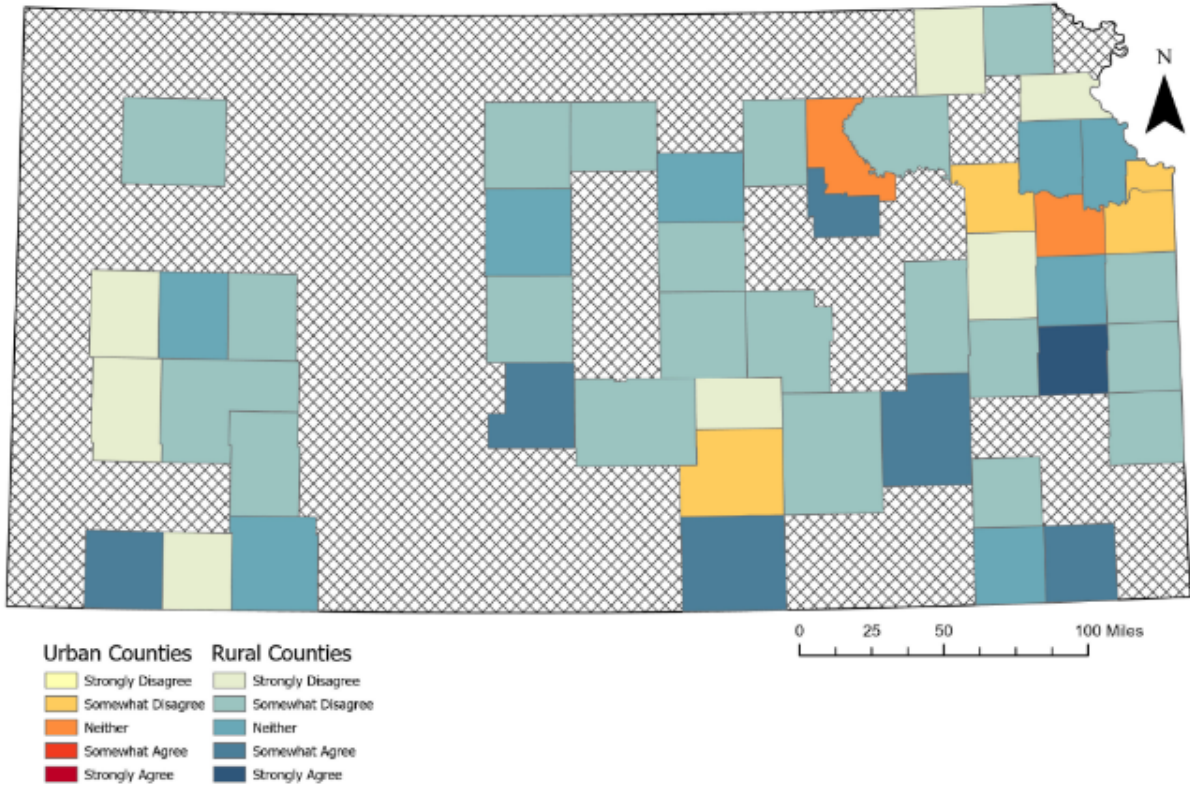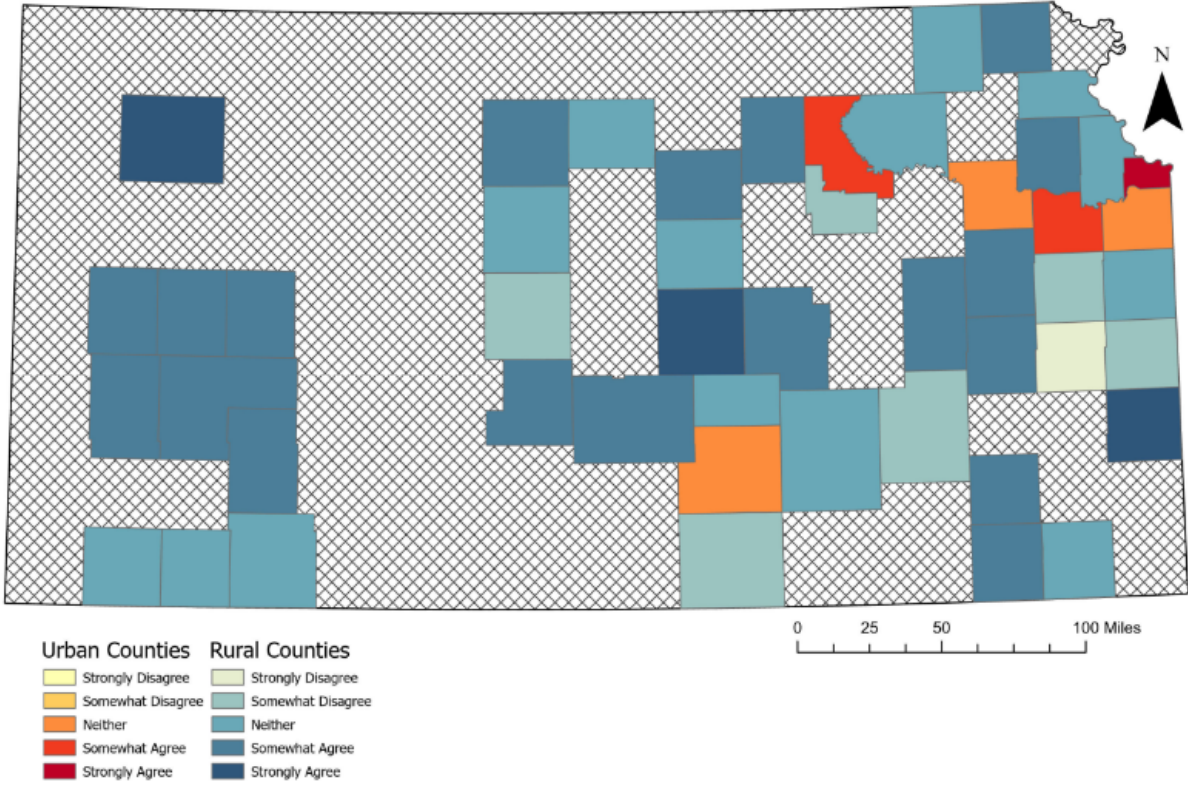
Map 1.7

Question 14_7

I feel that there is enough information available about climate change and its effects on local communities.

Urban Counties   Rural Counties
Strongly Disagree   Strongly Disagree
Somewhat Disagree   Somewhat Disagree
Neither   Neither
Somewhat Agree   Somewhat Agree
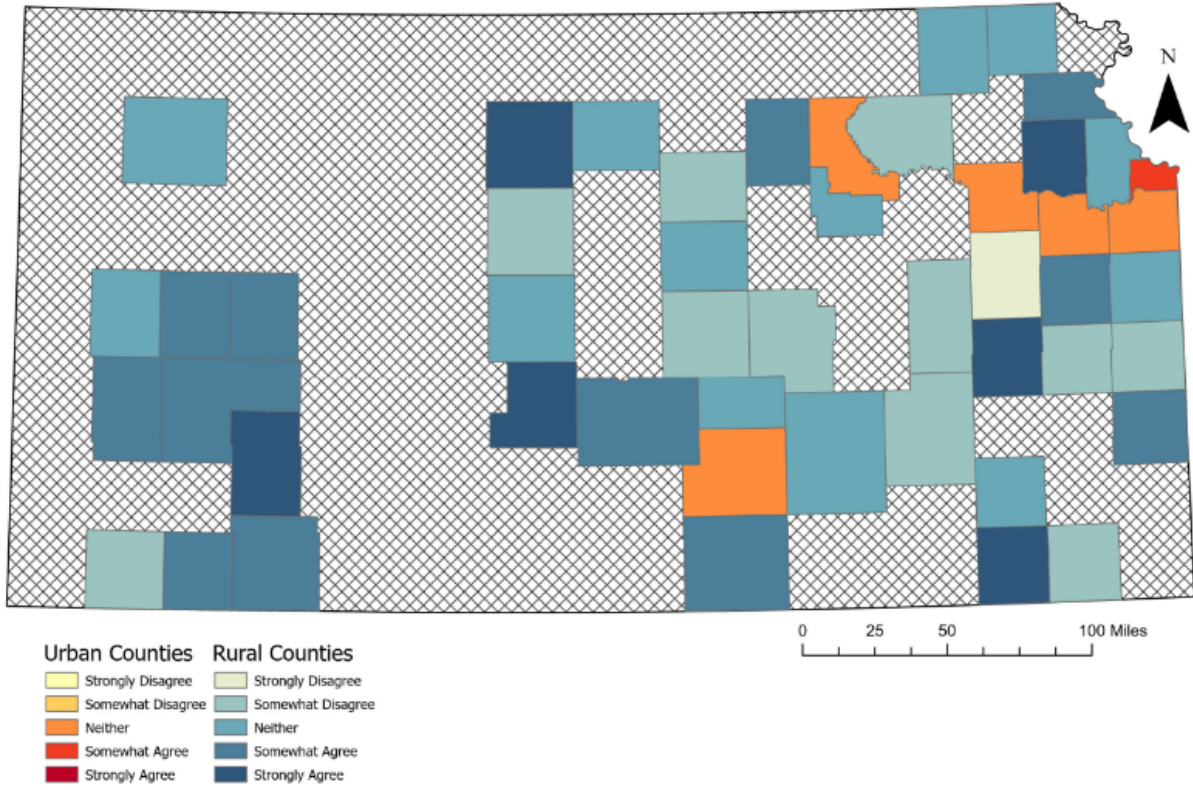Strongly Agree   Strongly Agree
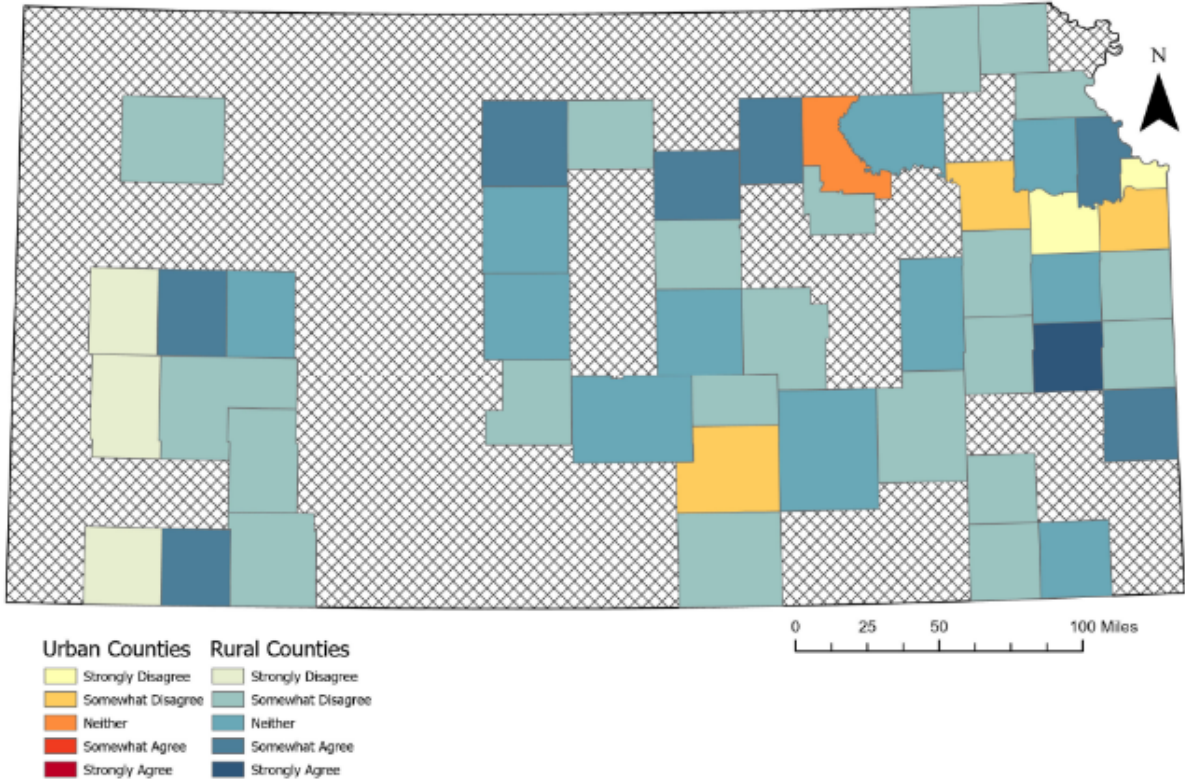
Map 1.8

Question 14_8

I believe that my actions can make a difference in addressing climate change.

Urban Counties	Rural Counties
Strongly Disagree	Strongly Disagree
Somewhat Disagree	Somewhat Disagree
Neither	Neither
Somewhat Agree	Somewhat Agree
Strongly Agree	Strongly Agree

0   25   50   100 Miles

Map 2.1

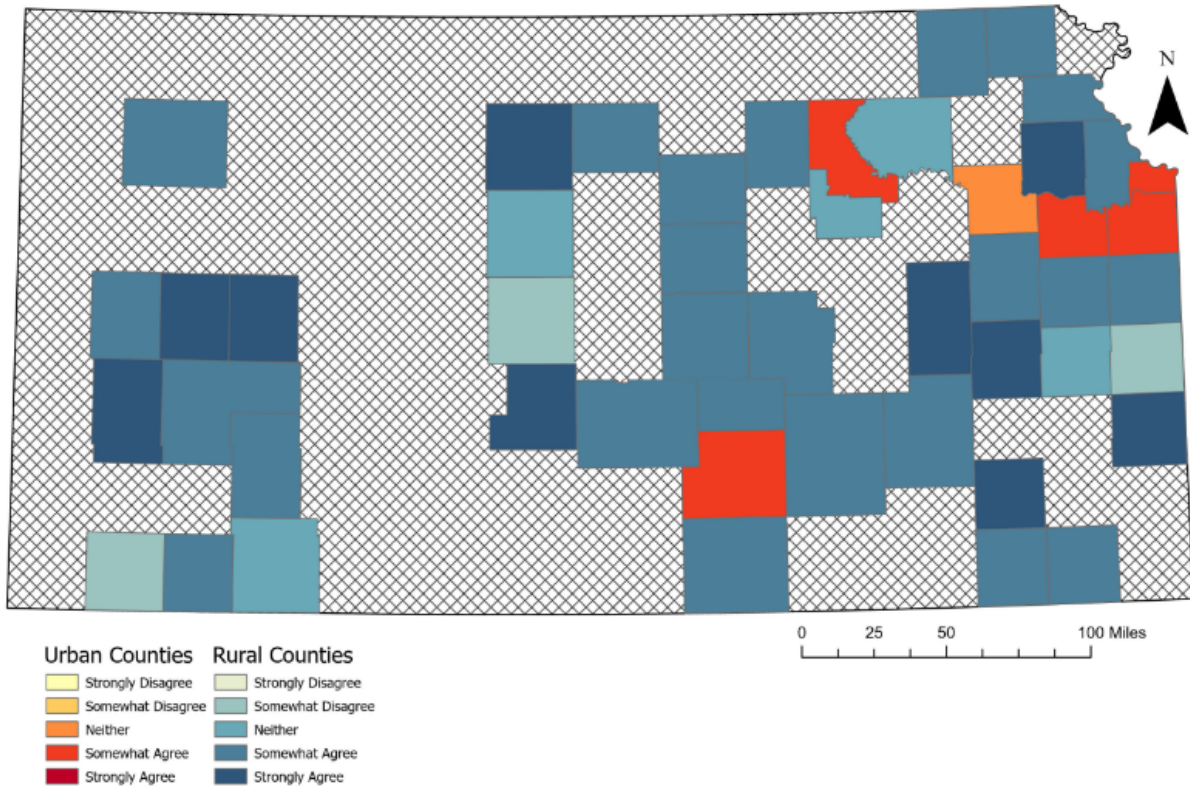# The sustainability of natural resources (water, soil, plants, fossil fuels, etc...) in my community is threatened by climate change.

Urban Counties
- Strongly Disagree
- Somewhat Disagree
- Neither
- Somewhat Agree
- Strongly Agree

Rural Counties
- Strongly Disagree
- Somewhat Disagree
- Neither
- Somewhat Agree
- Strongly Agree

0   25   50   100 Miles

Map 2.2

Protecting local natural resources should be a priority in addressing climate change.

Urban Counties
- Strongly Disagree
- Somewhat Disagree
- Neither
- Somewhat Agree
- Strongly Agree

Rural Counties
- Strongly Disagree
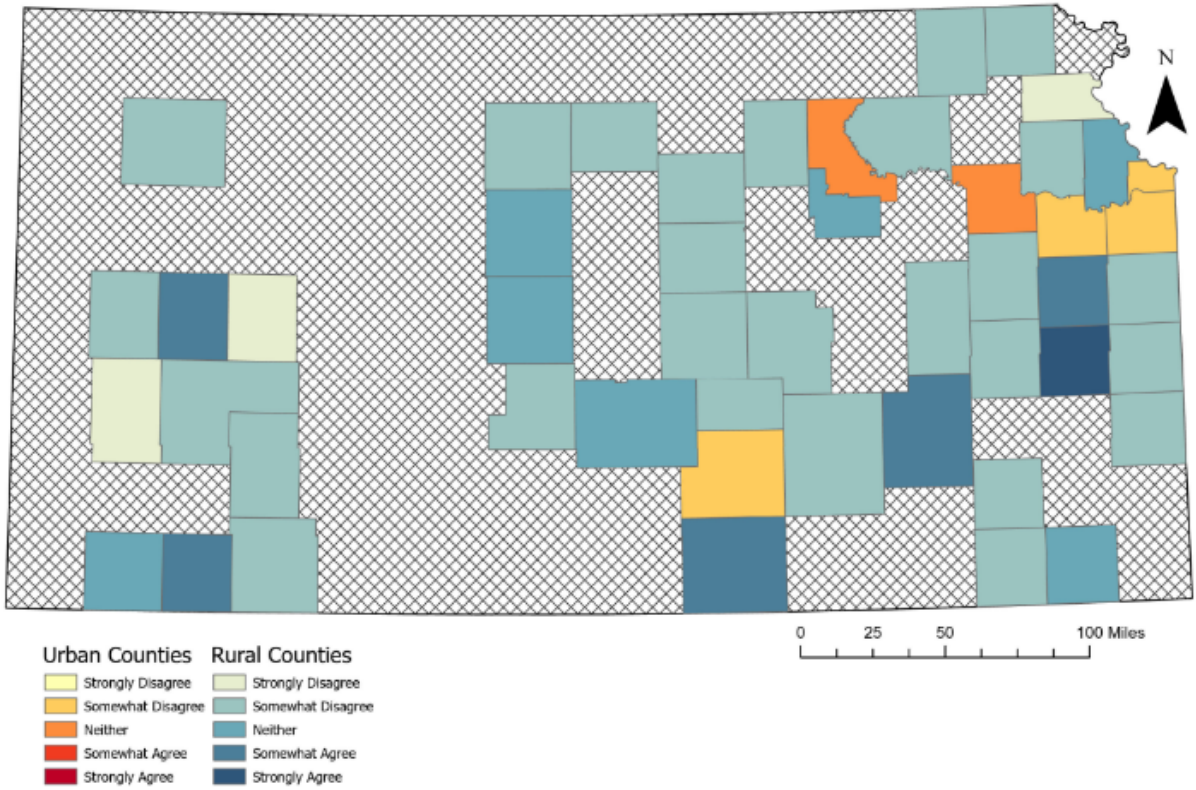- Somewhat Disagree
- Neither
- Somewhat Agree
- Strongly Agree

Map 2.3

I am concerned about the long-term availability of natural resources in my community due to climate change.

Urban Counties | Rural Counties
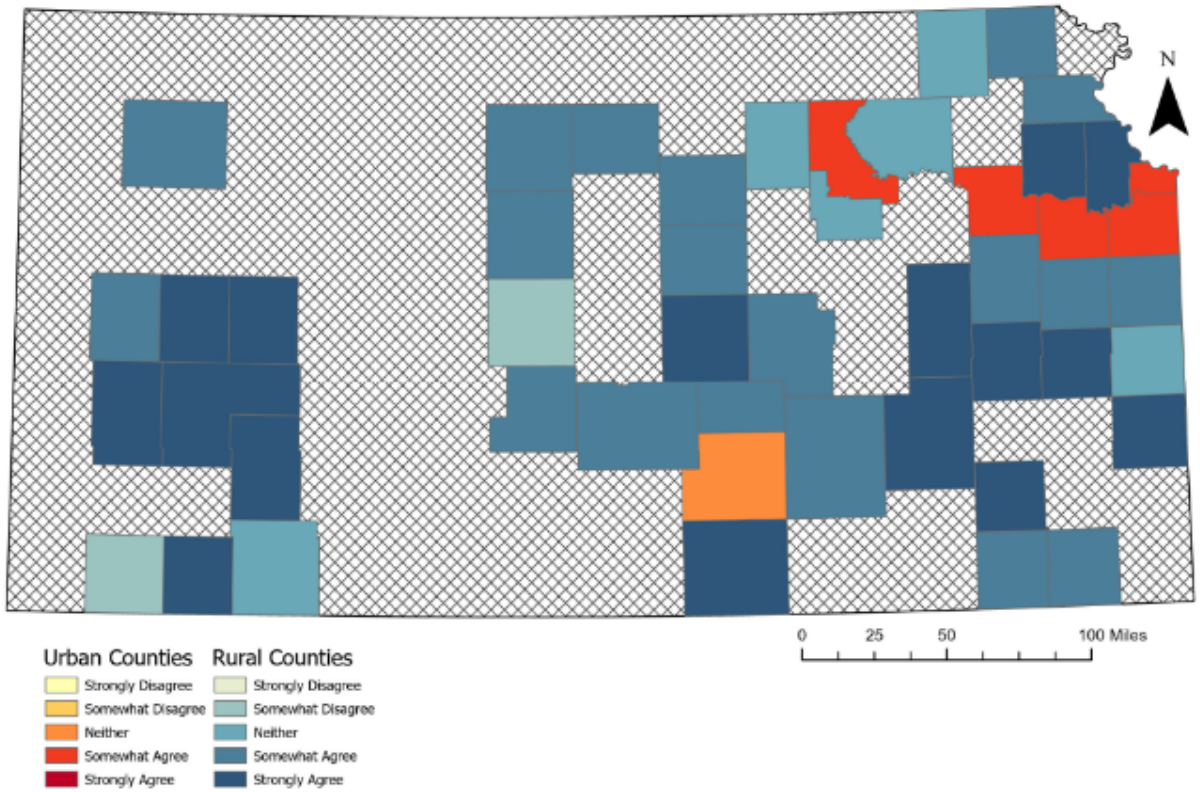
Urban Counties:
- Strongly Disagree
- Somewhat Disagree
- Neither
- Somewhat Agree
- Strongly Agree

Rural Counties:
- Strongly Disagree
- Somewhat Disagree
- Neither
- Somewhat Agree
- Strongly Agree

0   25   50   100 Miles

N

Map 2.4

My community is well-prepared to deal with the challenges posed by climate change.

Urban Counties	Rural Counties
Strongly Disagree	Strongly Disagree
Somewhat Disagree	Somewhat Disagree
Neither	Neither
Somewhat Agree	Somewhat Agree
Strongly Agree	Strongly Agree

Map 2.5

Sustaining natural resources is essential for the long-term well-being of my community.

Urban Counties	Rural Counties
Strongly Disagree	Strongly Disagree
Somewhat Disagree	Somewhat Disagree
Neither	Neither
Somewhat Agree	Somewhat Agree
Strongly Agree	Strongly Agree

0   25   50   100 Miles

Map 3.1: *Mapping Census Rural Definition #3: All areas outside Census places with 50,000 or more people*

Kansas Urban vs Rural Counties

Rural Definition #3: All areas outside Census places with 50,000 or more people.

Legend:
- Cities with 50,000+ Population
- Urban Counties
- Rural Counties

0   40   80 Miles
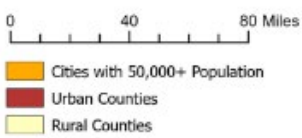
Cartographer: Kyra Lagnevall, Kansas State University

Source: Annual Estimates of the Resident Population for Incorporated Places in Kansas: April 1, 2020 to July 1, 2023 (SUB-IP-EST2023-POP-20), U.S. Census Bureau, Population Division Release Date: May 2024
TIGER US Census County Shapefile