

# Perceptions of ranchers and farmers on climate change impacts and adaptation strategies in Nevada

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## Introduction

Climate change poses potentially adverse consequences to natural resources, including the management of water and land, ecosystems, and human health (IPCC, 2007). Farming and ranching communities are especially sensitive and vulnerable to adverse effects of climate change due to their strong dependence on agricultural production for their livelihood (Campbell, 1999). Meanwhile, public risk perception on climate change plays an increasingly important role in shaping environmental policy and management response systems (Brody et al., 2008). This study aims to gather information on the perspectives of ranchers and farmers regarding climate change science, risk, and policy in Nevada. More specifically, this research tries to better understand what Rural Nevada believes about climate change, to delineate how rural areas may be vulnerable to climate change, and to see if in the future there might be ways to work together to adapt to climate change. This will help researchers in our National Science Foundation-funded research project at UNLV, UNR and DRI, as well as natural resource managers in Nevada, better understand Nevada's ranchers and farmers' perceptions of climate change. This will also aid researchers and managers in understanding how to best connect with Nevada ranching and farming communities regarding climate change.

## Methodology

### 1. Data

A survey of 46 questions was designed to reveal socioeconomic characteristics of ranchers and farmers in Nevada, to understand their climate change perceptions, and relationships with physical environment. A list of ranchers and farmers (n=1892) was obtained through a partner academic institution in Nevada. The survey packages, mailed out in December, 2009, includes an 8-page back-to-back survey, customized holiday card with local picture (Figure 1), hand-signed personalized cover letter, and a self-addressed pre-paid return envelope. The survey was approved by the Institutional Review Board at UNLV.

### 2. Data entry and processing

327 surveys have been received (a response rate of 17%). The surveys have been entered into Microsoft Access 2007 form and table (Figure 2) and processed with SAS 9.2 and geographic information system (GIS) software ArcGIS.

### 3. Analysis methods

Survey data are analyzed using descriptive statistics with SAS 9.2. Locations of survey respondents have been mapped with collected zip-code information in ArcGIS 9.3.1.



Figure 1. A ranch in Northwest Nevada. Photo was taken in September, 2009.

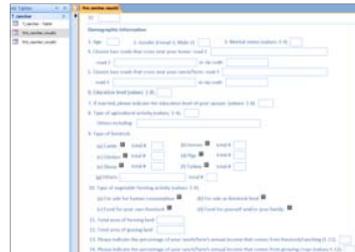


Figure 2. Form for survey data entry was designed in Microsoft Access 2007.

## Results

37% and 55% of farmers and ranchers are within the age groups of 45-59 and 60+ (n=313), respectively. The percentage of male is 74% (n=317). 85% is the married couples (n=316). The percentages of Republican and Democrat are 73% and 15% (n=288). The percentages of "Somewhat conservative" and "Very conservative" are 32% and 42% (n=302). Table 1 lists the perceived adverse impacts from the surveyed farmers and ranchers. 41-56% of respondents believe in little or no negative impacts on the themselves, their families, ranching communities, people in the world, and plant/animal species. From the adaptive strategies (Table 2), few people (9%) would like to take public transportations, which suggests more people rely on private cars or trucks. Figure 3 shows the farmers and ranchers who responded to the surveys spread out in the whole Nevada, mainly in Northwest and most with one response per zip code.

Table 1. Perceived negative impacts of climate change.

Degree	Yourself (n=294)	Your family (n=292)	Ranching community (n=294)	People in US (n=290)	People in developed countries (n=288)	People in developing countries (n=289)	Future generations (n=288)	Plant and animal species (n=291)
Not at all	30%	27%	24%	23%	23%	27%	25%	25%
Only a little	26%	24%	20%	20%	21%	16%	16%	20%
Moderate	26%	28%	25%	28%	26%	15%	18%	20%
A great deal	14%	15%	26%	21%	18%	31%	28%	25%
Don't know	5%	6%	4%	8%	12%	10%	13%	10%

Table 2. Adaptive strategies to reduce the negative impacts of climate change (n=327).

Item	Percentage
Increase the amount of insulation in your home to decrease your energy consumption.	57%
Install low-energy light bulbs in your house	58%
Plant more trees near your home	51%
Use public transportation more than you do now	9%
Use more fuel-efficient vehicles	51%
Nothing	14%
Adopt a sustainable lifestyle (recycle, consume less).	
Try to practice sustainable agriculture (alternate crops, agricultural technology, reduce fertilizer and fuel usage)	
Energy independence (solar, wind, geothermal, use waste as energy sources, telecommute)	Sample comments from interviewees
Control water and improve our water efficiency	
Everything checked has been done, for financial not "environmental" reasons.	
Fire the scientist that are part of this fraud.	

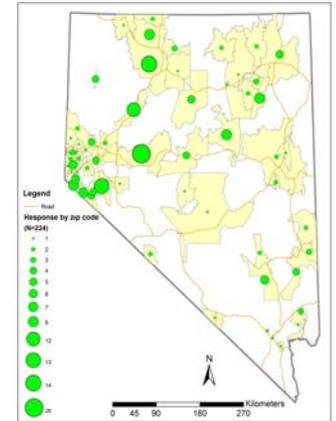


Figure 3. Response by zip code boundary (n=224).

## Conclusions and Discussion

The knowledge gained from this research will help researchers and natural resource managers understand how to best communicate climate change science and effectively perform outreach with vulnerable Nevada ranching and farming communities. Invaluable information from local rural communities, acquired through generations of experience of working on the land, will also support policy makers and stakeholders in identifying adaptation and mitigation options.

Future research is needed for in-depth and integrated analysis by using multiple regression, logistic regression, and factor analysis approaches, for example, examination of the impacts of distance to important physical features (e.g., rivers and lakes) on climate change risk perceptions.

## Acknowledgements

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## References

- Brody, S.D., Zahran, S., Vedlitz, A. and Grover, H., 2008. Examining the relationship between physical vulnerability and public perceptions of global climate change in the United States. *Environment and Behavior* 40, 72-95.
- Campbell, D.J., 1999. Response to drought among farmers and herders in Southern Kajiado District, Kenya: a comparison of 1972-1976 and 1994-1995. *Human Ecology* 27 (3), 377-416.
- IPCC, 2007. *Climate Change 2007: Impacts, Adaptation, and Vulnerability*. Exit EPA Disclaimer Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (Parry, Martin L., Canziani, Osvaldo F., Palutikof, Jean P., van der Linden, Paul J., and Hanson, Clair E. (eds.)). Cambridge University Press, Cambridge, United Kingdom, 1000 pp.