Relationships Between Fossil Fuel Extraction Sites and Opinions on Climate Change

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INTRODUCTION

- For most countries, climate change is treated as a fact, backed by science…but not in the United States.
- Since fossil fuels have been blamed for climate change, there is reason to believe that people who depend on fossil fuels for their livelihood may have different climate change beliefs.
- Education level and political affiliation have been shown to significantly influence climate change. opinions in the US, but maybe there is something to be said for geographic location (Dunlap & McCright; Hamilton, Brulle, Carmichael, & Jenkins; Leiserowitz).

HYPOTHESIS

- Hypothesis: People who live near fossil fuel extraction sites have different opinions on climate change than those who do not live near extraction sites.
- Null Hypothesis: People who live near fossil fuel extraction sites do not have different opinions on climate change compared to those who do not live near extraction sites.

DATA

- Climate change opinion data collected and published by Howe, Mildenberger, Marlon, & Leiserowitz [1]
- Data on active oil and gas wells in the United States was compiled by FracTracker Alliance using data from various state regulatory agencies [2]
- Data on operating coal mines was compiled and released by the United States Energy Information Administration (EIA) [3]

METHODS

- To visualize the fossil fuel data, I reformatted the data on oil & gas wells and coal mines in Excel, added the CSV file to ArcMap, and spatially joined it with a county shapefile so that the point data could be shown as counts per county. The resulting maps are shown below in **Figure 1** and **Figure 2**.
- Next, I performed a t-test to see if there was a statistically significant relationship between the presence of fossil fuel extraction sites in a county and climate change beliefs of the people in that county.

Active Gas and Oil Wells in the United States (2016)

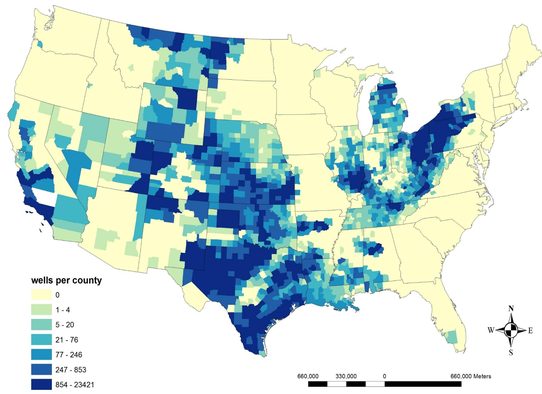

Figure 1. active oil and gas wells in the US. While some states have not one active well, Texas and Pennsylvania each have over 80,000.

Active Coal Mines in the United States (2015)

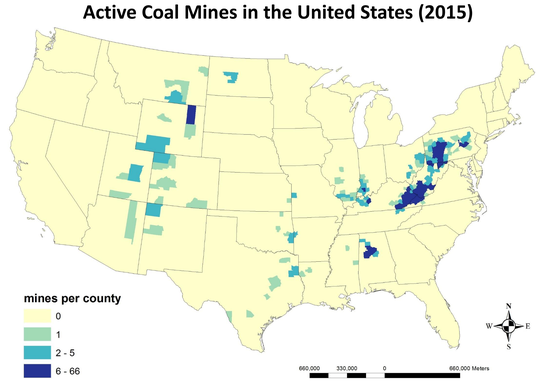

Figure 2. active coal mines in the US as of 2015, you can see that most are concentrated in the Appalachian region of the US.

RESULTS

Table 1. *comparing the climate change opinion data [1] and the location of oil and gas wells [2]*

Results Comparing People's Climate Change Opinions from Counties with Oil & Gas Wells vs Counties without Oil & Gas Wells					
Climate Change Belief (measured as percent of county population that agrees with statement)	**County**	**Mean**	**SD**	**SEM**	**T Test**
"global warming is happening"	Oil/gas wells in county	57.983	4.65	0.123	16.657**
	No oil/gas wells	60.735	4.58	0.111	
"global warming is caused mostly by human activities"	Oil/gas wells in county	42.686	3.79	0.100	9.739**
	No oil/gas wells	44.062	4.06	0.098	
"most scientists think global warming is happening"	Oil/gas wells in county	35.742	4.77	0.126	15.909**
	No oil/gas wells	38.717	5.56	0.134	
"I am worried about global warming"	Oil/gas wells in county	46.812	4.53	0.120	13.177**
	No oil/gas wells	49.046	4.89	0.118	
"global warming is already harming people in the US"	Oil/gas wells in county	48.348	3.79	0.098	12.988**
	No oil/gas wells	50.097	3.79	0.092	

*p < 0.05, **p < 0.01

Table 2. *comparing climate change opinion data [1] with the location of coal mines [3]*

Results Comparing People's Climate Change Opinions from Counties with Coal Mines vs Counties without Coal Mines					
Climate Change Belief (measured as percent of county population that agrees with statement)	**County**	**Mean**	**SD**	**SEM**	**T Test**
"global warming is happening"	Coal mines in county	55.594	4.86	0.370	11.797**
	No coal mines	59.971	4.66	0.104	
"global warming is caused mostly by human activities"	Coal mines in county	41.050	3.39	0.258	8.103**
	No coal mines	43.647	4.08	0.094	
"most scientists think global warming is happening"	Coal mines in county	33.855	4.43	0.337	8.828**
	No coal mines	37.712	5.58	0.131	
"I am worried about global warming"	Coal mines in county	45.783	3.80	0.289	6.215**
	No coal mines	48.194	4.96	0.118	
"global warming is already harming people in the US"	Coal mines in county	47.550	3.18	0.242	6.396**
	No coal mines	49.552	4.00	0.093	

*p < 0.05, **p < 0.01

- **Table 1** and **Table 2** show there is a statistically significant relationship between the presence of fossil fuel extraction sites in a county and the population's climate change opinions.
- The statistical significance for every claim is very significant, with a p value of less than 0.01 for each.

CONCLUSIONS

- People who live near fossil fuel extraction sites have different opinions on climate change compared to those who do not live near fossil fuel extraction sites.
- This does not necessarily mean that one causes the other.
- While there is science to support many of the statements posed to participants in the Howe, Mildenberger, Marlon, and Leiserowitz study, more needs to be done for these statements to be accepted as facts.

FURTHER QUESTIONS

- What else – besides the presence of coal mines, oil wells, and gas wells – might be driving these counties to have different opinions on climate change than their coal/oil/gas-free counter parts?
- Does the size of the fossil fuel extraction sites have an impact on climate change opinions, or just simply the presence of them?

ACKNOWLEDGEMENTS

Thanks to the University of Iowa Department of Geographical & Sustainability Sciences faculty and staff, especially Professor Margaret Carrel and Adam Skibbe, and my classmates.

REFERENCES

- [1] Howe, Peter D., Matto Mildenberger, Jennifer R. Marlon, and Anthony Leiserowitz. "Geographic Variation in Opinions on Climate Change at State and Local Scales in the USA." *Nature Climate Change* 5.6 (2015): 596-603. Web
- [2] FracTracker Alliance. "2016 US Oil & Gas Activity." *2016 Annual Report.* 2016.
- [3] EIA, "US Energy Information Administration Annual Survey of Coal Production and Preparation." EIA-7A, 2015.