



Risk and Opportunity: Social Responses to Induced Seismicity in Colorado and Oklahoma

Liesel Ritchie, Nnenia Campbell, and Jamie Vickery
CU Collaboratory for Induced Seismicity



Study Overview

Purpose

To understand how people evaluate the benefits, risks, and uncertainty associated with oil and gas development in the context of induced seismicity in Colorado and Oklahoma.

Research Questions

1. How, and to what extent, do community attachment, identity, sense of place, and ties to the natural environment affect beliefs and attitudes about oil and gas development activities? (Social-ecological Context)
2. How do individuals and groups in communities evaluate risks and benefits associated with oil and gas development activities? How are risks of induced seismicity considered in the context of other risks? (Risk/Benefit Calculus)
3. What are the key factors influencing decision-making processes related to support/lack of support for oil and gas development? To what extent do concerns about induced seismicity influence these decision-making processes? (Decision-Making)
4. What, if any, is the relationship between beliefs about risks related to oil and gas development, individual and collective stress, and social disruption? (Phase II)
5. What, if any, is the relationship between documented physical impacts of oil and gas development in a given area and perceptions of risk? (Phase II)
6. What, if any, is the relationship between beliefs about economic impacts of oil and gas development and perceptions of risk? (Phase II)

Data Collection Activities

- **RQ 1-3:** 51 interviews and 12 informal group discussions with community stakeholders in Oklahoma and Colorado
- **RQ 4-6:** Telephone surveys with random sample of 1,400 households in Colorado and Oklahoma (Spring 2018)

Overview of Qualitative Findings

Social-ecological Context

Livelihood shapes ties to environment
Emphasis on sense of place stronger in rural environments
Induced seismicity mediates influence of political dynamics

"Those royalties are the only reason why we didn't have to sell off parts of our family land to get my mother the care she needed." —Major County, OK resident

"We only got one Earth, and when all this is gone, we have nothing to leave our children. I have nothing to leave— I'm a great-grandmother. I looked at my great-grandkids and I think, "What are they going to have if somebody doesn't stand up and say something?" What are they going to have?"—Logan County, OK resident

"How do you weigh the significance of, say, an old brick façade that falls off compared to having companies go bankrupt, revenues drop by a billion dollars, and schools end up working going on four-day weeks?" —Oklahoma County geologist

Risk/Benefit Calculus

Livelihood threats/supports
Social & economic conditions
Personal costs
Immediacy of threats
Values

"It took seven months and \$106,000 to fix [earthquake damage], and I was being treated for cancer and couldn't be in my home. I was trying to manage contractors and chemotherapy at the same time." —Oklahoma County resident

Decision-Making

Sense of efficacy
Trust in regulators
State of uncertainty

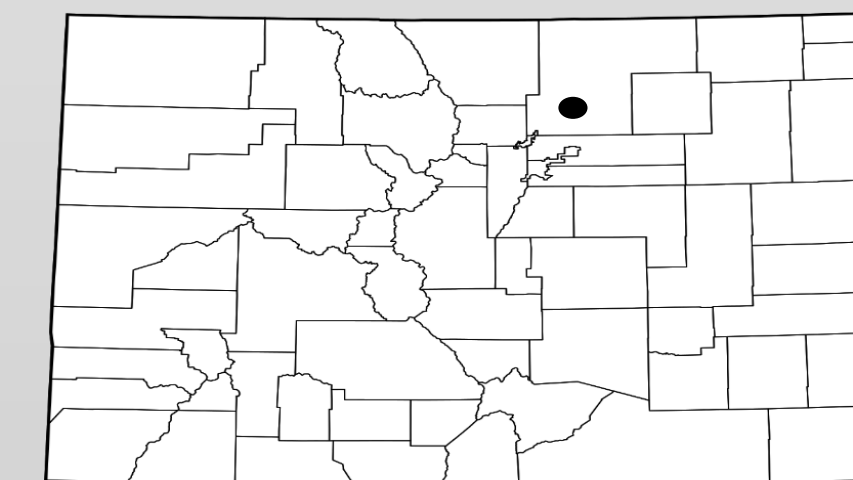
"Because of the heightened awareness at the COGCC level, and the populous pushing back...Because of their reaction to that, and sensitivity to that, [COGCC] stepped in and shut down the injection well immediately [after the earthquake], and put seismographic instruments on top of it." —Weld County Activist

"For years [Oklahoma politicians] denied there was any connection [between injection and earthquakes] at all. And then when you find out some of these behind-the-scene things that they were doing, it just makes you distrustful" —Edmond resident

Community Context

Colorado

Perceived Risks	<ul style="list-style-type: none"> • Health and safety • Nuisance issues (e.g., truck traffic, noise) • Development near population centers • Environmental justice issues
Perceived Benefits	<ul style="list-style-type: none"> • Tax revenue • Local spending • Support to agricultural pursuits • Corporate citizenship
Community Impacts	<ul style="list-style-type: none"> • Minimal discussion of relationship interference • Recreancy concerns



City of Greeley/Weld County

- Population: 92,889 (Greeley)/252,825 (Weld County)
- Minor earthquake activity

Oklahoma

Perceived Risks	<ul style="list-style-type: none"> • Threats to critical infrastructure • Damage to residences • Physical safety
Perceived Benefits	<ul style="list-style-type: none"> • Driver of state economy • Urban amenities • Support for service economies • Support for agricultural pursuits
Community Impacts	<ul style="list-style-type: none"> • Reluctance to speak publicly • Stigmatization of critics • Generalized stress due to shaking • Critiques of economic dependence

Fairview, Oklahoma/Major County

- Population: 2,579 (Fairview) / 7,527 (Major County)
- Moderate earthquake activity

Edmond, Oklahoma/Oklahoma County

- 81,405 (Edmond)/718,633 (Oklahoma County)
- Frequent earthquake activity

