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Why Now?: A Case Study of Split Estate and Fracking Activity in Garfield County Colorado

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WHY NOW?: A CASE STUDY OF SPLIT ESTATE AND FRACKING
ACTIVITY IN GARFIELD COUNTY COLORADO

A Thesis

Presented to

The Graduate Faculty

Central Washington University

In Partial Fulfillment

of the Requirements for the Degree

Master of Science

Cultural and Environmental Resource Management

by

Janessa Ann Zucchetto

November 2016

CENTRAL WASHINGTON UNIVERSITY

Graduate Studies

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ABSTRACT

WHY NOW?: A CASE STUDY OF SPLIT ESTATE AND FRACKING

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This research examines the socio-environmental impacts associated with hydraulic fracturing activities and issues of split estate in Battlement Mesa Planned Unit Development in Garfield County, CO. Data for this research was collected during 2 months in the summer of 2015 using a series of ethnographic research methods. In doing so, this research adopts political ecology and political economy of nature as theoretical frameworks to understand the interconnections that exist between local impacts of fracking activities and a national strategy to secure gas markets internationally. I argue that the socio-environmental impacts associated with hydraulic fracturing in Garfield County, CO are not only the result of issues related to split estate, but are also the result of a national strategy lead by the federal government to create a supranational trade agreement known as the Trans Pacific Partnership (TPP) that incentivizes U.S. natural gas exports, which in-turn will maximize profits generated from those exports at a national scale.

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CHAPTER I

ENERGY BOOM IN THE LIVING ROOM

Introduction

Bruce Anderson¹ and I gaze out over his deck; he points to a cottonwood tree on the golf course slightly farther than 1000 feet from his back fence to indicate where Ursa Resources² has plans to install a multi-well, industrial scale gas pad. He articulates some of his concerns about the proximity of the pad to his house: “They have an explosion on that pad, we lose all of our windows and glass, stuff like that.”³ After the visual reference, and taking in the sound of crickets on a warm summer morning, we spend nearly four hours speaking about Bruce’s background, the proposed gas development, and its potential impacts.

The Andersons bought their house in Battlement Mesa in 2005; in their title a clause stated, “Mineral rights may be owned by others.” Bruce, like many other Battlement Mesa Residents, did not give this clause much thought until 2009 when Antero Resources⁴ announced it had bought the mineral rights beneath Battlement Mesa from Exxon Mobile, the original mineral right holder.⁵ Many residents were taken

¹ Pseudonyms replace real names for all individuals that are part of this research study.

² Ursa Resources Group II LLC is a privately owned energy company with mineral leases in Texas, Colorado, Arkansas, New Mexico, North Dakota, and Montana.

³ Interview, September 8, 2015, Battlement Mesa, Colorado

⁴ Antero Resources is an independent exploration and production company specializing in acquiring natural gas.

⁵ Another transfer of mineral rights took place in 2013 to Ursa Resources. There is no limit to the number of transfers for mineral rights; many residents believe the rights could be passed off again in the future.

by surprise because they were told that after the oil shale bust in the 1980s, gas development would never be pursued in Battlement Mesa again. The clause “mineral rights may be owned by others” demonstrates the concept of split estate or separate ownership of mineral rights and surface rights. (The issue of split estate will be described further in Chapter III). This situation is typical in Western Colorado, an area rich in shale gas resources, where roughly 85% of the private landowner agreements include split estate (Oil and Gas Accountability Project, 2005).

Battlement Mesa is a unique example of split estate because homeowners do not function as surface right owners. This removes them almost completely from the negotiation process required in the state of Colorado when an energy company wishes to access minerals on split estate land. Instead, the official surface right holder is Battlement Mesa Partners, the developer of the retirement community.

Bruce and a few other residents formed Battlement Concerned Citizens (BCC)⁶ as a subcommittee of the Grand Valley Citizens Alliance (GVCA)⁷ in 2009. Six years running in the summer of 2015, they have managed to keep drilling outside the boundaries of the development. It seems as though time is running short, however, as Ursa Resources has submitted official permit requests to the county for two of its five planned well pads

⁶ The BCC formed in response to Antero Resource’s announcement to drill for natural gas in Battlement Mesa.

⁷ The GVCA is a non- profit community organization committed to spreading awareness of impacts of oil and gas activities in Western Colorado.

within the development (WCC, 2015). Articulating his frustration with the process, Bruce asserts:

I feel totally helpless because I just can't run out there and say, "stop this". It doesn't happen that way, it takes long, arduous fights and eventually you might be right, but it doesn't make any difference.⁸

Bruce and the other members of the BCC have very little control over what happens in their neighborhoods; they believe heavy industry such as natural gas development does not belong in close proximity to people.

While hydraulic fracturing in Colorado is not a new practice,⁹ technological advancement combining hydraulic fracturing and horizontal or directional drilling (fracking¹⁰) was adopted in Western Colorado in the early 2000's. This advancement in technology made natural gas extraction and production economically feasible in relation to the global commodity price of natural gas from 200- 2010 (Richter, 2014). Shale gas increased from 1% of U.S. gas supplies in 2000 to 20% in 2010 and is expected to rise to a share of 50% by 2035 (International Energy Agency, 2010).

Increased homeland production of natural gas has reduced imports of foreign oil and gas in the U.S. (Zuckerman, 2014) and is a promising intermediary, providing cleaner burning fuel in the transition from fossil fuel dependence to renewable energy sources (Bridge, 2004). The U.S. consumes the most natural gas of any country in the world,

⁸ Interview, September 8, 2015, Battlement Mesa

⁹ Fracking was first invented by Edward A L Roberts in the 1860's and was soon adopted by oil companies for drilling vertical wells (Zuckerman, 2013)

¹⁰ Invented in 1990 by George Mitchell (Zuckerman, 2013)

nearly double the amount of the second highest consumer, Russia (Table 1). With intense political support and the advancement of technology, the U.S. exceeded Russian natural gas production in 2010 to become the largest producer of the energy resource the world (Table 2).

Table 1
Top Ten Natural Gas Consuming Countries

Rank (total)	Country	Total Consumption (thousand cubic meters)	Per Capita (cubic meters)	Year (est.)
1	United States of America	759,400,000	2,381.4	2014
2	Russia	409,200,000	2,872.2	2014
3	China	180,400,000	133.1	2014
4	Iran	157,300,000	1,969.8	2013
5	Japan	134,300,000	1,056.6	2014
6	Canada	104,400,000	2,997.0	2014
7	Saudi Arabia	102,400,000	3,744.6	2014
8	Germany	77,480,000	956.6	2014
9	Mexico	73,260,000	609.0	2014
10	United Kingdom of Great Britain and Northern Ireland	66,690,000	1,101.9	2014

Source: Adapted from CIA World Fact Book (2014)

Table 2

Natural Gas Production and Consumption of the U.S. and Russia in Billion Cubic Feet (bfc)

Year	U.S Production	U.S. Consumption	Russia Production	Russia Consumption
2014	25,728	26,698	20,437	14,451
2012	21,316	25,538	21,764	15,711
2010	24,033	24,087	21,536	15,471
2008	20,158	23,277	21,514	15,242

Source: Adapted From U.S. Energy Information Administration (2016a)

Increasing levels of natural gas production for the U.S. and Russia have geopolitical ramifications (Bowler, 2015). In 2014 when global natural gas supplies surged, the international market became flooded, which drove down both crude oil and natural gas prices. Russia is heavily dependent on oil and gas exports, so the dramatic price drop put the Russian economy into a recession. The U.S. has the ability to influence global oil prices by flooding the market with natural gas when domestic production is increased, (Zuckerman, 2014; EIA, 2016). The same holds true for influencing other states that rely heavily on fossil fuel extraction for economic vitality, specifically the Organization of Petroleum Exporting Countries (OPEC).¹¹ In February 2016, Saudi Arabia, Russia, Venezuela, and Qatar publicly discussed organizing a production freeze in response to falling oil prices. The cooperation between Russia and OPEC is historically significant because Saudi Arabia and Russia are geopolitical rivals.

¹¹ Current members of OPEC include Algeria, Angola, Ecuador, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, United Arab Emirates and Venezuela (OPEC, 2016).

Previously, Russia has avoided coordination with OPEC to impact global oil prices; they may be considering collaboration now due to the low price of oil (Kramer & Reed, 2016).

While many geographic locations around the world have significant natural gas reserves, the conditions have been just right in the U.S. for the development of the natural gas industry on a commercial scale (Richter, 2013). The U.S. has a favorable tax environment, adequate water supplies, a relatively small population density in resource-rich areas, and the separation of mineral and surface rights in land-ownership legislation (Richter, 2013). Natural gas production is exempt from complying with several forms of federal policy and regulation. For instance, the 2005 Energy Policy Act¹² allows oil and gas companies to conceal chemicals used during the fracking process, in a circumnavigation of regulation known as the Halliburton loophole (Holzman, 2011; Coman, 2014). Additional loopholes exist in statute with the Emergency Planning and Community Right to Know Act¹³ of 1986 and the Clean Water Act¹⁴ of 1972 (CWA). Additionally, natural gas development is completely exempt from complying with the Safe Drinking Water Act¹⁵ of 1970 (SDWA). Oil and gas companies are not mandated to

¹² Energy Policy Act 2005 - a bill designed to provide subsidies for a wide range of energy production and exemptions for fracking to sever federal acts.

¹³ Emergency Planning and Community Right to Know Act 1986- related to emergency preparedness and potential chemical hazards to the public

¹⁴ Clean Water Act 1972 - related to the regulation of water pollution addressing point pollution sources.

¹⁵ Federal Safe Drinking Water Act 1979 - pertaining to the regulation of public water systems (wells that serve at least 25 people). Injections into the ground and disposal of waste, for the purpose of oil and gas production, are exempt as long as the state does not foresee a threat to ground or surface water.

divulge the release of toxic chemicals or obtain permits for groundwater pollution under these acts (Colborn et al., 2011). The U.S. has a favorable regulatory and policy atmosphere for natural gas production that does not fully consider resident well-being in proximity to fracking wells (Minor, 2014).

Colorado regulates oil and gas development at the state level through the Colorado Oil and Gas Conservation Commission (COGCC) and at the county level through the jurisdiction of elected county officials (COGCC, 2016). The loose federal rules on fracking activities place the burden of policy development and regulation on the individual states and counties.

Garfield County is a use-by-right county concerning any gas wells proposed on private land. In this case, the policy speaks for itself: if a company owns mineral rights, it is free to pursue extraction. Battlement Mesa, however, is a Planned Unit Development (PUD) and is considered to be similar to a city under county law. In this case, Ursa Resources is required to submit special use permits to Garfield County before they are allowed to drill. Permit or not, Bruce and some of his fellow community members are uncomfortable with Ursa's plans to drill here.

Problem

Because of the most recent fracking boom in the U.S., large-scale resource extractive industry and communities of people intersect like never before. The presence of industry affects the nature-society relationship in a given geographic area. Specifically, fracking activities have the potential to threaten the social well-being of

nearby residents. This research amplifies resident voices in one community where the nature-society relationship is changing due to impending natural gas development. Although the impacts are very localized, there is an uneven distribution of potential positive and negative impacts associated with gas development. Some people in the county benefit significantly from fracking activities, while others tend to bear the costs.

Currently, there are 4,700 residents in Battlement Mesa, all of whom live within a one-mile radius of one or more of the five planned multi-well natural gas pads (Figure 1; Google Earth, 2017). These pads will include 25-30 gas wells each and will be developed in 8-10 well increments.¹⁶ The proposed development could last five years at best and 30 years at worst (from the homeowner's viewpoint). The rate of development depends on many factors -- the largest being the commodity price of natural gas.

A group of Battlement Mesa Residents, the majority of whom are retirees living on a fixed income, oppose Ursa's planned development in their neighborhoods. Many residents in Battlement Mesa own their homes and the surface land where their homes sit. They do not, however, own any rights to the minerals underneath their houses or the surface rights to the common spaces within the development. Under split estate laws, rights of mineral holders supersede rights of surface owners. Furthermore, the mineral right holder may use the surface land to access the minerals underneath the surface land.

¹⁶ Participant observation, September 2, 2015, Ursa Community Meeting, Battlement Mesa.

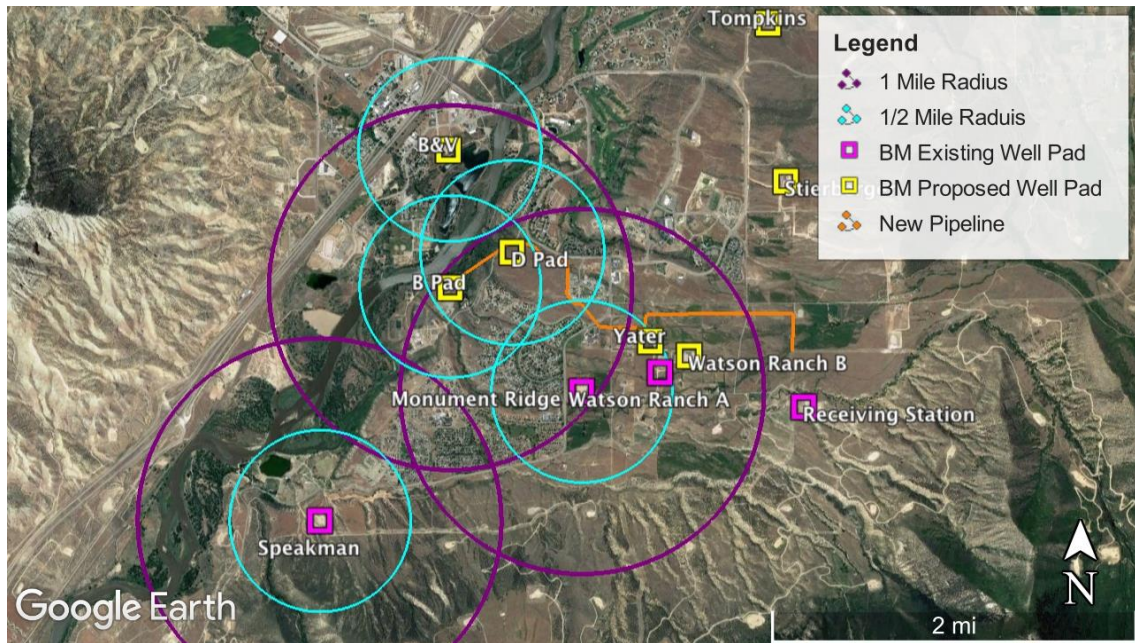


Figure 1: Well pad distances from dwellings- residents living within ½ and 1-mile radius of fracking activities Google Earth (2017)

This law makes preventing oil and gas drilling in Battlement Mesa extremely difficult for residents. Additionally, it may subject them to close proximity industrial development and the related social impacts in the near future. Possible social impacts connected to future gas development include: loud noise, heavy traffic, foul odor, light pollution, property value decline, health impacts, community connected to future development.

Purpose

In this thesis, I present background information on the most recent fracking boom in the U.S. and review the network of laws and policies that regulate fracking activities in Colorado. I then explore the social impacts of living in close proximity to oil and gas development using placed-based data. In doing so, I aim to better understand

the relationship among split estate, fracking activities, and residents. Additionally, I explore systemic reasons for why fracking activities occur, keeping in mind geo-political and economic factors.

I use the theories of political economy of nature (Guha & Martinez- Alier, 1997; Harvey, 2006; O'Connor, 1998;) and political ecology (Bridge, 2000; Delgado, 2012; Himley, 2013; Perreault, 2006) to inform and guide my research project. Data is analyzed from two different perspectives. Political ecology will be used to analyze fracking on a small scale with a narrow scope working from a local level out (bottom-up approach). In doing so, I will use in-person interviews to gain an in-depth understanding of stakeholders' views. Specifically, I aim to understand the relationship between the natural gas industry and the residents of Battlement Mesa. Although Battlement Mesa is a special case currently, it is of interest more broadly because it lends insight to understanding the relationship between industry and people. Once I have identified key issues through in-person interviews, I will use political economy of nature to think about broad range causes of said issues. This will begin with the examination of geopolitical factors at the federal and state levels as well as industry actions. Political economy of nature guides a top-down approach by making connections between systemic factors and the smaller scale analysis. To achieve a broad scale analysis, I will conduct archival work (a detailed description can be found in the Methods section on page 26). This thesis attempts to influence the ongoing debate about residential drilling in Garfield

County at a local scale and Colorado at a state level by amplifying voices of community members who will be affected by such activities.

Significance

Members of the BCC believe that, one way or another, Battlement Mesa will be used to set precedent for residential drilling in Colorado. If drilling is allowed to proceed as planned, Battlement Mesa will be used to set the norm for other neighborhoods. Conversely, if community organizations and residents are able to convince the county or state to deny permits for drilling in Battlement Mesa, precedent will be set to keep drilling out of residential areas. By using both critical social theory (Bridge, 2000; Delgado, 2012; Himley, 2013; Perreault, 2006) and political economy of nature (Harvey, 2006; O'Connor, 1998, Guha & Martinez- Alier, 1997) to analyze fracking related issues, this thesis provides a lens to policy makers to consider when making decisions.

The outcomes of this project will be applicable beyond the scope and scale of the study to other geographic areas regionally and nationally. This research gives voice to a community of residents in Battlement Mesa Colorado in order to amplify their concerns and draw attention to the uneven distribution of burdens and benefits of fracking at a local scale. Planned gas development in Battlement Mesa may be used to set precedent on residential drilling across Colorado where large-scale fracking projects could have similar localized impacts.

Additional outcomes are as follows: In Washington, and many other western states that have split mineral and surface ownership, but do not have fracking, this

research may provoke residents to learn if they own their mineral rights or not. This knowledge and awareness could prevent future conflict among a wide variety of mineral and surface right holders. In places such as Wyoming, New Mexico, and Montana, where fracking also occurs, this research will have extramural significance for landowners dealing with potential sub-surface oil and gas company leases by making them aware of a larger support network available to help them through the process.

This research makes theoretical contributions to a body of work focused on social critical geography (Bridge, 2000; Delgado, 2012; Harvey, 2006; Himley, 2013; O'Connor, 1998; Perreault, 2006;) specifically work on environmental injustice (Brulle & Pellow, 2005; Guha & Martinez- Alier, 1997; Sze & London, 2008) with its focus on split estate rights.

Literature Review

This thesis takes a critical approach to analyzing the impacts of the most recent fracking boom in Garfield County, Colorado. Political ecology theory analyzes the nature society relationship from a critical perspective. Described by Robbins (2011) as the opposite of apolitical ecology, political ecology is a scholarship that challenges hegemonic power, analyzes flaws in human/ environment interactions and explores solutions to exploitation and poor management.

Political ecology links the transformation of the environment to political and social processes and takes a critical approach to analyzing adverse environmental and social outcomes of this relationship (Blakie & Brookfield, 1987). Many scholars agree

that land degradation and marginalization are critical issues facing communities affected by resource extraction (Bakker, 2003; Blakie & Brookfield, 1987; Escobar, 1998). Political ecology has been widely used in the Third World to link scholarship to activism in resource conflicts, and is also applicable to the First World (McCarthy, 2002; Willow, 2014). Core issues and fundamental theory of political ecology are relevant to the human-environmental relationships in the First World (McCarthy, 2002). In this sense, McCarthy (2002) argues that the human-nature relationship can be studied in situations of environmental degradation for the benefit of outsiders and cost to locals, regardless of the place, space, or socio-economic status of the population. I adopt the critical approach to analyzing interactions between society and the environment at a local scale in Garfield County. Essentially, I use political ecology to guide place-based data collection and analyze local scale interactions between community members, industry professionals, and government officials surrounding the social and environmental conflict of natural gas production.

Within political ecology, political economy of nature is a lens available to conceptualize local impacts at a larger geographic scale. Environmental injustice, contradictions of capitalism, and neoliberal discourse are themes within political economy of nature relevant to this thesis.

Notions of environmental inequality (Brulle & Pellow, 2005; Guha & Martinez-Alier, 1997; Sze & London, 2008), the second contradiction of capitalism (O'Connor, 1998), and spatial fix (Harvey, 2006) highlight how fracking activities disproportionately

place burdens of development on marginalized communities and create social justice issues. O'Connor (1998) analyzes the relationship between conditions of capitalism and conditions of the environment and relates conditions of both to the occurrence of human conflict and environmental degradation. The second contradiction of capitalism implies that capitalism has a propensity to destroy its own environmental conditions of production (O'Connor, 1998). As explained by Environmental Justice scholars Brulle and Pellow (2005), the treadmill of capitalism requires constant injection of capital for continued economic growth (p6). This growth benefits the economic development coalition (business, labor, and government) and disproportionately burdens the poor and racial minorities (Brulle et al., 2005). O'Connor explores how intrinsic crises of capitalism, specifically, overaccumulation, and underconsumption, force society to confront contradictions in capitalism and induce adaptation and change in conditions of production (1998). As discussed in Chapter II, Garfield County relies heavily on oil and gas tax revenue. A powerful relationship exists in capitalism between the government and capitalists (in this case the oil industry) that becomes mutually beneficial when favorable policy is enacted for economic gains. To ameliorate problems of overaccumulation, Harvey (2006) describes spatial fix as temporary but necessary movement of capital to new geographic areas. This spatial fix is part of a continuous process of development and re-development that Harvey (2001 p. 24) largely, but not exclusively, ties to processes of Globalism. I use contradictions of capitalism, spatial fix, and environmental justice issues to conceptualize the situation in Battlement Mesa.

Specifically, through analysis of historic events at a local scale while considering the capitalist mode of production present on a larger geographic scale.

Neoliberal discourse is one potential contributor to the negative social impacts of fracking activities in the U.S. This thesis does not focus specifically on neoliberalism; however, it does identify neoliberal discourse in select situations. David Harvey (2007) emphasizes neoliberalism as one driving factor of uneven geographic development. In doing so, Harvey (2007) takes a critical approach to analyze this process. He defines the economic concept as a “mode of discourse” that universally effects “political-economic practice” to the extent that it has become the “commonsense way we interpret, live in, and understand the world” (p. 23). This discourse has led to a “wave of institutional reform and discursive adjustment” that creates “uneven geographic development” (Harvey, 2007 p 23). Social scholars who research fracking and other resource extractive industries assert that neoliberal discourse is used to help normalize impacts and justify applying cost-benefit analysis to social and ecological resources (Finewood et al., 2012; Himley, 2012). One example of doing this is framing natural gas as a “green fuel” (Finewood et al., 2012). In Colorado, problems of environmental justice associated with the commodification of shale gas lead to disproportionate social and ecological burdens on local communities relative to the economic benefits of the industry. Within political economy of nature, critical resource geography allows the analysis of how the commodification of natural resources under a capitalist system creates uneven landscapes of social and ecological distress (Delgado, 2012; Harvey, 2006). Research on

the social impacts of fracking continues to develop as a multidisciplinary issue. For instance, legal studies research addresses the absence of federal regulation for fracking activities and focuses on appropriate policy development and regulation of the oil and gas industry as it varies from state to state (Andrews & McCarthy, 2014; Davis, 2012; Stephenson & Shaw, 2013). Local government control and capacity to regulate fracking has also been a primary focus of fracking research (Pearson, 2013; Perry, 2012).

Research from the disciplines of geography, sociology, and anthropology have focused on the use of pro-fracking discourse to frame the impacts of fracking as a cost-benefit trade-off (De Rijke, 2013a, b; Finewood & Stroup, 2012; Hudgins & Poole, 2014; Malin, 2014; Mercer et al. 2014; Perry 2012). Studies in this category criticize strategies used by the natural gas industry that employ neoliberal discourse and nationalist attitudes to highlight the economic importance of fracking.

Social scientists consider few studies on the economic benefits of fracking to be independent academic research. According to Lave and Lutz (2014), the oil and gas industry has done a good job of filling the research gap with economic studies that focus on the multiplying effects of jobs and mineral leases. This is done without giving adequate attention to the cost incurred by the cities and towns where fracking occurs, or the fact that local citizens rarely hold fracking jobs. One exception to this norm is a study by Bartik, Currie, Greenstone, and Knittel (2016) titled "The Local Economic and Welfare Consequences of Hydraulic Fracturing". Bartik et al. (2016) found that in high

potential counties¹⁷ fracking activities yield economic gains that significantly exceed economic benefits in other counties. Bartik et al. (2016) created a model to calculate economic welfare impacts associated with counties in four categories of varying potential for natural gas yield. They found that economic benefits such as total income, employment, royalties, and salaries accrued by counties located in high potential shale plays outweigh the impacts to welfare such as increased violent crime and diminished quality of life (Bartik et al., 2016).

Along similar lines, scholars such as Barth (2013) and Simonelli (2014) explore the impacts associated with resource extraction activities. For example, Barth (2013) used data from past boom and bust resources cycles to address the strain on social services and damages to infrastructure, like roads in several North American locations. Furthermore, Simonelli (2014) explores how the oil and gas industry may damage the economic benefits from existing industry, such as agriculture and tourism in Pennsylvania.

Social science research on fracking is heavily focused on the socio-cultural impacts of the industrialization of previously rural areas (Brasier et al. 2011; De Rijke 2013a, 2013b; Hudgins 2013; Pearson 2013; Perry 2012; Simonelli, 2014; Willow 2014). Brasier, et al. (2011) and Hudgins (2013) explore community attitudes toward fracking activity in Pennsylvania and New York in relation to the previous existence of energy

¹⁷Bartik, et al., (2016) categorize high potential counties based on several factors that influence production such as geologic variation and timing of extraction, and compare that to a measure of welfare impacts.

development such as conventional oil and gas drilling. De Rijke (2013a; 2013b) and Perry (2012) highlight the conflict between rural family farms in Australia and the gas industry and draw attention to the complicated socio-cultural transformations that occur through the industrialization process using interview data and policy analysis, respectively. Based on data collected through participant observation, Willow (2014) argues that the new politics of environmental degradation can be classified by the blurring of the boundary between those who benefit from environmental degradation and those who bear its burdens, creating disempowerment and vulnerability.

Scholars who focus on rapid transformation due to energy development have done so through specific case studies similar to Battlement Mesa with regard to the rural landscape and community opposition (Brasier et al. 2011; De Rijke 2013a, 2013b; Hudgins 2013; Pearson 2013; Perry 2012; Simonelli, 2014; Willow 2014). Battlement Mesa, shares characteristics with other study areas covered in fracking research however, is unique due to the existence of a split estate. As described in Chapter III, residents must deal with the split estate and lack of power to have a say in the leasing process, so the social impacts explored by previous scholarly work may be amplified in Battlement Mesa. For instance, in their critical review of fracking research, Lave and Lutz (2014) assert that research conducted on the physical impacts of fracking has lacked consideration of community concerns, while social science research has primarily focused on the rapid social change produced by energy development. Lave and Lutz (2014) argue that “Fracking’s impacts are profoundly geographical, as they re-distribute

the environmental injustices associated with energy production” (P. 740). They call for more careful consideration of the cost and benefits of fracking. Lave and Lutz criticize the use of qualitative methods in fracking research but admit that current research on the physical impacts of fracking ignore important social impacts. My research seeks to address this gap by providing an analysis of relevant effects on resident well-being in a community where impacts are highly localized (Battlement Mesa). Furthermore, I compare Battlement Mesa residents’ experience with fracking activities to those who live outside Battlement Mesa and may have a different relationship to natural gas production.

Study Area

Garfield County is located in Western Colorado at 39.6000° N and 107.9000° W; it occupies 2,956 square miles (US Census Bureau, 2010) and features a diverse topography, from floodplains to high desert mountains. Garfield County is comprised of 60% federally owned land and has a population density of 19 persons per square mile with a total population of 57,302 persons (Table 1) (US Census Bureau, 2010). The county is bordered by Rio Blanco and Routt Counties to the north, Eagle County to the east, Mesa and Pitkin Counties to the south, and Grand and Uintah Counties of Utah to the west (US Census Bureau, 2010). Seventy-six percent of the county’s population live along the I-70 corridor in the Colorado River Basin. The I-70 corridor municipalities include: Glenwood Springs, Rifle, Carbondale, Silt, New Castle, Parachute, and Battlement Mesa (US Census Bureau, 2010). Garfield County ranks above average in

Colorado for median household income at \$64,902 and below the state average in life expectancy at 77.6 years (Table 3; US Census Bureau, 2010).

Table 3
Social Demographics for Garfield County

	Median Household Income 06'-12'	Population	Persons Per Square Miles	Life Expectancy (NGI, 2014)
Colorado Average	\$56,456	5,272,086	48.5	79.92
Garfield County	\$64,902	57,302	19.1	77.6

Source: Adapted from U.S. Census Bureau (2010)

Industries in Garfield County include energy development, tourism, agriculture, and retirement services (US Census Bureau, 2010). The primary case study of this research, Battlement Mesa, is an example of the intersection of the retirement services industry and the energy industry. Oil and gas development is located in concentrated pockets surrounded by more sporadic development (Figure 2). Well pad density is very high along the 1-70 corridor in the central region of the county. The eastern and north-central portions of Garfield County are largely devoid of oil and gas activity, occupied by the Whitewater National Forest to the north and the municipalities of Glenwood Springs and Carbondale to the east. Glenwood and Carbondale are the main tourist centers for Garfield County. Glenwood Springs and Carbondale are known for their beautiful scenery and more affordable pricing when compared to nearby Aspen in Pitkin County. Locals in this area joke that the millionaires relocated from Aspen to Carbondale when the billionaires moved into Aspen and made it unaffordable for those less affluent. Garfield County has an economic profile with the seemingly opposing industries of

energy development and tourism -- both central to the livelihood of county residents.

This dichotomy is visible in this research when considering how residents are responding to impacts of oil and gas development, a central question to this thesis.

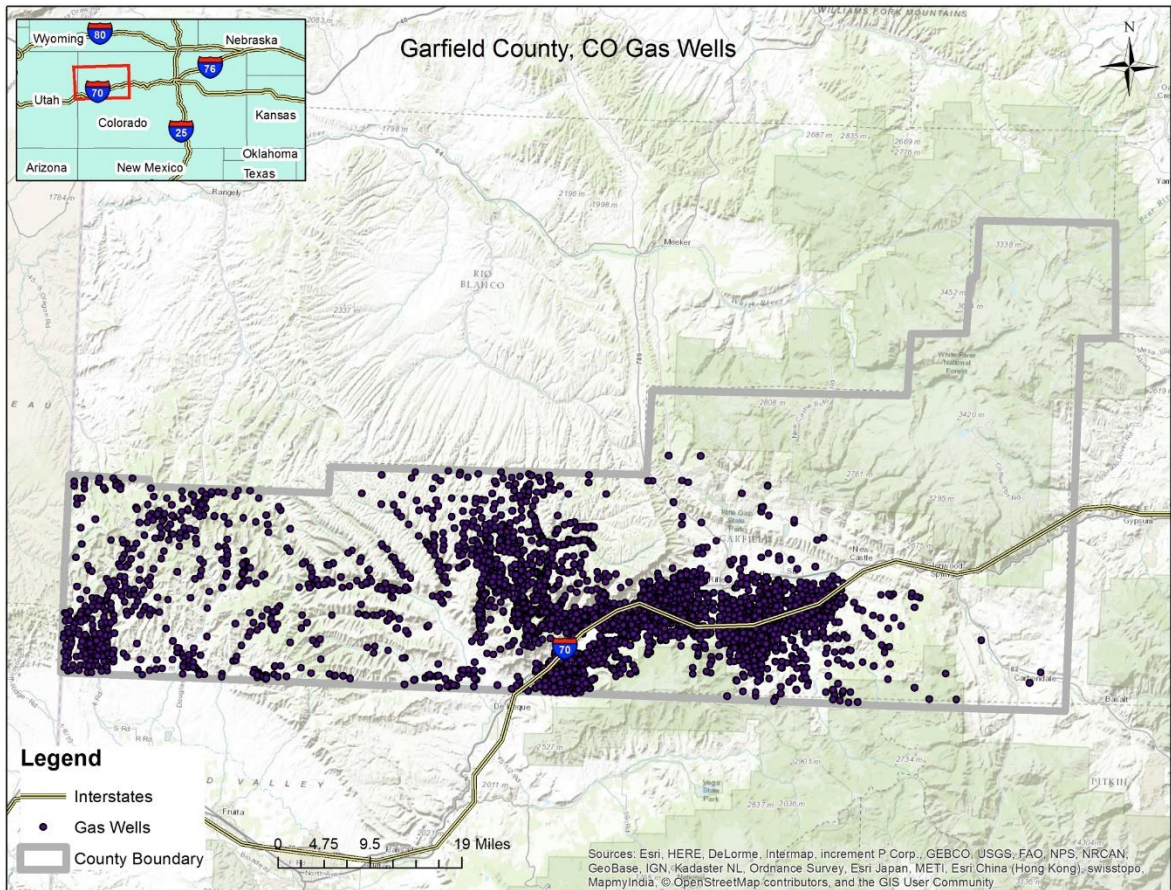


Figure 2 Study Area Map (Mallett, 2015). Purple dots indicate gas well locations.

Hydrology and Climate

The study area for this research encompasses two major drainages and watersheds of seven states that drain into the Colorado River (Castle et al., 2014).

Diversions along the Colorado River provide agricultural irrigation and drinking water across Colorado. The integrity of the drinking water supply is something to keep in mind

when considering potential impacts fracking activities may have on resident well-being. The Colorado River is also a major drinking and irrigation water source for California (Castle et al., 2013). Garfield County has an arid to semi-arid moderate mountain climate with warm summers and cool winters (Garfield County Administration, 2015). Yearly precipitation of 12 to 20 inches is critical for replenishing groundwater reserves and stream flow (CDW 2006). Occasionally intense rainfall events (Figure 2) can lead to high levels of run-off (CDW 2006) with the potential for sediment leaching and flooding. Understanding the probability of this occurring in the Piceance Basin is important because of potential natural gas well spills during times of flooding. Thunderstorms can occur daily during late summer months, making the potential for lightening to strike oil and gas equipment a legitimate concern held by nearby residents (Redmond, 2015).

Garfield County lies entirely in the Piceance Basin, a tight sand resource play made up of a mix of shale, sandstone, and coal (Johnson et al., 2009). The Williams Fork formation is thousands of feet thick and has been the most accessible gas deposit to date (Johnson et al., 2009). In addition to the Williams Fork formation, the Piceance Basin is home to the Niobrara formation. The Niobrara shale formation is largely untapped on the Western Slope due to difficulty of access, but test wells have indicated very high yields from this formation compared to that of the Williams Fork (Ursa Resources, 2013). The yield difference in one case with WPX Energy (full name) wells is an average of 12 million cubic feet of natural gas per day for a 30-day period, compared to about 1.5 million cubic feet per day for the same period at a Williams Fork well

(Proctor, 2013). Ursa Resources states on its website “Our primary development target is the Williams Fork (Mesa Verde) reservoir. This is a well-established reservoir with highly repeatable results. Secondary targets include the Mancos [of San Juan County] and Niobrara. Recent well results from WPX indicate that the Niobrara could be a highly prospective resource play in this basin” (Ursa, 2015). Battlement Mesa is located above both Niobrara and Williams Fork formations, occurring at different geological depths. A simple understanding of the shale formations located under Battlement Mesa will be useful when pondering the question of why energy companies continue to drill in Colorado. The depth and estimated productivity of varying shale plays are large factors in producing economic gains associated with fracking activities (Bartik et al., 2016).

Split Estate

The existence of split estate in the American West can be traced back to the Homestead Act of 1862, an act designed to incentivize settlement in the West. American settlers received a gift of 160 acres as long as they constructed a small building, lived on the land and cultivated it for five years (Bureau of Land Management, 2006). Land given under the original 1862 act included mineral ownership. In 1910, nearly forty years after the Homestead Act, Congress recognized that the surface land and subsurface land had different values and began retaining minerals or selling mineral rights separately. Minerals retained by the federal government are leased to extraction companies under guidelines provided by the Mineral Leasing Act of 1920 (Bureau of Land Management,

2007).¹⁸ Even though split estate law is nothing new, its existence is not common knowledge. Geographic areas where oil and gas drilling take place and areas where humans are living are not black and white. With the huge increase of gas production in Colorado, gas development is encroaching on residential areas in the state. While split estate was widely acknowledged as a big problem by the interviewees who worked in government and community organization; many individuals asserted that the problem was out of their control. When I asked about improving the law, one community organizer said: "Split estate is private property stuff; that's really difficult to change."¹⁹ One state government official I spoke with said state level efforts on mitigating the impacts of split estate focus on educating homebuyers:

We didn't create that rule [split estate] but we have to deal with that all the time . . . we have to explain that a lot to citizens and try to educate them, inform them. If they're going to buy property hopefully they're asking the right questions of their realtor. Um, to find out whether or not they own the mineral rights, typically they are not sold when somebody is buying a house in a sub division.²⁰

This interviewee frames the issue of split estate as a problem with educating the public rather than challenging or limiting the law at the federal and state levels.

¹⁸ The author does not intend to provide extensive information on the laws regarding mineral leasing procedures during this period. For a detailed description of these laws see Matthews (1985).

¹⁹ Interview, Grand Junction, July 17, 2015

²⁰ Interview, Glenwood Springs, September 15, 2015

Methodology

The data and analysis in this thesis stems from 8 weeks of qualitative research in Western Colorado from July 6 - September 23, 2015. For my entire stay in Colorado, I was based out of Grand Junction in Mesa County, located about 30 miles from the Utah border and 47 miles southwest of Battlement Mesa. Fieldwork was divided into two 4-week stages. The first period was used to establish contacts, gain familiarity with the history and social dynamics of the area, and understand the role of natural gas development in the community. During this period, I became acquainted with the Western Colorado Congress (WCC) and their work on the proposed gas development in Battlement Mesa. This sparked my interest as a potential split estate case study for my thesis.

The WCC, the GVCA, and the BCC are three groups very involved in local health and environmental issues such as fracking. I interviewed a WCC oil and gas community organizer and attended meetings for the GVCA and the BCC. Additionally, I conducted a focus group with five individuals who work on a sustainable fracking project at a working tourist ranch about 40 miles northwest of Grand Junction in Garfield County. These events served as my introduction to understanding life and gas development in Western Colorado and gave me the opportunity to meet the people who were necessary for conducting this research.

The second period of 4 weeks consisted of intensive primary research. I spent the majority of my time during this period conducting semi-structured interviews and

participant observation in Battlement Mesa and the nearby towns of Rifle, Glenwood Springs, and Parachute, all in Garfield County. I used a mix of qualitative methods in both phases of fieldwork. These methods included archival work, document analysis, participant observation, semi-structured interviews, and informal focus groups.

This thesis has three main objectives: O1) to understand the role of split estate rights in producing the social impacts of natural gas development (fracking) in Colorado; O2) to identify the relationship between split estate rights and natural gas development in a low price climate; and O3) to explore solutions to the negative impacts of the split estate natural gas development relationship. To attain O1) Role of split estate, this research asked the following question: RQ1) What are the social impacts of fracking in Garfield County? To fulfill O2) Drilling with a low commodity price this research asked: RQ3) Why are energy companies continuing to drill in Colorado despite the low commodity price of natural gas? To address the final objective O3) Possible solutions this research explores: RQ2) How are residents responding to impacts? Answers to research questions were pursued through a series of ethnographic methods. Specific methods used in this research include archival work, participant observation, semi-structured interviews, and focus groups.

Participant observation is used to help social science researchers “intellectualize” (Bernard, 2011 p. 330) knowledge they already have by getting involved as an interested party at a meeting or event and recording data on human behavior. This method is effective during short periods when the researcher speaks the same

language as their informants (Bernard, 2011). Participant observation by ethnographic researchers (Perry, 2013 and Willow, 2014) has been used to analyze the social impacts of fracking on communities. I conducted participant observation in Garfield County in the towns of Rifle, Parachute, and Battlement Mesa (Table 4). Each event of participant observation focused on natural gas development in Garfield County. All the events except the Energy Advisory Board (EAB) meeting were directly focused on the proposed natural gas development in Battlement Mesa. I attended public meetings as a member of the public, took notes, and observed. I did not get involved in these events or introduce myself to the group as a whole. I did, however, approach individuals after the meetings to ask them to be part of my study. At board meetings closed to the public, the event organizers were aware of my intentions to collect data and allowed me to ask questions during the meetings (Table 4). Participant observation helped answer RQ2: How are residents responding to impacts. I thought about this question in two ways. The first way was the physical response to impacts or the actions residents were collectively taking. The second way I thought about this question was on an individual basis, how residents were personally responding to impacts. This method proved effective because the physical part of the answer to RQ2 was easy to observe.

Semi-structured interviews are unstructured and open-ended but follow a fluid script; they are used to build on information obtained through participant observation and archival work (Creswell, 1998). Semi-structured interviewing is the best method to use in cases where the researcher will only conduct one interview per informant

(Bernard, 2011). This interview technique is used in fracking research by De Rijke (2013b) and Perry (2013). This method allowed me to ask all my informants a similar set of questions to guide the interview but also use discretion to follow leads when I felt it was useful.

Table 4
Participant Observation Conducted

Location	Event type	Number of occasions	Objective
Battlement Mesa	BCC Board Meeting	4	Understand Social Impacts and Community Response
Battlement Mesa	Public Meeting	3	Understand Public Reaction to Proposed Drilling
Rifle	Public EAB Meeting	1	Understand How Impacts Were Dealt With
Glenwood Springs	Public Hearing-Planning and Zoning Commission	1	Listen to Ursa Mitigation Proposals, Public Concerns, Opinions of Public Officials

Initially, potential interviewees were contacted through cold calling, personalized e-mails, and in person after public meetings or events. Once I made initial contacts, I approached informants through the snowball referral method – that is, I asked current informants to introduce me to other potential informants.

In total, I contacted approximately 50 individuals and conducted 15 one-on-one interviews, one group interview ($n = 4$), and one unofficial²¹ group interview ($n = 5$). The majority of interviews ($n = 12$) were conducted face-to-face and recorded with the permission of the interviewee. I followed all HSRC- IRB protocols (H15091) during the

²¹ Used as personal correspondence and anecdotal evidence only

interview process. Interviews lasted between 45 minutes and 4 hours. In cases where the interview was conducted over the phone ($n = 2$) or the interviewee was not comfortable with the audio recorder ($n = 1$), I took written notes with permission from the interviewee. Official interviews, where informed consent was obtained, are used in this thesis as empirical evidence. In order to remove identifiers and for the privacy of my interviewees, pseudonyms are used for all individuals referred to in this research.

During each interview, I attempted to take detailed notes from three perspectives: analyzing myself, recording my feelings toward the day and the interview; objective notes about what the interviewee was saying; and third person notes about the scene and interview itself. I used the multi prospective interview notes to analyze interview data during both fieldwork and the analysis phase of my research. In the field, I reviewed notes for topics that interviewees were passionate about, seemed nervous to discuss, seemed dishonest about, or avoided. I then considered this when preparing for my next interview, assuring to ask similar questions to the next interviewee and measuring their response. During the analysis phase, I consulted my field notes as a resource when interviewees provided conflicting information regarding a specific subject.

This study sought to contact and interview local government officials, oil industry professionals, scholars, community groups, and residents to gain a multi-faceted view of issues and perceptions related to fracking in Garfield County. Table 5 details who I interviewed and the focus of the interview. Some of the people I interviewed had

multiple roles in the community related to oil and gas and could have been placed under more than one interviewee category. I list people in the category based on the capacity in which I interviewed them. For example, many of the residents are also part of a community organization but our interview was based on their personal experience rather than in a professional capacity; therefore, I listed them in the resident category. Sample interview questions are available in Appendix A of this thesis.

Semi structured interviews are the central method of data collection used in this thesis. I used interviews to help answer each one of research questions. In combination with participant observation, I used interviews to gain understanding of RQ2: *How are residents responding to impacts* on an individual level. In collaboration with archival work, I used interviews to answer RQ3: *Why do gas companies continue to drill*. While focused on this question I took advantage on the semi-structured nature to ask “Why?” when it was appropriate. I was careful not to be suggestive with my questions, for example, I only asked about export potential once the interviewee brought it up. The one exception to this was when I spoke with an energy company representative. In this case I asked if the representative would like her/his company to export gas. Interviews were especially vital in answering RQ1: *What are the social impacts of fracking in Garfield County*. While the word cruncher helped identify tangible impacts of fracking in Garfield County, interviews were the main way I identified the non-tangible impacts of fracking activities. Content analysis is used in this research by analyzing text documents for recurring themes and commonly used words. Originally developed by Laswell (1927)

to study propaganda, content analysis gained popularity among social scientists in the 1950's. MacNamara (2005) suggests present application for content analysis is to examine a broad range of 'text'.

Table 5
Interview Participants and Theme

Interviewee Category	Number of Interviews Conducted	Main Focus of Interview
Community Organization Representative	Three	-Social Impacts -Community Response
Industry Professional	One	-Why Drill in Low Price Climate -Community Relations -Mitigation Measures for Proposed Drilling.
Local Government Employee	One	-Social Impacts -County Fracking Rules -Split Estate -Community Response
State Government Employee	One	-Relations Between Industry and Government -Why Now -Social Impacts -State Regulations
Local Scholar	One	-Social Impacts -History of Oil and Gas -Geopolitical Significance -Environmental Movement
Journalist	One	-Social Impacts
Local Residents Who Do Not Own Minerals	Seven	-Social Impacts -Split Estate -Opinion of specific plans
Local Activists	Two	-Social Impacts -Why now
Ranchers Who Own at Least a Portion of their Minerals	Two	-Social Impacts -How they Negotiated -Potential Export

Text applies to anything from interview transcripts to newspaper and magazine content (p. 1). Perry (2011; 2012) uses a form of content analysis (interpretative policy analysis) to inform her research on social justice and resource conflicts. To do so, Perry (2011) analyzes and interprets government documents, research reports, media coverage, and public testimony to determine ways people are responding to rapid energy development (Perry, 2011).

Text documents used for content analysis in this thesis are broken up into three groups: interview transcripts, newspaper articles related to oil and gas drilling, and the EAB meeting minutes from 2007-2015. The word cruncher function of the qualitative data analysis software *Atlas Ti* was used to compare the complete text of documents within each group and statistically analyze the frequency of each word. This was used to help answer RQ1: *What are the social impacts*. The Word Cruncher Analysis provided examination of a larger data set than it was possible for me to gather using interviews and participant observation alone.

It can be expected that the words *oil* and *gas* be exhibited in the analysis more often than others are because oil and gas development is the topic of this research. Each group of text documents is included because of its focus on oil and gas development. The purpose of doing this is twofold-- to act as a preliminary analysis on the impacts of fracking and to serve as a form of quantitative inquiry to validate qualitative findings of this research. In doing so, this portion of analysis reduces bias that is inevitable when conducting in-person interviews (the fact that the researcher

influences the data with the questions asked). To account for this, this research compares interview data to other text documents on fracking in which the interviewer was not involved in influencing content. Text documents are broken into three groups for the purpose of analysis. The groups consist of in-person communications with the author (interviews), public comments and complaints (EAB hearing transcripts), and news articles and opinion letters published in local newspapers. To perform the content analysis, commonly used words and identifiers were removed from the analysis (i.e.: and, he, she, the, then...) and the word counts were exported into an Excel spreadsheet. The word cruncher was helpful in calculating words used to describe tangible impacts (i.e.: noise, pollution, odor) of oil and gas development, but physically intangible social impacts (i.e.: stress, disempowerment, fear) that can be described in many different ways had to be analyzed using a fine-grained qualitative analysis. For this reason, interview transcripts require additional more in-depth coding and analysis.

Complete interview transcripts were coded for recurring themes and analyzed through the lenses of political ecology and political economy. For the analysis through the lens of political ecology, I thought about the interaction between specific interviewees and their environment, as well as the power dynamics between groups and individuals in the community. For political economy, I considered how large-scale factors such as global commodity price, energy security, and global politics affects the smaller-scale nature-society relationship. One example of how I did this is by thinking about how top-down social processes (such as the fracking boom) and federal

regulations (or lack thereof) influenced residents of Garfield County and Battlement Mesa.

The comparison of multiple data sets or data triangulation as described by Creswell (1998) and Bogdam & Biklen (2006) is a form of validating data by cross-referencing two or more sources to confirm accuracy. Triangulation identified similarities and differences among opinions of individuals gathered in interviews, media sources, and documented opinions of citizens over the last ten years. Additionally, referring back to my multi-perspective interview notes has allowed me to create a narrative of my fieldwork experience and intertwine that with physical data. Qualitative interview data, when combined with archival work and content analysis, provide place-based data on community responses to oil and gas development. Slowly, as more scholars study the impacts of oil and gas to local communities using mixed qualitative methods, a scholarly data set will grow and findings may be compared in a meta-analysis on a regional, national, or international level. My research contributes to this larger qualitative data set currently in development.

Outline of Thesis

This thesis is organized into six chapters broken up as follows: Chapter I presents the introduction to the research problem, the purpose of my study, the significance of this research, a literature review, the methodology used to collect and analyze data, and a thesis outline. Chapter II is focused on the resource extraction history of Battlement Mesa, the community of people that reside there now, and split estate law. In this

chapter I provide a historical and social context for examining fracking activities in Garfield County through the lens of political economy. The purpose for doing so is to set the stage for analyzing the nature society relationship present in Garfield County and Battlement Mesa, especially as it relates to energy development. Chapter III provides an analysis of the social impacts of fracking in relation to split estate land-ownership situations. In doing so, I argue that split estate, at least in part, is contributing to the negative social impacts of natural gas development in Garfield County. The purpose of this is to make the connection between split estate ownership law and the impacts of oil and gas development. Chapter IV presents an analysis of the social impacts of drilling in Battlement Mesa. I argue here that drilling in Battlement Mesa may be causing environmental injustices because the benefits of fracking activities are widely distributed while the burdens of development are extremely localized in communities like Battlement Mesa. Chapter V discusses a broad scale analysis of geopolitical factors that incentivize drilling, supra-national trade agreements, and natural gas exports. In this final analysis chapter, I argue that the potential for natural gas exports, to some degree, is incentivizing fracking activities in Garfield County. The purpose of doing so is to make a connection between the pursuit of U.S. natural gas exports and an increase in fracking activities at home. Chapter VI is comprised of concluding remarks, recommendations, and suggestions for further research. The purpose of this chapter is to answer my research questions and provide a final theoretical analysis of fracking activities through the lenses of political economy of nature and political ecology.

CHAPTER II

THAT'S THE WAY THINGS ARE HERE

Introduction

In the midst of a dramatic week of meetings and hearings for BCC, I sat down with five residents who willingly shared their experience. Speaking about her/his awareness of oil and gas activity, one resident stated:

It's just everywhere, you can hardly look anywhere and not see some evidence of oil and gas. Whether it is a flame burning in the distance or it's a big tank that's in front of things, or the terrible stack they've got over there by monument that's just ugly as homemade sin. The progress in terms of the oil company feels to me like it's been very creeping and spreading along in time. I think from the oil companies' perspective, we're like a company town. Because oil money built the rec center, it built the golf course, it built all of our medical facilities, so it kind of seems like we should all be, but we're not all, on the company payroll. That's the difference [between Battlement Mesa and a company town]...I don't know if anybody [has] all the answers. But I do think we have to really look at this relationship between [the] oil company and the residents.¹

This focus group participant described the dichotomy between the interests of many long-term Battlement Mesa residents and the oil and gas companies who hold mineral interests. The participant explains why this dichotomy is not completely obvious to an outsider; at first glance, Battlement Mesa seems like a company town.² Many residents, however, are not on the company payroll. To say natural gas development is prevalent in Garfield County is a bit of an understatement. Hopping on a flight from Grand

¹ Focus Group September 21, 2015, Battlement Mesa

² A company town is a community that is solely dependent on one company or firm for all aspects of town life such as employment, housing, goods, and services (Company Town, 2016).

Junction to Denver on a clear day provides a unique vantage point to view some of the thousands of well pads on the Western Slope.

The objective of this chapter is to provide background information necessary to understand the nature-society relationship as it relates to natural gas development in Garfield County Colorado, a central driver of this research. This chapter describes historical events and existing laws that help set the stage the overarching argument and answering the research questions. Specifically this chapter identifies how spatial fix has been used in the past to ameliorate capitalist crisis in Battlement Mesa. Additionally, it gives background information for the research question pertaining to residents' response to impacts of gas development. In order to explore notion of spatial fix further, we must first look at past events, current stakeholders, and the structure of governance informing the nature society relationship in Garfield County with a broad lens.

Overaccumulation and underconsumption are intrinsic crises of capitalism that force society to deal with contradictions by changing production (O'Connor, 1998). Over accumulation occurs at the point in which the re-investment of capital no longer produces returns and at this time "surplus of devalued capital and excess labor exist side by side" (Harvey, 2001 p. 26). To ameliorate problems of overaccumulation, Harvey (2006) describes spatial fix as part of a continuous process of development and re-development that can be physical or geographical. In this chapter, I focus on the physical development and re-development in Battlement Mesa associated first with oil shale and later with retirees.

Battlement Mesa PUD is an unincorporated, covenant controlled development, that does not have a governing body or central government. Garfield County holds jurisdiction over Battlement Mesa because of its unincorporated status. Understanding the difference between an unincorporated development and a city, town, or rural area is important when considering RQ1: What are the socio-environmental impacts of split estate in relation to natural gas development (fracking) in Garfield County? In a typical split estate situation, there are two main stakeholders, the mineral rights holder (energy company) and the surface rights holder (home owner). In Battlement Mesa, however, there are three parties: the mineral rights holder (Ursa), the landowners (residents), and the surface rights negotiator (Battlement Mesa Partners). Although residents do own the surface rights to their land and pay property taxes accordingly, they have very little to no influence on how the surface use agreement is negotiated. In fact, the first surface rights agreement was produced in 1990 and not formally recorded with the county until 1999³. Many residents have been left completely in the dark regarding plans for oil and gas drilling in their neighborhoods. This chapter seeks to explain in part why this exists in the first place using historical data and theories about contradictions of capitalism and spatial fix. In this chapter I argue that as a result of the capitalist mode of production, capital investment was built up overtime in Battlement Mesa, and spatial was used as the result of a crisis.

³Authors field notes. Recorded during participant observation September 18, 2015. Battlement Mesa.

This chapter is divided in to five sections. First, I look at natural gas production rates at a local scale, this will help paint a picture of what the fracking boom looks like in numbers. Second, I provide a detailed description of the history of Battlement Mesa in order to provide context for the current debate between Battlement Mesa residents who oppose drilling, and Ursa Resources, the company pursuing a 200 gas well project within the boundries of the PUD. Third, I introduce local governance and fracking laws to demonstrate that Battlement Mesa is under unique jurisdiction, and to set the stage for a full description of split estate law in Chapter III. Fourth, this chapter describes a few of the group actors with a stake in the Battlement Mesa project. Fifth, I explain the current efforts of the community organizations trying to stop or minimize impacts of fracking activities in Battlement Mesa. This chapter concludes by remarking on the potential precedent set if drilling is, or is not allowed in Battlement Mesa.

Natural Gas Consumption and Production

Natural Gas extraction and production varies widely by county in the Piceance Basin (Table 6; Table 7). Garfield County accounts for by far the most production: 653.402 billion cubic feet (bcf) of the 783.195 bcf produced in the entire basin in 2013 (COGCC, 2014). The “fracking boom” began here in the early 2000’s and peaked in 2012 with a total of 1,689 new wells (Webb, 2015).

Table 6

Piceance Basin Annual Natural Gas Production by County 2000- 2006 (Bcf)

County	2000	2001	2002	2003	2004	2005	2006
Delta	0.001	0.005	0.006	0.002	0.025	0.401	0.065
Garfield	70.305	88.285	116.868	149.824	209.714	270.231	351.613
Gunnison	0.121	0.11	0.04	0.079	0.079	0.007	0.556
Mesa	5.668	5.027	7.695	9.345	7.807	10.755	15.478
Moffat	19.544	17.489	19.178	18.527	19.557	19.521	19.742
Pitkin	0	0	0	0	0	0	0
Rio Blanco	31.24	31.414	35.936	34.159	33.622	37.579	48.159
Total (Bcf)	126.878	142.33	179.723	211.935	270.804	338.495	435.612
Total (MMcf/d)	346.7	389.9	492.4	580.6	739.9	927.4	1193.5
Y/Y%							
Change	N/A	12.50%	26.30%	17.90%	27.40%	25.30%	28.70%

Source Adapted from Colorado Oil and Gas Conservation Commission (2014)

Table 7

Piceance Basin Annual Natural Gas Production by County 2007- 2013 (Bcf)

Country	2007	2008	2009	2010	2011	2012	2013
Delta	0.019	0.026	0.01	0.009	0.015	0.061	0.153
Garfield	443.4	565.152	610.868	648.453	676.333	702.767	653.402
Gunnison	1.183	1.475	1.41	2.078	1.901	1.974	1.477
Mesa	30.651	45.788	38.476	37.992	41.662	47.134	37.105
Moffat	16.15	20.169	17.082	19.345	18.252	17.011	16.955
Pitkin	0	0	0	0	0	0	0
Rio Blanco	48.119	54.468	76.041	99.841	106.274	90.586	74.103
Total (Bcf)	539.552	684.079	743.887	807.781	844.436	859.534	783.195
Total (MMcf/d)	1478.1	1869.1	2038	2212.9	2313.5	2348.5	2145.7
Y/Y%							
Change	23.90%	26.40%	9.00%	8.60%	4.50%	1.50%	-8.60%

Source: Adapted from Colorado Oil and Gas Conservation Commission (2014)

New gas well activity is in part by the number of active drilling rigs in the county; rigs and operating crews are generally contracted out and move from state to state, based on need. Garfield County saw an average of only three active rigs at any given time during 2015, compared to an average of 18-20 active rigs during the 2009-2013 period (Webb, 2015). Over the 15-year period from 2000 – 2015, an estimated 11,000 new wells were drilled, fracked, and entered into production. Initially, it was unclear to me why energy companies continue to drill despite the low commodity price of natural gas (Figure 3). My interest surrounding Ursa's pursuit of natural gas projects in Battlement Mesa inspired (RQ3) Why are gas companies continuing to drill in Western Colorado despite the low commodity price of natural gas? One strategy used by energy companies is to drill wells and cap them so they can be fracked and start producing in the future when the commodity price of gas is higher. However, other factors, such as variance in global LNG prices may provide incentive for continued drilling. Analysis connected to reasons energy companies continue to drill in a low-price climate (RQ3) is located in Chapter V of this thesis. The oil and gas companies WPX Energy and EnCana Corporation are the two major natural gas extractors in the Piceance Basin; together they are responsible for 67.8% of production (NGI, 2014). Some minor producers in the basin include the Bill Barrett Corporation, Chevron, Occidental Petroleum, and Exxon Mobil/ XTO Energy (Table 8); additionally, 67 other companies hold mineral rights that represent the potential to develop 1,842 acres of land in the county (NGI, 2014).

Percentages of total sales in Table 8 include conventional oil as well as natural gas in the Piceance Basin.⁴

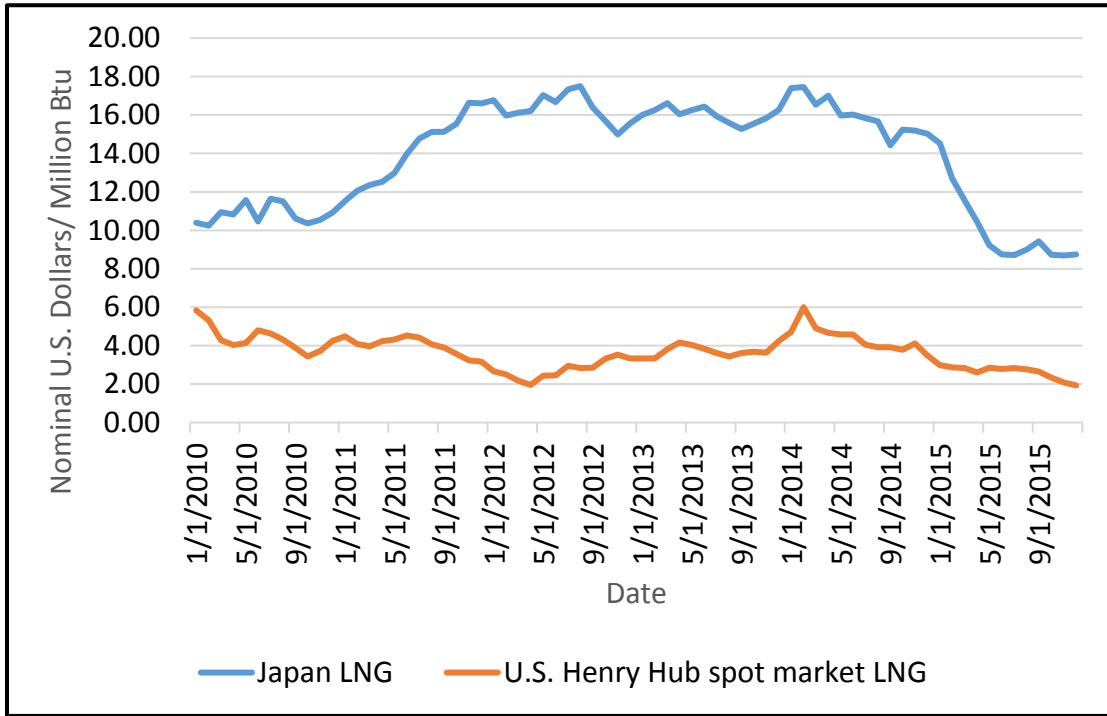


Figure 3: Japan and the U.S. Natural Gas Prices 2010-2015 Adapted from Energy Information Administration (2016c)

Table 8
Top six Gas Producers in the Piceance Basin

Rank	Operator	Gas Sales (Mcf*)	% of Total
1	WPX Energy	292,522,523	36.40%
2	Encana	251,773,602	31.40%
3	Bill Barrett Corporation	44409043	5.80%
4	Chevron	10965391	4.40%
5	Occidental Petroleum	46195832	5.80%
6	Exxon Mobil/XTO Energy	16405760	3.30%

*Mcf equals the volume of 1000 cubic feet of Natural Gas

Source: Adapted from Natural Gas Intelligence (2014)

⁴ Occidental Petroleum ranks third in natural gas production but fifth in overall production when including traditional oil production.

In addition to the major and minor corporations extracting gas in Garfield County, there are a handful of very small privately held companies extracting Piceance gas. Each of these companies has the potential to operate in its own unique way. In the Colorado Energy Industry, the size and make-up of a company matters. Small, privately held companies are less susceptible to pressure from shareholders. They have more flexibility in deciding when and how they will drill. On the other hand, large companies such as Anadarko Petroleum and Exxon Mobile have big budgets for research and development, access to the latest technology, and multi-phase development plans that could in the end have less impact on the environment and local population. Because energy companies have some freedom in choosing how they want to operate, not all companies can be thought of with the same regard. Some companies have a much better reputation than others-- a fact that both energy companies and the local population are aware of. Energy companies who have a good track record working with the community take pride in that. One community organizer stated: "our operators work very closely with the residents and are very respectful of them". Others have improved their conduct greatly over the last four years. Speaking about her/his first impression of operators who sit on the EAB, one county employee stated:

Those meetings were an eye opener, that anger. Actually, on the board, the misbehavior and cannibalism, they were chewing on each other. So when I got here, and they were still kind of doing that four years ago, I just made it my mission to

communicate and educate these folks, and get them to work as a team, which you probably saw they pretty well did.⁵

This interviewee is describing a shift in operator attitudes from competitive and distrustful in 2011, to more cohesive at the time of this interview in 2015. This in-turn leads to better outcomes for citizens dealing with gas development because the EAB members can cooperatively respond to community concerns rather than simply point fingers. In addition to community pressure, there is a climate of self-policing among the energy companies in Colorado. Described to me by one county employee with the following statement:

Now you have the companies self-policing. They are more organized, they communicate, they have like the other day after the Northwest Oil and Gas Forum, there was an operators' task force meeting. And it was all the operators in the area basically, they met them all and went through their sort of usual issues. And so they put pressure on each other saying "look we're both operating over here, we're getting filleted over here and I know darn well it's your guys' drivers that are causing the problems, and you need to cut it out."⁶

The notion is that they will keep each other in line through social pressure. If one company is involved in a scandal or disaster, then it sheds negative attention on the industry as a whole.⁷ Since 2006, energy companies have improved their collective

⁵ Interview September 9, 2015, Rifle

⁶ Interview September 9, 2015, Rifle

⁷ Author's personal correspondence, 2015

conduct dramatically. However, the direct relationship between county residents and the oil and gas industry has been influenced by a longer history of oil and gas in the area. In the specific case of Battlement Mesa, the oil shale boom and bust in the 1980's has had a significant impact.

History of Battlement Mesa

The towns on the Western Slope of Colorado have a few key characteristics: physical isolation, rapid urbanization, an industry dependent on natural resource extraction, and quick declines and increases in population tied to the commodity price of the resource (Gulliford, 2003 p. 3). Battlement Mesa was no exception to this characterization when Exxon moved in, responding to a push for homegrown fuel. In the midst of the Organization of Petroleum Exporting Countries (OPEC) oil crisis, energy self-sufficiency was a top priority for the Nixon administration (Miller & Blevins, 2005). For example, in his work on the oil shale boom and bust, Guilford (2003 p. 198) argues that "boomtown changes in the valley were a direct result of a national oil crisis, heightened by a president's insistence that energy self-sufficiency become the moral equivalent of war and the creation by Congress of the Synthetic Fuels Corporation" (Gulliford, 2003 p.198).

Many energy companies at the time believed that the future of America's energy landscape was in synthetic fuels, and they had particular interest in oil shale. Oil shale is a kerosene-like substance that requires a combination of applied heat and a conventional mining technique known as thermal dissolution (Muller, 2012). Oil shale

must go through a transition to add hydrogen and remove sulfur and nitrogen components in order to be used as a fuel (Smith et al., 2007). Exxon published a white paper to articulate the possibilities for prosperity in “The Role of Synthetic Fuels in United States Energy Future” (1980). Exxon also assumed that technology would advance as long as they invested ample amounts of money into making the project work. Several energy companies, including Tosco, Unocal, Mobil, Chevron, Conoco, Occidental, Consortium, and Phillips, planned oil shale extraction facilities in Garfield County, and the boom was in full swing by 1980 (Mackley et al., 2013).

Exxon promised a level of production with the Colony Shale Oil Project much higher than that of its competition; they committed to producing 50,000 barrels of natural gas per day (bpd) in 1985, and 1.5 million bpd by 2005 (Gulliford, 2003). The population of the Western Slope was predicted to increase exponentially as well, growing from about 100,000 people in 1985 to 1.75 million people in 2005 (Gulliford, 2003). Exxon’s plans were overly ambitious, technologically speaking. The arid Colorado River Basin could not meet the industry’s need for fresh water and a technological fix for innovation in extraction technology did not occur as investors had hoped. Ultimately, the 1982 decrease in global oil prices caused Colony’s viability to vanish. On May 2, 1982, a day known in the Rocky Mountain West as Black Sunday, Exxon suddenly abandoned the Colony Oil Shale Project. Immediately 2,770 employees were out of work. This had reverberating effects on the local economy. More than 7,000 contract and consultant jobs disappeared and the many community support employees such as

health professionals and educators had no choice but to move away. After the bust, migrant workers continued to arrive in Garfield County; the community was in desperate need of social assistance for many unemployable and transient workers. Therefore, the cycle of boom and bust continued. This bust is an example of what Harvey (2001) may call a crisis of capitalism. The oil shale bust in 1982 led to a massive devaluation (bankruptcies, unemployment, unsold commodities (oil shale) where "surplus of devalued capital and excess labor exist side by side" (Harvey, 2001 p. 26). A new strategy was necessary to continue production without losing the capital investment already imbedded into the landscape such as the land, minerals, and facilities. In an effort to recover a small amount of losses, and further secure their presence in Battlement Mesa with spatial fix, Exxon advertised the area as a retirement community almost immediately following the oil shale bust of 1982. The initial spatial fix in Battlement Mesa was a physical re-investment designed to change the landscape and done to buy time until technology could make resource extraction viable once again. Retirees were ideal candidates for taking up residence in Battlement because they did not need employment and commonly lived on a fixed income. Eventually in the late 1980's, Exxon formally sold the surface rights of land where the community sits to Battlement Mesa Corporation, retaining mineral rights in the process. This transaction created the current situation of split estate⁸ in Battlement Mesa. Although this thesis does not focus directly on the social impacts of boom and bust, several interviewees

⁸ See Chapter III

spoke about it in some capacity. One community organizer described the current issue residents of Battlement Mesa face as a residual impact:

With oil shale in the [19]80's, there is a day, you can ask people anywhere in the state about Black Friday, when Exxon Mobile, just Exxon at the time, they closed down an oil shale production and overnight they unemployed thousands of people. You know that has huge social impacts. It hugely impacted Rifle; it impacted Grand Junction, put a lot of people out of work; a lot of people left. One of our biggest fracking fights is kind of a remnant issue of that.⁹

It seems in part that Garfield County residents speak of the oil shale boom and bust as a past nightmare that has resurfaced for Battlement Mesa residents through the existence of split estate. Some residents see the boom and bust coming full cycle. One interviewee related the impacts of the 1982 bust to a fracking boom in recent years. She /he remembered:

I was quite involved with [a local charity], in 2004 when pretty much all of the federal lands were opened up for leasing. And I could see the social impacts. Of course, I saw all the social impacts during the oil shale boom and bust, so I was kind of, you know, prepared. I mean I could identify some of those impacts.

This quote demonstrates a theme that I encountered with many of my interviewees, the tendency to compare the recent boom cycle to previous ones. Other residents are distrustful and are skeptical of energy companies' such as Antero and Ursa Resources to drill for natural gas. One resident shared her/his belief:

I developed my own theory. I think that much of this stuff on the fact that there are still a lot of people believing that oil shale will someday make its comeback and that will be the eight million gallons of oil a year that will make another big boom. They are trying to save aspect because they have invested heavily in

⁹ Interview, July 17, 2015, Grand Junction

properties here, and would like to develop that. So, they want the oil people to stay at it and stay with it.¹⁰

This resident believes that Ursa may have an ulterior motive to act as a placeholder for oil shale development in the future. This is an example of the distrust some residents have toward energy companies, due in part to the history of Exxon's Colony Project. Other residents I spoke with had different ideas about the return of oil shale. Two community organizers discussed their skepticism during a lunch interview after a public meeting in Battlement Mesa:

Interviewee 2: Speaking of oil shale, that's actually one of the ones that we're trying to wrap up. It's been this huge delayed process to get the BLM to update their oil shale rule and we've been part of a suit to force them to update their rule and they've been dragging their feet about it for years.

Interviewee 1: "But with the fracking of natural gas, really oil shale is dead."

Interviewee 2: "That's what they say. But then you know they still do all this maneuvering in the background. Why?"

Interviewee 1: "I think it's a stunt to get the land."

Interviewee 2: Yeah, it's all a shell game. Like getting the permits, getting the land, for future investment. I keep saying that to my friends who are working on the tar sand mining, man they keep moving forward with that thing. It's amazing, I'm just shocked. Because I still am convinced, it's an investor game but they've done an incredible amount of work out there in just one year.¹¹

Similar to the previous interviewee, both of these people display a level of distrust for local government officials and the oil companies involved in energy development in Battlement Mesa. The first interviewee foresees an attempted revival of the oil shale

¹⁰ Interview September 8, 2016

¹¹ Interview September 22, 2015, Battlement Mesa

project. The following two interviewees are inconclusive but question the motives of investors and rule makers. After all, Battlement Mesa does not function as a typical city or town with a local government. They fall under the jurisdiction of Garfield County and based on governance alone do not have the power to regulate the fracking activities within their own development. But there is not a clear-cut set of laws. In Colorado, authority to regulate fracking varies county-by-county (Davis, 2012; Minor, 2014; Rinfret et al., 2014).

Local Politics and Governance

The local governments in Colorado each maintain a varied scope of power (Minor, 2014). The four main types of local government in Colorado include: “home rule municipalities, statutory municipalities, home rule counties, and statutory counties” (Minor, 2014). Each local government has a slightly different authority to regulate fracking (Davis, 2012; Dennison, 2004). Home rule authority means to hold “all powers necessary and proper for local government”; this is protected by the Colorado Constitution and applies to both municipalities and counties (Minor, 2014 p. 90). Under statutory governments, specific authority is granted under Colorado statute, the limiting factor is that municipalities and counties have specific powers related to issues designated by the general assembly (Minor, 2014). Garfield County is a statutory county, meaning its power is defined by the Colorado Statute and has very little regulatory control of local natural gas development unless it is within the boundaries of a municipality or unincorporated development such as Battlement Mesa (Dennison,

2004). A special use permit, granted by the county, is required when drilling is proposed for such areas. Essentially, county commissioners who reside more than an hour away from the proposed development in Battlement Mesa hold the ability to decide whether heavy industry is developed in that community.

The Garfield County Oil and Gas Division (GCOCD) serves as a nexus between community members and the energy industry (Garfield County Administration, 2015). GCOCD reports to the state permitting body, the Colorado Oil and Gas Conservation Commission (COGCC) (GCA, 2015, COGCC, 2015). The Garfield County EAB, under the GCOGD authority, provides a public forum for stakeholders to promote communication in order to minimize conflict between citizens and energy companies (GCA, 2015). The EAB is charged with investigating citizen complaints and helps energy companies come up with solutions to mitigate claims (GCA, 2015). Similarly, the organization Community Counts is a 501c3 non-profit that works directly to mitigate citizen concerns and complaints. They are available 24 hours per day to support residents on issues such as noise, odor, light pollution, and traffic. Community Counts offers classes to operators on how to engage with the community and provides “good neighbor” certifications for completion of that program¹². To the best of my knowledge, this is an organization and practice unique to Western Colorado. While support organizations seem to be abundant, they made little mention of any non-tangible impacts, instead focusing mainly on tangible nuisance impacts of energy development.

¹² Interview September 3, 2015

Stakeholders and Community Makeup

While conducting interviews, several informants mentioned that oil and gas is entrenched in the communities of the Western Slope. From campaign finance, sponsorship of major events, donations to non-profits, direct financing of community college programs, funding for hospitals, schools, and libraries, to support and funding for local government programs, it is difficult to find a public or private entity that does not somehow benefit monetarily from the industry. It is not completely clear how much money Garfield County directly receives on an annual basis, but a snapshot of the 2013 budget suggests that 36% of all county revenue resulted from oil and gas, representing \$39,181,538 of \$107,938,349 in total revenue (EAB, 2013). In this excerpt from an EAB report, one financial analyst stated: “The economic and fiscal impacts of the energy industry in Garfield County are significant to the financial well-being of Garfield County, both to the government and the area economy as a whole” (EAB, 2013 p 49). This person also asserted that economic impacts are not calculated to factor in “individual user benefits or broader social impacts such as changes in amenity or quality of life factors” (p. 4). Interpretation of this statement suggests impacts can be both positive and negative - largely dependent on the individual. Individual user benefits could be referring to the cheap gas prices loosely tied to the gas drilling in the area, or it could be referring to the lack of individual user benefits for the average Garfield County resident who does not work for the oil and gas industry. Access to amenities is likely referring to the increased investment in community infrastructure like libraries, schools, hospitals,

and parks; I perceive these as largely positive benefits for residents. However, oil and gas funding for vital services such as education and health clinics may influence subjects taught and care given. Quality of life factors may include royalty money earned by individual landowners with mineral leases, but it also includes the negative impacts to well-being when residents do not invite drilling activity. Residents, who claim that social impacts and quality of life factors are just as important as economic impacts, analyze the county's view of oil and gas development and suggest a more precautionary approach. One community activist shared thoughts on the matter:

I had felt that, "Why don't we have legislation that does a complete analysis?-- Maybe like what they do in Europe--and a rating system like, 'Okay, this is how the natural gas will help our economy. This is why it will help lessen pollution in cities if we use [more] natural gas.'" And then, on the other side . . . You know, the negative side: "we're polluting the groundwater, we may be making people very ill. We don't know the aftermath of all of this in any event. Our earthquakes caused by rumblings, and stuff like that." Then we take that information and we just say, "you know what? This is not worth it."¹³

This interviewee described a view that legislators at the federal and state level must consider externalities related to fracking activities when constructing policy around natural gas development. In the absence of this described evaluation system, the burden of protecting residents from the negative impacts of fracking activities, falls largely on the citizens themselves. On a local level, this may be another contradiction going forward. According to Harvey (2001) capital "has to build a fixed space or landscape necessary for its own functioning ...only to have to destroy that space and

¹³Interview, September 22, 2015, Grand Junction

devalue much of the capital invested therein at a later point in order to make way for a new spatial fix at a later point in its history" (p. 25). I consider the ability for natural gas drilling to devalue home prices and diminish quality of life as the applicable contradiction to Harvey's theory. This is inevitable in Battlement Mesa because capital must maintain a constant flow and new fixes are necessary to produce profit. I will discuss the next potential spatial fix in Battlement Mesa later on in this thesis in Chapter V (page 106).

The WCC, and its subsidiary, GVCA are community organizations that advocate on residents' behalf. Currently, both organizations are working with the BCC to eliminate or reduce natural gas drilling and its subsequent impacts in Battlement Mesa PUD. The WCC and sister organizations do not oppose oil and gas development in Garfield County as a whole. Instead, they acknowledge that the industry is a vital part of the county's economy and recognize the potential threat to human well-being that gas development represents as it moves closer to where humans live. One state government official noted the changing concentration of wells per pad, and articulated how drilling activity and people are moving closer to each other:

The trend is multiple wells from a single pad, instead of a single well every forty acres. We're seeing these multiple well pads where wells go down and horizontally out in many [directions], up to ten, or twenty, or thirty wells sometimes. And closer to people, because Colorado has a greatly expanding population and there's a lot of urban sprawl along the front range especially, so towns are moving out. And some cases they are moving into areas that historically had a lot of oil and gas development, so it's not just oil and gas

moving into where people are, but there are a lot of people moving into where oil and gas has historically been.¹⁴

This statement honestly articulates the situation of residents in Battlement Mesa.

Natural resource extraction existed in the area before most residents moved in.

However, with increases in technology, the concentration of gas wells has increased significantly. Antero's original proposal for natural gas drilling in Battlement Mesa consisted of 14 wells on 14 pads. Ursa's proposal calls for up to 200 wells on ten gas pads in the same area. Discussed later on in this chapter, the high concentration of wells combined with the high population density in Battlement Mesa (relative to the surrounding area) causes concern for community groups and residents.

In 2010 Battlement Mesa had 4,417 residents (US Census Bureau, 2010). Current estimates are slightly higher at 4,540 residents (US Census Bureau, 2014). Residents' median age is 38.7 years and residents age 55 and older make up 30.3% of the population (US Census Bureau, 2014). The ethnicity of the population is predominately white, 22.7% of which are Hispanic or Latino; a small number of residents are American or Alaskan Native (3.1%), other (3%), and Korean (0.5%). Battlement Mesa Partners continues to advertise the residential area as a retirement community; however, it has become the semi-permanent home to many oil and gas employees and their families. (Many oil and gas workers follow job availability and relocate accordingly). There is a great divide on ideals and way of life between the retirees and the working families. Oil

¹⁴ Interview, September 15, 2015, Glenwood Springs

and gas is a polarizing topic among residents. One interviewee shares her/his concerns this way: “The fabric of the community changed so you know, there’s more families, more blue-collar folks that [are] living in a paycheck-to-paycheck kind of situation. And so the retirees don’t have an awful lot in common with those people.”¹⁵

Retirees are desperately trying to keep the industry out while working families depend on the industry for income and future employment. As the Ursa Resources’ fracking project develops, the working population of Battlement Mesa is likely to increase. An increased population of working families, who depend on energy companies for employment may cause voices of the retiree community to become diluted. This dichotomy may be an important component of environmental justice theory, and the central argument of this thesis. This divide will be discussed further in Chapter IV of this thesis.

Battlement Concerned Citizens

The current mineral rights holder of gas underneath Battlement Mesa is Ursa Resources. Ursa is a privately held company with over 60,000 acres of mineral rights and 260 wells on the Piceance Basin (Ursa, 2013). Aside from Colorado, Ursa has natural gas development projects in Texas, Illinois, and Pennsylvania (Ursa, 2013). Ursa acquired the mineral rights to Battlement Mesa from Antero Resources who previously held a surface use agreement in the PUD. Currently, Ursa has plans to construct nine multi-well pads to

¹⁵ Interview September 17, 2016 Battlement Mesa

extract the gas under Battlement Mesa; five pads are proposed to exist within the boundaries of the PUD (Figure 4).

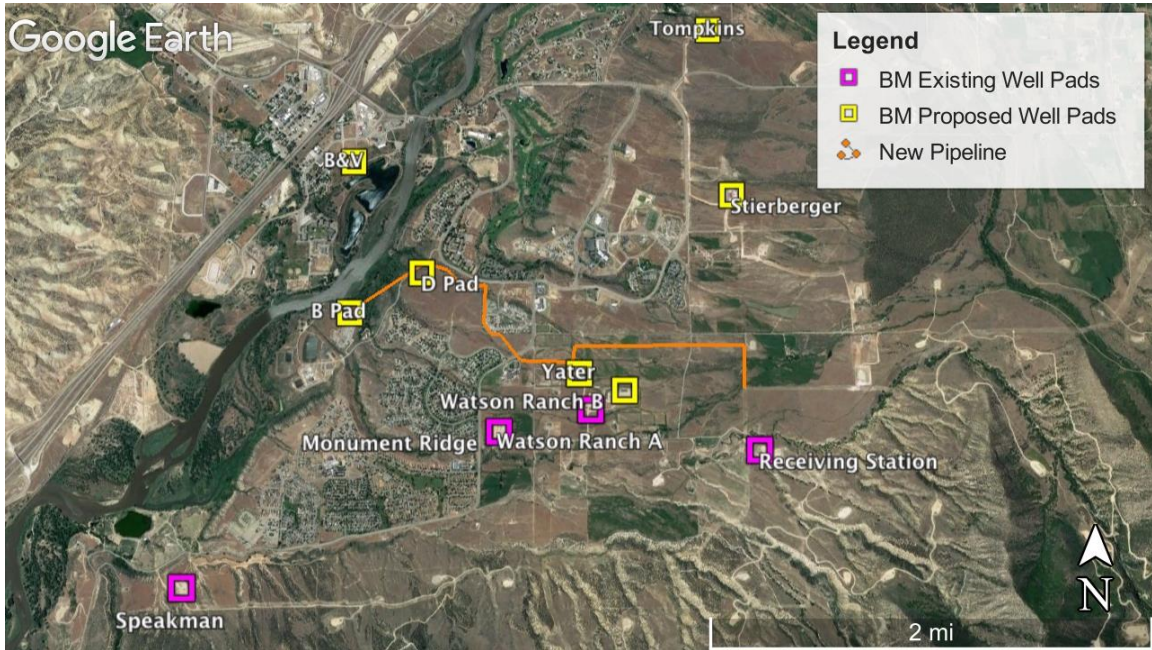


Figure 4: Battlement Mesa Existing and Planned Well Pads and Pipeline. Adapted from Google Earth (2016)

In July of 2015 Ursa submitted an application for special use permits for the first two well pads and a pipeline connecting the two pads (Figure 5). BMC B pad is located on the southern bank of the Colorado River, 600 feet upstream from the community's water intake facility. BMC B will affect only a couple of residents with houses within the PUD, but it will be in direct view of an apartment complex directly across the river to the north. BMC D pad is located in the central common space where it will be less than ½ mile to many homes (Figure 6).

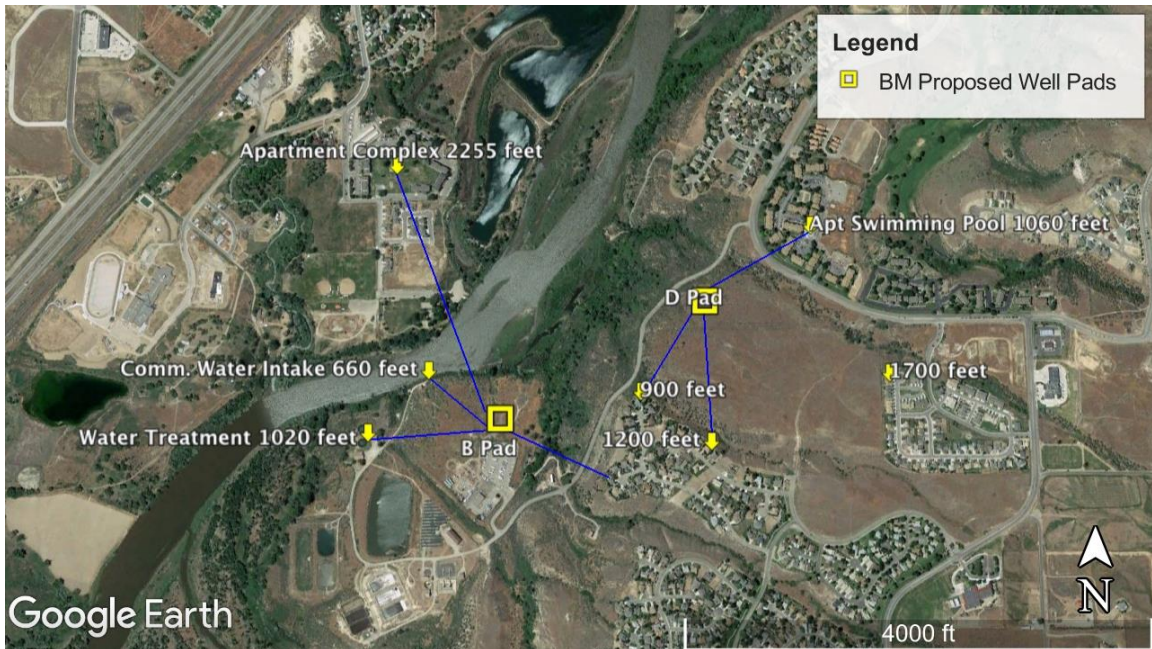


Figure 5: *Well Pad Distances from Occupied Dwellings and Community Infrastructure.* Adapted from Western Colorado Congress (2015; Google Earth, 2016)

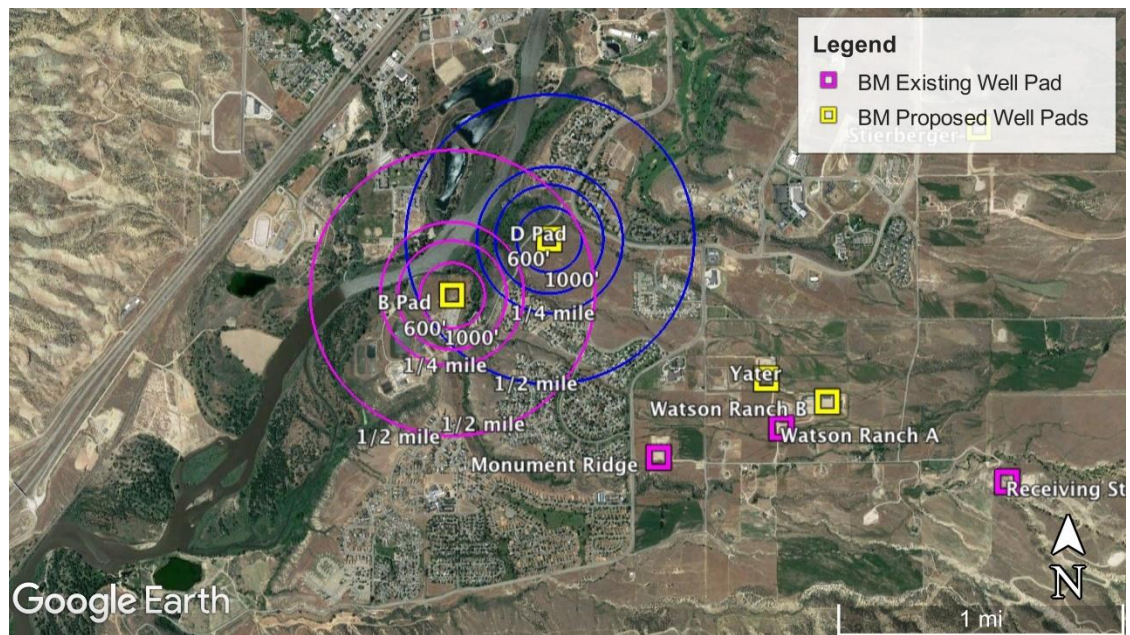


Figure 6: *Pad Distance from Occupied Dwellings.* Adapted from Ursa Resources (2015; Google Earth, 2016)

Each pad is proposed to house between 25 and 30 gas wells that may be drilled in stages of eight or more wells. No time period for drilling all 25-30 wells has yet been specified. Once drilled and fracked, a typical gas well will produce for about 30 years. It is a possibility that residents could endure up to three drilling cycles separated by an unknown period. When the company decides to drill and frack can largely depend on the commodity price of natural gas. The Colorado Oil and Gas Conservation Commission requires a gas pad setback distance of 1000 feet in residential areas. Distance from a well pad to any other building or location is calculated from the center of the well pad to the point. In many cases the actual distance from house to gas well may be greater than the state required 1000 feet, especially in large scale multi-well projects. BMC D pad is located in between two neighborhoods in Battlement Mesa; distance varies by individual house location. Several residents are located within 1000 feet of the center of the pad and a great number of residents are living within one half mile of the well pad, additionally all residents live within one mile of one or more well pads.

The BCC was formed in 2009 when residents first learned of Antero's plans to drill inside the PUD. The group generated enough public attention to influence county commissioners to fund a health impact assessment (HIA) on the proposed development. Researchers from the Colorado School of Public Health (Witter et al., 2010) conducted the HIA and outlined potential health impacts to residents living within a half mile of oil and gas operations. Researchers conducting the study produced a preliminary draft that identified potential health impacts and provided recommendations for mitigation and

risk prevention. They received negative attention from the energy industry and were asked to revise their results taking into account public comments on the impacts and recommendations. When the second draft of the HIA was published, the negative impacts as a result of oil and gas drilling had increased, again generating negative attention from the energy industry. County commissioners terminated funding for the research and a final draft of the HIA was never published. There is disagreement among stakeholders as to why the defunding of the HIA occurred; residents believe the county shut down the research because the results were unfavorable to oil and gas, while county staff assert that nothing was going to change from the second draft to the final, so the measure was cost saving. A county official articulated this to me as follows:

They didn't cut it short. The contract ran out, they didn't extend it, the authors sat there, and I could show you the transcript, we're sitting in the room, I mean nobody's hiding from anything ... the most damning possible impacts they would ever write were already in there. What people were commenting on going 'well this isn't a scientifically valid analysis so you can't really say that the risks are this high for health', well, all that information just stayed in there instead of being culled out or going through another review process. And so it was stopped, but it was a complete report. They just said "okay, we're not going to have the industry and the citizens and the county all just beating on this giant report because there's never going to be agreement. So let's call it good."¹⁶

Whatever the case may be, the authors of the HIA went on to publish their findings in the American Journal of Public Health (Witter et al., 2013). Additionally, Garfield County is using the guidelines put forth in the HIA to evaluate Ursa's proposal.

¹⁶ Interview, Rifle, September 9, 2015

Conclusion

This chapter has one main objective, to provide background information in order to set the stage for answering the research questions and articulating the overarching argument of this thesis. In this chapter, I focus particularly on outlining what residents/stakeholders have done to organize in response to oil and gas development. In doing so I introduce several groups with conflicting interests who's actions will help to answer RQ2) How are residents responding to impacts? To fully answer this question I will present empirical data throughout the analysis chapters of this thesis (III, IV, V). This chapter also serves the function of providing an analysis of historic events using political economy of nature as a lens. I describe and analyze the oil shale bust of 1982 in the context of capital accumulation, crises of production, and spatial fix. In doing so, I argue that the current situation in Battlement Mesa is a result of capital re-investment and spatial fix after a massive devaluation occurred. Furthermore, Exxon used this spatial fix to buy time until technological fix could occur to make resource extraction viable again.

In Colorado as a whole, energy development is moving closer to people, and urban sprawl locates people closer to oil and gas development. Concerns about residential drilling are relevant issues in the state today. The BCC believes the fight to keep drilling out of their community has statewide significance. Allowing fracking activities in Battlement Mesa PUD may be used to justify future oil and gas development in other residential areas. If drilling is not allowed in the PUD, Battlement Mesa will help set precedent for future development, encouraging statewide boundaries of where oil

and gas development can and cannot be located. Currently, the BCC group opposes Ursa's plans and is working with the WCC and GVCA to push well pad locations farther away from homes and ensure mitigation for impacts of development. From an environmental justice perspective this may help reduce, the uneven distribution of impacts related to fracking activities Ursa Resources is making its best effort to listen to community concerns and has offered mitigation far beyond state requirements; nonetheless, they admit there will be impacts to the local community. BCC members acknowledge and commend Ursa's inclusive approach but do not believe Ursa should have the right to drill inside the PUD. Excerpts about the oil shale bust over 30 years ago may indicate that residents fear (unknowingly) another crisis that creates further contradictions of capitalism such as diminished quality of life and the destruction of home values creating the need for another spatial fix. Moving forward, Chapter III will take an in-depth look at split estate, and explore the role this mineral right ownership situation has in creating social impacts. Chapter III describes both direct and indirect impacts of issues related to fracking on split estate land.

CHAPTER III

SPLIT ESTATE, NEGOTIATION, AND RESIDENT VIEWS

Introduction

Imagine 23 years ago, you decided to move out of the city and settle down somewhere with a slower pace of life. You purchased a home in a rural development complete with mountain vistas, a golf course, and a community center. You had retirement in mind and planned accordingly to live on a fixed income. This investment will hugely affect the quality of the rest of your life. About 15 years in, you are close friends with neighbors and work as a volunteer at the local school. You feel proud to be a part of this community. Something odd is happening though, sporadically, you notice gigantic metal 'Christmas trees' producing bright flames miles in the distance. Slowly, you notice more truck traffic than usual and hear about something called fracking, some nearby residents are making a lot of money. You hear complaints of water contamination and illness associated with fracking but brush them off. Life is good for you. Then, a couple of years later you get the letter in the mail. 'Gas Company owns the minerals under your property and plans to use your land to extract their minerals starting next month'. You receive an invitation to a community meeting to learn all about it. At the meeting, you find out about something called split estate and the companies' plan to put 14 natural gas well pads in your community. One of the gas pads will be 500 feet from your house. You learn that even though you own your home

(almost paid off) you technically do not have any right to negotiate or change your situation, nor will you be paid anything for the bother.

This story is all too familiar in Battlement Mesa, where the split estate scenario may harm the social well-being of property owners directly affected by gas drilling on or in close proximity to their property. Typically, if an oil and gas company that owns rights to the minerals underneath the surface property approaches a landowner, the landowner and the gas company will negotiate the terms of a surface use agreement (SUA). Battlement Mesa is a unique case: residents are legal surface right holders, they own their homes, and pay property tax accordingly, but they do not function as a typical surface owner. They are part of a covenant-controlled housing development¹ that governs guidelines on appropriate exterior paint colors and restrictions on how long vehicles can be parked outside individual properties. The community has several common use areas that are maintained by Battlement Mesa Partners. If fully approved by county and state officials, Ursa Resources² will place five multi-well gas pads on common use areas within the community. No individual residents are considered the surface right owners for the negotiation process with Ursa. Instead, the developer (Battlement Mesa Partners) is negotiating with Ursa on the homeowner's behalf. A WCC community activist tied this issue to split estate and described it to me this way:

¹ A covenant is a set of guidelines that residents must follow. A homeowners' association or committee of residents manages and enforces the covenant.

² Ursa Resources is the energy company with plans to drill up to 200 gas wells within the boundaries of Battlement Mesa

At one point [in time] they [Exxon] sold the surface rights to a development company [Battlement Mesa Corporation] who developed a retirement community called Battlement Mesa there... This huge development company did not own the mineral rights. Exxon still owned the mineral rights and then they sold them off to a series of different mineral owners. Meanwhile, on top of it, the retirement community was built and those people were not notified that there was split estate, and some people were even misinformed when they asked if there was going to be drilling in the community or if that was a threat. The corporation, Battlement Mesa Corporation, that was selling the land and selling the homes, told people that drilling would never happen in Battlement Mesa.³

The previous statement shows how prospective buyers were misled and told drilling would not take place. This thesis focuses on the existence of a split estate and its impacts to residents who have no choice but to neighbor oil and gas development.⁴

From an environmental justice perspective, Guha and Martinez-Alier (1997) argue that the poor or vulnerable populations who participate in environmentalism are motivated by conflict over the control and access of natural resources. Guha and Martinez- Alier (1997) present several case studies that take place mainly in South Asia and Latin America- they describe social conflict that results from ecological crisis. Guha and Martinez- Alier (1997) then make a connection to the U.S. environmental justice movement, where a struggle exists for power over the rights to access natural resources and incentivizes technological fix. Marsden et al. (1987) use the case study of British agricultural development to offer a theoretical framework using political economy for

³ Interview July 17, 2015 Grand Junction

⁴ This thesis does not address the legality of the actions of Battlement Mesa Corporation or Exxon in hiding plans for drilling from residents.

mitigating uneven development. Finally, Harvey (1996) adopts a more general view of unevenness through a historical materialism perspective. Harvey (1996) argues, “Different geographical places compete endlessly for capital investment and the process worsens unevenness because one local region is pitted against another” (p.229).

The issue of split estate rights is studied from a regulation and policy perspective (Davis, 2012) and in economic research (Chouinard & Quinn, 2008; Collins & Nkansah, 2015). Impacts of split estate, however, have not been analyzed by social theorists. Davis (2012) claims that consequences related to split estate situations negatively impact livelihoods of surface land-owners who do not also own their mineral rights when fracking activities occur on said land. However, Davis does not support this claim with evidence and moves on to discuss the political implications of this issue. Two scholars, Collins and Nkansah (2015) administered a survey to land-owners who had natural gas drilling on their property. The authors calibrated their study by using mineral right ownership as a control variable and found that landowners who had fracking activities on their split estate land statistically were more likely to report environmental problems than landowners who did not have a split estate. The split estate landowners cited more environmental and social problems of “polluted water, storage of fracture fluids, land surface damages, property value declines, a lack of cooperation by the driller, and lack of notice for construction and drilling activities” than those who did not have a split estate (Collins & Nkansah, 2015 p. 697). Collins & Nkansah focus their

research on landowner probability of satisfaction with drilling and do not discuss the impacts of split estate beyond reasons given in their survey.

This thesis focuses on a split estate scenario with the private surface/private mineral right relationship. Specifically, it looks at the social well-being of property owners directly affected by gas drilling on or in close proximity to their property when they do not own their mineral rights through the case study of Battlement Mesa. In this chapter, I focus on the negotiation process for drilling to occur on split-estate land. In doing so, I compare the impacts and outcomes of the negotiation process as perceived by the residents using empirical interview data. I make a distinction between situations where the surface owner does not own any mineral rights and situations where the surface owner owns at least a portion of their minerals. I then compare the outcomes and impacts of the two scenarios.

In this chapter, I make a connection between split estate law and the social impacts of oil and gas development. I argue that impacts of oil and gas development in Battlement Mesa are partly due to the existence of a split estate. Furthermore, I argue that split estate rights set the stage for environmental injustice because mineral right holders may receive individual monetary benefits from fracking activities while non-mineral right holders are less likely to do so. This chapter proceeds as follows: First, I explain the variations of split estate look like and how this plays out for individual stakeholders using empirical interview data. Second, I demonstrate that this is a problem in Western Colorado; again, I do this using empirical interview data. Finally, this

chapter concludes with an analysis of the split estate issue from an environmental justice perspective.

Split the Estate

The people most shocked by the existence of split estate had newly learned of its existence.⁵ Battlement Mesa homeowners were assured that no drilling would occur in their neighborhoods when the resource was not accessible. Technology changed,⁶ however, and the adoption of horizontal drilling techniques made accessing shale gas underneath Battlement Mesa possible and profitable, thus turning it back into a commodity. The split estate scenario of Battlement Mesa represents a political struggle at the county and state levels between opposing interests and rights of citizens and the energy industry. Garfield County and the COGCC are the governing bodies that have the power to approve or deny drilling within Battlement Mesa through permitting processes. Battlement Mesa residents must fight for protection from the impacts of gas development while Ursa Resources, asserting their dominant rights, must argue that their drilling activities are safe.

While oil and gas companies with drilling operations on split estate land have their own unique set of challenges, the capital investment to secure a surface use

⁵ To the best of my knowledge, the split estate law was not used in this context until the early 2000's; even then it was generally used in isolated cases with one or two gas wells on very large rural property effecting one or two households at a time.

⁶ Innovation and adoption of horizontal drilling techniques that re-define recoverable gas reserves. New technology was developed, which allowed companies to drill resources that were not recoverable with old technologies, processes, and equipment.

agreement is much lower when compared to land that is not divided into a split estate. In the case of Battlement Mesa, individual residents are not receiving any direct monetary compensation to accompany the surface use agreement. As explained in Chapter II, in a typical split estate situation where there is only one surface owner, said surface owner can expect to receive \$3,000- \$5,000 (WCC, 2015) per well pad drilled on their property. In situations where surface owners own some portion of their mineral rights, the mineral rights can be used as leverage to negotiate terms of use. Terms negotiated include hours of operation, well pad location, water recycling systems, use of existing roads, reclamation and mitigation, limits on truck traffic, and higher monetary compensation. Surface use agreements in the latter case are negotiated between company land men⁷ and the property owner; commonly both parties have access to legal counsel. The outcome of surface use negotiations when the surface owner owns at least a portion of the minerals differs on a case by case basis. Compensation depends partly on how much the energy company desires access to the minerals and also on the property owner's access to legal knowledge or resources to pay for legal counsel.

As discussed in the background information and laws regarding split estate in Chapter II, operators are required to negotiate "in good faith" with surface right owners. Although as one community activist points out, there is no concrete definition of "good faith":

⁷ A land man is employed by an energy company to negotiate mineral leases and surface use agreements with surface right owners

They have to negotiate in “good faith”, right? And who defines what good faith is, and if good faith is good enough for the oil companies. They just go ahead and do what they want and screw you.⁸

Some landowners I spoke with claim companies have used bullying tactics to obtain SUAs and are not in fact held accountable for negotiating in good faith. Remembering 2006 when the drilling boom in Garfield County was just starting, one local land-owner gave a first-hand account of the negotiation process. This homeowner articulated in casual conversation that land men repeatedly pressured her/him to sign the surface use agreement and threatened to revoke the agreement if the landowner sought legal counsel. The land man then threatened that if the land-owner did not sign the SUA right away, the gas company would “bond on” to their land and she/he would be held responsible for any damages that occurred on the land because of oil and gas activity. Whether the land man was telling the truth or not did not exactly matter; he aimed to intimidate the landowner into signing the agreement quickly, before the landowner could properly research the situation and perhaps find leverage to negotiate the terms of the agreement. If the surface owner refuses to negotiate with the gas company from the beginning, they receive no compensation, have no power to negotiate terms of use, and may themselves be liable for any damage to the property caused by the development. Essentially, surface owners have no choice but to cooperate with gas companies who wish to access subsurface minerals.

⁸ Interview September 10, 2015, Grand Junction

In cases like this one, the intersection of split estate rights and an energy company's desire to extract minerals on the split estate land causes feelings of disempowerment (Willow and Wylie, 2014) for the surface landowners. While some individual landowners' shared experiences of disempowerment and helplessness during my fieldwork, others shared experiences of successful negotiations, and prosperous monetary gains. Although their similarities are more plentiful than their differences, there are three distinct factors that set these cases apart, namely: (1) they have access to legal resources and knowledge; (2) they own at least a portion of the sub surface minerals; and (3) they have the skills to negotiate or have an expert who is willing to negotiate on their behalf. These factors are not exclusive; someone who is a skilled negotiator may fare all right with very little mineral rights to leverage. On the contrary, someone else might own a decent portion of their minerals and still benefit significantly without strong negotiation skills or knowledge of the leverage they possess. Again, outcomes vary on a case-by-case basis. For instance, a landowner was able to arrange the payoff of his/her mortgage with the energy company before negotiations about the surface agreement and mineral lease began. This person has paid off family land, will receive additional compensation for surface use agreements, and will receive royalties on any gas extracted from the property she/ he owns.⁹ This is an example of the monetary compensation possible in situations where persons own at least a portion of their minerals and have the knowledge and skills to negotiate.

⁹ Focus Group July 9, Grand Junction

In a similar scenario, a property manager of a local “dude ranch”¹⁰ negotiated with several energy companies to require cohesion among them, and the use of cutting edge industry “best practice”, advanced technology, and outside scientific expertise to reduce impacts of drilling on the property, all the while still making royalties off the gas extracted. The property manager described the ranch’s situation to me this way:

We own approximately 50% of the mineral leases, on about 50% of our property. So that’s a long way of saying about 25% of the minerals underneath private property here, we control. So we have places where we control 25%, places where we control 100%, [and] places where we don’t have any mineral rights.¹¹

Owning part of the minerals and having a strong legal team has allowed the surface owner to require the energy companies to have as little impact as possible and to require mitigation that will improve the habitat in the long run. In this case, owning just a quarter of the minerals attached to the surface land puts the landowner in a significantly better position in regard to social well-being through the negotiation process. Explaining further, the property manager said:

We wanted to look at how we approach energy on the forefront before it actually has the marketability to where things go crazy again, and adapt procedures and rules and mitigation tactics to where we would actually see energy in this area come and go and we would have a net habitat gain as part of that, which is a pretty bold statement. But that’s what we’re all working towards, and I think that’s a critical great move for not only the NGO’s, for the governments,... great for stock holders whether it

¹⁰ A “dude ranch” is a ranch focused on tourism or entertaining guests.

¹¹ Interview September 07, 2015, De Beque

be Black Hills¹² or EnCana¹³ to be involved, and it's great for the ranch because of the long term utilization of the ranch. We're trying to create a perpetuity model here, for future generations, and so we think it's really critical for the ranch.¹⁴

The management team at the ranch foresees more positive impacts than negative impacts from gas development. This reflects the way people who own mineral rights speak about their experiences with oil and gas companies, and the negotiation process. It is much different from the way people who do not own their mineral rights reflect on the process.

The vast majority of Battlement Mesa residents have no part in the negotiation process between Battlement Mesa Partners and Ursa Resources regarding the proposed gas development¹⁵. The WCC community organizer I spoke with told me:

Battlement is kind of a unique situation, when you look at individual ranchers that negotiate SUAs. They do have some amount of control over the process... not all of it, but they do have some. Because the company has the right to develop their mineral resource and that is the way the law is written, to try to deny a company, I mean you can't; that's illegal; it's called a takings.¹⁶

¹² Black Hills is an energy company operating in Garfield County

¹³ EnCana is an energy company with operations in Garfield County

¹⁴ Interview September 07, 2015, De Beque

¹⁵ The Battlement Mesa Service association is made up of Battlement Mesa residents. The service association received an undisclosed sum of money from Antero when the original surface use agreement was signed and voted to adopt a non-confrontational stance toward any future energy development.

¹⁶ Interview July, 17, 2015, Grand Junction

The WCC representative is pointing out the fact that the individual homeowners have virtually no control over the SUA negotiation process, or power to stop the gas development from continuing. I say virtually no control because ultimately the Garfield County Commissioners and the Colorado Oil and Gas Conservation Commission have the final say if development proceeds. Battlement Mesa's dependence on the county government is described by the WCC community organizer as follows:

Battlement Mesa is an unincorporated community and they don't have a town government so to speak. They do have ... a service association with representatives from different parts of the development that is kind of like a pseudo government situation, but they don't have the same clout as a town city council would. So that community is pretty dependent on the county to be their local government officials, also then the state to help them negotiate with the industry because all the common lands where the drill rigs are going are owned by this one fellow and this one corporation.¹⁷

If Battlement Mesa residents generate public attention and disapproval, the greater population may be able to influence the commissioners to require increased mitigation measures, or refuse permits for the planned development by threatening not to re-elect them.

Ursa does hold periodic public meetings for residents to attend and learn about the proposed energy development. But the information flow at the meeting I attended was largely one way. It was a formal presentation that provided lengthy descriptions of

¹⁷ Interview, July 17, 2015, Grand Junction

plans, technology, and mitigation measures in industry specific language.¹⁸ Additionally, Ursa Resources staff refused to take questions until the end when some residents were visibly frustrated by Ursa's unwillingness to hear them out. At the same time, many of the residents' concerns centered on the split estate, and they questioned Ursa's legal right to drill within the PUD, which from Ursa's point of view was old news that had been discussed at previous community meetings.

Some people may look at the situation in Battlement Mesa and remark that the homeowners should not have purchased land that had a split estate. This is complicated, however, as described by a community activist, since the process for identifying land with a split estate is no easy task for prospective buyers.

You have to look at the title and you have to look at the ownership, if mineral rights were split off anywhere along the line because when you go to a county clerk's office you can see every sale that goes back to whoever first owned the land. This spot [land] would be the Indians, that's a whole other discussion, yeah who was the first quote, unquote rightful owner, some white guy from Boston or whatever. So where along the line did the minerals get split off? Or were they split off from the beginning? But every land-owner, if you're in the city, it's not as important if you're buying rural property. The thing about contemplating buying rural property, that has to be done before you buy that property because you might find out that you're screwed, that you have nothing to say about these people coming on to your land and basically doing whatever they want... And you know, there's not much support for the landowner in terms of how they stipulate what happens.¹⁹

¹⁸ Participant Observation September 1, 2015, Battlement Mesa

¹⁹ Interview September 10, 2015

In other words, landowners and prospective buyers need to consult the county clerk to view the land title and research the history of ownership for the parcel of interest in order to identify first if there is a split estate, and second, do additional research to find out who owns the minerals if they are in fact severed.

In situations of severed surface and mineral ownership, the mineral rights are considered dominant and supersede the rights of the surface owner. Additionally, “the owner of the mineral estate owns an implied right to use so much of the surface of the particular tract of land as is reasonably necessary to access and develop the minerals that exist in that tract” (Jones et al., 2013 p. 183). To break it down more simply, the mineral right holder is legally allowed to access the subsurface of the land and to use the surface to do so, even if they do not own surface rights to the land.

Split estate is relatively common in the Western United States, prevalent on about 80% of land use agreements (WCC, 2015). However, many residents are either unaware completely of the phenomena, or are aware but essentially do not know what it means. For example, one Battlement Mesa resident shared her/his awareness of the nearby drilling before buying a home here:

Absolutely not aware, the first time I became aware was driving the corridor from here to Glenwood, because I do that all the time, and up on the hill you would see the fire and I thought, ‘my gosh that just looks violent and so ugly’. And that's when I was first aware of any drilling. And, I mean I was a loan officer for ___ Bank and didn't know about it, and my [partner] is a retired attorney and she/he didn't know about it. Our title work doesn't say anything about it. No, and then just a few years ago I noticed the wells, or about a year ago, I first noticed the wells outside of the PUD. Did not think it would ever come in to the PUD. I was irritated

that it was that close to homes and they had effects from it. I was irritated about that, but never thought that it would get as close as it's getting.²⁰

Another homeowner explained his/her knowledge of split estate as follows;

It does not mention anything about that. It does say [in the real estate title] there are split rights, but I knew that, I've bought and sold a lot of real estate in Colorado, so I knew that, but they're not drilling in everybody's backyard. You know, when you get that letter saying we want to come within 200 feet of your house, that gets your attention in a way that, I really didn't think it was going to come in.²¹

Many residents in Battlement Mesa share this informant's sentiment. After the oil shale bust in 1982 with the failure of Exxon's Colony project, residents did not believe oil and gas extraction would happen at Battlement Mesa ever again.

As an example outside of Battlement Mesa, a second-hand account of an individual learning about split estate for the first time was described to me this way:

When all this boom was going on, a very fine attorney was going to be drilled on, and he didn't know about split estate. And he had a fit. And ...he's the one who really put it on the map and got it in the newspapers. And I think some new legislation came out of it that you have to inform the potential buyer in... no uncertain terms what split estate means concerning the minerals. And I may be completely wrong in saying that.²²

²⁰ Focus Group Interviewee #2 September 21, 2015, Battlement Mesa

²¹ Focus Group Interviewee #1 September 21, 2015

²² Interview September 22, Grand Junction

The legislation that this community member spoke about is explained by a community organizer at the WCC:

WCC tried to get it passed in the law that split estate needed to be disclosed in any property use agreements, because that is not standard practice, so we were trying to make it law that realtors have to disclose who owned the mineral rights as best as they could. So there have been attempts to make it transparent, there have been attempts. This isn't specifically related to split estate, but you know when you're talking about why people get so upset about it, one of the things is having limited ability to negotiate where a rig can go if you're an adjacent landowner, where you have some power where you can put the rig and put the road, all of these things in the SUA, but when you're the neighbor, right now you have zero say.²³

So even when people are aware of the split estate, understanding how it will apply to them is a completely different story. The idea that mineral rights and surface rights may be owned separately is counter intuitive to the way the community is advertised by Battlement Mesa Corporation (Battlement Mesa, 2015). One community activist shared her/his view on split estate law and the impacts of buying property with a split estate:

You know I don't think people understand split estate particularly well, and again who writes the laws? People will go buy property, they think it's going to be wonderful -- their retirement home, they're going to raise a family, whatever, and all of a sudden they find out they don't own the minerals.²⁴

The difference in opinion between mineral right owners and non-mineral right owners seemed to be the support for tougher state regulation. Even though many of the mineral right owners negotiated individual contracts with operators with far tougher

²³ Interview July 17, 2015, Battlement Mesa

²⁴ Interview September 10, 2015, Grand Junction

constraints on the development process and drilling than required by state rules and policy, they expressed an individualistic viewpoint toward the matter. In comparison, the land manager from the tourist ranch and the BCC members might seem like they would support the same types of regulations, after all they are all after similar protections. However, they have different views about where the protections should come from and in public (at meetings) are seemingly on different sides of the regulation argument. WCC members support increased regulation and the ranch's team opposes it. All in all, mineral right ownership seems to influence the existence or absence of economic gain for the landowner.

Conclusion

In this chapter, I discussed literature regarding split estate and political economy of nature theory, the surface use agreement negotiation process experienced in Garfield County, and a comparison development impacts felt by mineral owners to those shared by non-mineral owners. For reasons articulated above, split estate may negatively impact the social well-being of surface owners who do not also own their minerals. In cases where the surface owner has full mineral right ownership and the where-with-all to negotiate with the industry, the landowner can make a great deal of money and avoid stress associated with the lack of control over impeding development. As one interviewee put it, "They've made the conditions so strict that it has worked out for them positively versus in situations where people don't own any minerals and don't

have any leverage to negotiate.”²⁵ While some people are bullied into leases without compensation, other landowners are compensated handsomely in exchange for access to the minerals below the surface land. In the case of (Battlement Mesa), the burden of development is placed on the have-nots (split estate landowners without mineral ownership) and the individual benefits are given to the haves (landowners who own both their surface land and mineral rights). This is creating an environmental justice issue, placing the burdens of development unequally on marginalized populations. Furthermore, increased drilling on split estate land may be incentivized because energy companies are not pulled into costly negotiations or required to pay royalties to the surface landowner for the gas they extract, requiring less of a capital investment on the energy company’s behalf.

People who own their minerals may also have more options than people who do not own their minerals, should an accident occur that threatens their land, health, and/or well-being. The compensation they receive for surface use, and the royalties they receive from the producing gas wells where they own the mineral rights, may serve as an insurance policy or “way out” in case of a spill or contamination. Burdens then are placed unevenly on land-owners who do not own their minerals. In this case, landowners have very little leverage to negotiate with the industry and receive little to no compensation.

²⁵ Interview September 22, 2015 Grand Junction

In Chapter IV, I will discuss the social impacts of natural gas activities in Garfield County and use a content analysis to quantify complaints made by citizens at the Garfield County EAB monthly meetings from 2008 to 2016. I will present empirical interview data relevant to RQ1: What are the social impacts of fracking activities in Garfield County Colorado.

CHAPTER IV

SOCIAL IMPACTS: COMMUNITY DIVISIVENESS AND

RESIDENT WELL-BEING

Introduction

The social impacts of oil and gas development in Garfield County are complicated and far-reaching. As a result, it is difficult to fully identify and describe them. All of the interviewees I spoke with during my fieldwork identified negative social impacts of energy development in the county, even the representative from Ursa Resources. Informants generally described impacts of energy development in one of two ways: either referring mainly to the tangible impacts, or focusing more on the non-tangible impacts.

Toward the end of our long conversation back in September 2015, Bruce articulated this concern:

We're utilizing all that potential energy to become kinetic energy and we're putting that energy into the oceans, into the land, and that's heat energy basically. The oceans record warmer temperatures because the heat energy is at a higher level... The earth itself reacts to the CO₂, now you're not going to see those things so well, but there's going to be an effect. And it's drastic. And acidification of the oceans is a problem. All those things change, we realize from statistical probability that a butterfly someplace flapping its wings will have a net effect, maybe thousands of miles away, and maybe years later, but it all has an effect. This thing is more than a butterfly flapping its wings; it's big, and the effect's going to come out.¹

¹ Interview September 8, 2015 Battlement Mesa

Bruce's statement is an example of what I classify as a non-tangible impact, these effects of fracking that cannot easily be quantified or statistically analyzed. Bruce and other residents spoke about social impacts much differently than many government officials and industry supporters/ representatives. For example, a state representative for an oil and gas regulatory body described the way her/his agency categorizes impacts in this way: "We kind of describe it as nuisance impacts, so things like noise, dust, traffic, and lighting."² This interviewee named negative impacts that are generally recognized by all stakeholders, including oil and gas industry representatives. These impacts are fairly easy to describe and record. Empirical examples of non-tangible impacts experienced by stakeholders are analyzed later in this chapter. These require more in-depth exploration than the nuisance impacts.

In this chapter, I consider community attitudes toward the socio-cultural transformations associated with disempowerment (Brasier et al., 2011; De Rijke 2013a, 2013b; Pearson 2013) and potential environmental degradation caused by increased fracking activities (Finewood et al., 2012; Willow 2014). In doing so I consider concepts within political ecology, specifically environmental conflict (Bridge, 2000; Delgado, 2012; Himley, 2013; Perreault, 2006) and environmental distress (Bakker, 2003; Blaikie et al., 1987; Escobar, 1998) to apply findings to my research in Garfield County. The specific notion that political ecology seeks to challenge hegemonic power associated with resource conflicts (Blakie & Brookfield, 1987) guides the analysis portion of this chapter.

² Interview September 15, 2015, Glenwood Springs

Within that analysis, I take a critical approach to analyzing negative environmental and social impacts that result from social and political processes associated with fracking activities in Garfield County Colorado. The ongoing consideration of environmental justice issue continues (Brulle & Pellow, 2005; Guha & Martinez- Alier, 1997; Suz and London, 2008)

The central argument of this chapter is that the social impacts of fracking activities in Garfield County go far beyond the tangible impacts that are widely acknowledged by Colorado oil and gas companies and the state government (Table 9).

Table 9
Fracking Impacts Tangible vs Intangible

Tangible- widely recognized	Intangible- recognized by some
Noise	Health
Light	Community divisiveness
Traffic	Disempowerment
Odor	Environment
Dust	Property Value Decline
Accidents	
Emissions	

One main concern that distinguishes Battlement Mesa from other communities facing natural gas development is the significant population of retirees and other vulnerable populations. According to the World Health Organization (WHO), vulnerable populations include the elderly, children, and “people living below the poverty line” (WHO, 2016).

This excerpt published in *Scientific American* articulates a cause for concern.

Poor people are more likely to deal with hydraulic fracturing in their community and raises concerns that such vulnerable populations will suffer the potential health impacts of air and water pollution associated with pulling gas from the ground (Bienkowski, 2015).

Throughout this chapter, I explore aspects of stress, disempowerment, and concern related to health impacts, declining property value, and environmental degradation in connection to proposed drilling activities in Battlement Mesa, as well as other locations in Garfield County.

This chapter proceeds as follows. In the first section, I present the Word Cruncher Analysis and discuss the tangible, widely accepted impacts of fracking activities in Garfield County. This sets the stage for discussing non-tangible impacts later on in this chapter. The second section looks into interviewees' opinions on social impacts. A wide range of views are considered—from gas company employees and state employees, to of course residents facing the impacts of gas development. The third section discusses impacts further by highlighting quotes that share common themes beyond what is explicitly stated. This is done to aid in a more in-depth analysis. Finally, I conclude by connecting the data analyzed in this chapter to political ecology theory.

Who Said What

For a preliminary analysis of the fracking impacts that are concerning residents in Garfield County, I used the word cruncher feature on the software *Atlas Ti* to count the number of times words associated with fracking impacts were used in public comments, interview transcripts, and archived documents. Analyzing words associated with impacts used in each different data set allowed for a comparison of the three different groups. The content of each data set is focused on gas development in Garfield County. The archived documents include newspaper articles about oil and gas drilling in Battlement

Mesa from the *Grand Junction Sentinel*, the *Glenwood Springs Independent*, and *High Country News* from 2009- 2015. Public letters written by activists and citizens ($n = 23$) from Garfield County about oil and gas development are also grouped in with the news articles for the content analysis. The second data set includes my complete interview transcripts ($n = 13$). The third data set includes public comments from the Garfield County EAB meetings from January of 2008 to September of 2015 ($n = 72$).³ I selected words to include in the Word Cruncher Analysis (Table 10) if they had high frequency in any one of the data sets, or if the words were used among a wide range of stake-holders to describe fracking impacts (based on interview data).

Recorded in Table 10, frequently used words associated with oil and gas impacts are recorded for each data set. The archived documents had the strongest percentages for most of the words associated with oil and gas. It is possible that this is the case because the documents in this group are most consistently related to one another. To be clear, interview transcripts and public comments at the EAB were created from persons with differing opinions on fracking. On the contrary, all of the news articles and letters written in the archived document group represent people who are opposed to the drilling in Battlement Mesa.

³ The Garfield County EAB was established in 2008 to facilitate discussion between the public, the oil and gas industry, state and local governments, and residents dealing with oil and gas activities on their properties. Board members include eight citizen representatives, eight government representatives, four association representatives, two school district representatives, and 14 industry representatives. Meetings are held on a monthly basis at the Rifle, CO library. There is an opportunity for members of the public to comment or voice concerns during each meeting.

Table 10
Fracking Impacts Word Cruncher Analysis

Document type	Archives (n = 23)		Interview Transcripts (n = 13)		EAB Complaints by year (n = 8)	
Impact words	Total words-6977	% of total	Total words-7115	% of total	Total words-2542	% of total
Gas	251	0.52	367	0.33	59	0.4
Battlement	180	0.37	88	0.08	14	0.1
Impact/Impacts	92	0.19	207	0.22	12	0.08
Noise	57	0.12	38	0.03	13	0.09
Odor	9	0.02	11	0.01	8	0.05
Light	17	0.04	12	0.01	9	0.06
Dust	20	0.04	21	0.02	2	0.01
Traffic	39	0.08	21	0.02	11	0.07
Emissions	45	0.09	5	<0.01	7	0.04
Accidents	29	0.06	3	<0.01	2	0.01
Economy/ Economic	115	0.24	36	0.03	4	0.03
Community	78	0.16	183	0.16	18	0.12
Environment	39	0.08	38	0.03	10	0.07
Health	109	0.23	86	0.08	29	0.2
Fear	8	0.02	5	0.13	3	0.02
Power	30	0.06	15	0.01	1	<.01
Mitigation	30	0.06	8	<0.01	3	0.02
Politics or Political	46	0.09	15	0.13	2	0.01
Society	39	0.08	12	0.01	0	0.0
Capitalist/ Capitalism	125	0.26	7	<0.01	0	0.0

This data helps to support my argument in this chapter by articulating the most commonly stated impacts associated with fracking activities. There are a limited number of ways a person can describe tangible impacts using the English language; for that reason it is safe to assume that nuisance impacts are well defined (dust, lights noise, odor, traffic). The commonly used words associated with non-nuisance impacts provide

preliminary suggestions for interviewee and community concerns about non-tangible impacts (accidents, environment, fear, health, power). Additionally, I use the Word Cruncher Analysis chart to present data in an alternative way that may increase the readability of this thesis.

The main contribution the Word Cruncher Analysis lends to my overarching argument is to provide justification for the need for place-based ethnographic research using in-person interviews and a fine grain data analysis. The Word Cruncher Analysis helps narrow down some of the impacts of fracking activities, and lends an additional validation to the data presented in this thesis. It does not, however, function in a way that could replace the coding and analysis achieved by transcribing, reading transcripts, and coding for broad themes, ideas, or feelings. If such a software existed, ethnographic research would be prominently displayed in scientific studies to account for a broad range of social impacts.

Knowing the information presented in the Word Cruncher Analysis is important because it highlights impacts of gas development in three different categories: Archives, interview transcripts, and EAB complaints. It is important to note similarities of listed impacts in all three lists. One data set of the group, interview transcripts, was subject to inherent bias because of the nature of in-person interviews. However, I had no influence on data presented in the EAB complaints or the archives. Relative similarities in all three lists help reduce concern for data bias in the analysis process.

Impacts Beyond Views of the Gas Patch

Despite Ursa Resources' goodwill and best practice approach to drilling in Battlement Mesa, many residents are still strongly opposed to natural gas drilling, a heavy industry, in their neighborhood. The BCC and the WCC are working to influence legislation at the state level to keep drilling out of residential areas. This is consistent with the argument made by Boudet et al. (2013) that attitudes toward natural gas development go beyond the "not in my backyard" (NIMBY) principle and can actually be characterized as a "not in any backyard" (NIABY) principle. Members of The BCC and The WCC are not opposed to drilling in Garfield County. They recognize the legacy of the resource extractive industry in the area and acknowledge that potential vast resources available for development exist, but they believe the extraction process should be better controlled. A community organizer explains this as follows:

We do not officially advocate for bans. But we are trying to keep drilling out of the PUD. Because we don't think that drilling rigs should be that close to people. And when I say we I mean the whole collective organization of people who think that there are places where you drill and there are places where you don't. And you certainly don't drill that close to somebody's apartment building, home, or school... We are a "do it right" organization, not a ban organization. We think that we can co-exist with oil and gas and in our communities [and] often we have to. You know, as long as there is a demand for natural gas, it's going to come from somewhere, so I don't personally think it is very fair for a rich suburb in the front range to be able to ban it, because then if they aren't developing it there it is going to put more of the development on us. Or if we were to pass a state-wide ban because we are a purple state and have the political power to pass a state-wide ban, then all of those companies are going to go to Wyoming and New Mexico. I have a concern about the fact that as long as there is a demand for the product, the thing will be produced somewhere. It is more amenable to

me that we should come up with a smart way of developing this that is not putting the pressure on the less politically powerful communities.⁴

The WCC has adopted a stance that is by no means opposed to fracking. This is an example of how acceptance of oil and gas is “embedded in the social structure”⁵ of the area. They believe oil and gas companies need to be held to a high standard, and that certain areas like schools and neighborhoods should be off limits to drilling activity. Pro regulation community members on the Western Slope believe that achieving a balance between an all-out fracking ban and a fracking free-for-all would disperse the burdens and benefits of development more evenly. A community activist described the current unevenness seen by residents to me as follows:

There is definitely a huge dissension between people who make money off of oil and gas, and the people who don't. That's why I say social impacts can go on forever because it creates a lot of dissension in communities. In Garfield, this has been an entrenched industry for a really long time, so these arguments are kind of old. You know they have been going on for a long time, and the battle lines are pretty well drawn.⁶

To further explain what this interviewee is describing, the issue of oil and gas is highly polarized in Western Colorado and it has existed that way for a long time. One distinguishable factor that sets the pro-industry community apart from the pro-regulation community is the prospect of monetary gain. This gain is achieved through either employment within the industry or through royalties on mineral leases. The ability for a landowner to make money through the oil and gas industry relates back to

⁴ Interview July 17, 2015, Grand Junction

⁵ Interview July 17, 2015, Grand Junction

⁶ Interview July 17, 2015, Grand Junction

owning the minerals as well as the surface rights (Chapter III). On the contrary, owning land with a split estate opens the door for a myriad of negative social impacts, should fracking occur on that land against the surface owner's will. In Battlement Mesa, for example, residents I spoke with discussed the divide in the community. Here is what one of them said:

One of the social impacts that I see that is disturbing is that we are a close-knit community here, and I don't know that many people frankly, because like I said I've been back and forth between here and Santa Fe a lot. But what I notice is there are people here that don't think they can talk to other people because they are on different sides of this issue. And I think that is really divisive in a community this small.⁷

This informant is describing how polarizing the issue of oil and gas development can be for a community. With increased drilling activity, more working families have moved into Battlement Mesa. Another resident remarked about how the community shift gradually became more apparent:

So to look at it in the extreme it kind of went from being a really nice place to retire and live as a retiree to the area's nicest man camp as more and more oil and gas people started moving in. And you know, you [started to] see in the media the high incidents of domestic violence, and drunk driving, and drug use and, you know it was a time when methamphetamines were a big deal around here. And all the attendant negative impacts on the community that we began to see, again from a distance, it wasn't affecting our daily lives to any great extent. But as the drilling became more and more pronounced, as you know this is a boom and bust industry, so you know we were going into the boom times.⁸

This person relates Battlement Mesa to a luxury man camp. She/he views the influx of oil and gas workers moving into the community as a negative impact resulting from the

⁷ Focus group, participant 1 September 21, 2016, Battlement Mesa

⁸ Interview September 17, 2016, Battlement Mesa

recent gas boom in Garfield County. This person notes that at first the change in the social makeup of the community did not affect her/him directly but that the change was noticeable from a distance. This highlights a dichotomy in the community. On one hand there are working families brought to Battlement Mesa for the oil and gas jobs. On the other hand, is a group of retirees who are on a fixed income going to be left with the remnants of Ursa's project? One group can leave with the jobs, the other most likely cannot, but both groups have an equal right to live in the community.

In the year 2000, 28.7% of the population was age 62 or older (US Census Bureau, 2000). This percentage decreased to 19.2% in 2010 and remained steady around 19.4 with a margin of error of +/-4.8 in 2014 (US Census Bureau, 2015). An additional measure of the portion of retired individuals may be the percentage of the population participating in the labor force. In 2000, the portion of residents working or looking for work was 48.9%, compared to 58% of the population in 2016 (Town charts, 2016). These statistics suggest that in 2000 over half the residents were either retired or under the age of 15.⁹ In fact, in 2000 20.2% of the population was under age 15, increasing to 22.3% in 2010 and data estimates derived from the American Community Survey suggest that the percentage of young people in Battlement Mesa (under 15) in 2014 was 21.2 with a margin of error of +/-10.1. There is a clear drop in the retiree population between 2000 and 2010.

⁹ Most likely these are children living with their parents in the community aged 0-15.

Housing prices peaked in Battlement Mesa in 2008 at \$292,000 on average, but dropped swiftly due to the 2008 financial crisis and real-estate market crash. Not all of the issues can be attributed to the financial crisis; however, housing prices in the Town of Parachute and Battlement Mesa have been slow to recover relative to the national average (Town of Parachute, 2015). In 2014 the average home price was about \$175,000, a 60% decrease from the 2008 price of \$292,000. Comparatively, the U.S. national average home price increased by 48% from \$191,108 in 2008 to \$283,775 in 2014 (US Census Bureau, 2016). The downward trend in real estate prices in Battlement Mesa is not consistent with the national average. Now, many factors may contribute to this, such as the value of new construction in the area. Some Battlement Mesa residents believe, however, this is due to the impending gas development in the community. One community activist spoke to me about community well-being, touching on the negative economic impact gas development has on real estate prices. This is what she/ he said:

It affects well-being on multiple fronts. (A). Quality of life in their place because all of a sudden what was their quiet idyllic sort of home is now invaded by industrial reality. And it's a bad industrial reality. Fumes, dust, gasses, noise, light pollution, all the wildlife is scared away, and they have to put up with that for a very long period of time. [B.] Economically it affects them because their property values go down, because they can't sell their property anymore. If they do sell it they have to sell for a fraction of what they thought they would be able to get for it. So their economic well-being is affected.¹⁰

In other words, once an oil or gas well pad is installed on or near a person's home, her/ his choices are limited. She/he can endure the physical impacts while drilling and

¹⁰ Interview September 10, 2015, Grand Junction

fracking take place (up to 30 years) or attempt to sell her/his home for what would likely be a much lower price than she/he would have received without the oil or gas drilling on or near the property. An example of this was described to me as follows:

One of our members now, he wants to move, he put his house on the market, he got a prospective buyer, and the buyer backed out when he heard there was going to be oil and gas drilling. So he can't sell his house.¹¹

Many residents believe that they would not be able to sell their homes even if they wanted to and that Ursa Resources' planned natural gas project (formerly Antero Resource's project) has deterred potential home-buyers and negatively impacted real estate values. Industry professionals, however, have argued that low housing prices in Battlement Mesa and the Town of Parachute are due to the decrease of oil and gas activity (in relation to the low commodity price of natural gas). The Town of Parachute asserts that housing markets in Parachute and Battlement Mesa have yet to recover from price declines due to the 2008 financial crisis. The Town of Parachute reports that many oil and gas employees who work in the Battlement Mesa/ Parachute area have chosen to live in Grand Junction or Rifle because of the amenities available in the larger towns. However, population data for the past 15 years indicates that the population in Battlement Mesa has actually increased. Rising from 3,632 people in 2000, to 4,471 in 2010, and to 4,540 in 2014 (US Census Bureau, 2015). Although it is not possible to definitively say that the price slump for real estate values in Battlement Mesa is due to

¹¹ Interview September 21, 2015, Grand Junction

encroaching oil and gas activity, it is very likely that impeding development has had an impact.

Residents living in Battlement Mesa, as well as interviewees who had worked in social services over the last decade, described the shift in community demographics and lifestyle to me. The prospect of jobs in the oil and gas industry attracts transient workers and has strained the social services in Garfield and nearby Mesa County. One long-term Battlement Mesa resident described her/ his experience with the change in population in her/his neighborhood this way:

The fabric of the community changed, so you know, there's more families, more blue-collar folks that [are] living in a paycheck-to-paycheck kind of situation. And so the retirees don't have an awful lot in common with those people. People that live on my street, I used to have wonderful neighbors, now all the homes are rentals. The little community newspaper that would come out, you know, gets thrown on the driveway, it would sit there for months, and they wouldn't even pick it up. I mean most of these folks, this is just a job and a house...and they're not community members. They don't care what's going on around them; they don't get involved in community events. And they all have dogs, lots of dogs.¹²

On the one hand, there are residents who depend on the oil and gas industry to sustain their livelihoods, and on the other, there are residents who feel that their quality of life will be diminished by close proximity fracking activities. Again, it is possible that this interviewee is describing reverse gentrification as a result of the movement of capital from one geographic area to another as discussed by Guerrieri et al. (2010, 2012).

Another resident described a similar sentiment:

¹² Interview September 17, 2016 Battlement Mesa

When the economy tanked so badly, we had foreclosed homes here. Just like they did in other places. And a lot of oil and gas workers are the ones that purchased those homes. Not 100% but . . . anyway, and we started getting a Hispanic community, and I have nothing against Hispanics, [but] we are this community, and they are that community. We're not fully together... We're not integrated. And it's a socio-economic thing I believe. You know they're living down there by Cottonwood Park. Anyway. But, they, those folks were staffing some of the businesses frankly, they helped keep Battlement alive when we get right down to it. Because retired people weren't going to do the work.¹³

This resident describes an economic down turn (the 2008 financial crisis) which occurred at the same time that fracking activities saw a dramatic increase in the area. She/he notes that oil and gas employees who previously would not have been able to afford a home in Battlement Mesa began to move into the community. When considering environmental inequality, it is possible that the continued movement of capital through physical natural gas extraction and split estate (causing property value to decline) has prompted continued community decline. However, there is some overlap of the retirement community and the oil and gas workers, as one community member explains, gaining private support from oil and gas employees:

When we run a petition around-- we've done that a couple of times now-- we even get oil and gas people to sign it. I mean, "no drilling in Battlement Mesa" they signed it. We turned in 416 signatures to the planning and zoning commission.¹⁴

Although it is uncommon for oil and gas workers to speak out against the industry, according to this interviewee, some employees have voiced opposition toward drilling in Battlement Mesa.

¹³ Interview September 21, 2016, Grand Junction

¹⁴ Interview September 21, 2016, Grand Junction

Beyond the community shift, impacts of gas development include the standard acknowledged “nuisances” of noise, odor, traffic, and light pollution but also include the more in-depth impacts to social well-being from declining real estate values to concern for human health. In Garfield County energy development is “woven into the social fabric of the community”¹⁵ -- as one community organizer describes it.

Informants from government organizations and the oil and gas industry tend to view issues of fracking as striking a balance of economic gain and nuisance impacts. For instance, one Garfield County employee described her/his view this way:

Well, certainly there's positive economic impacts and right now with the downturn there is a negative [impact] that a lot of people that don't have jobs that had jobs a year ago. So that's always a strain. But it is clearly one of the higher paying industries in our area. So when things are pretty good, then people have much higher than average salaries, which has a domino effect on the economy. As far as health and welfare, I mean there's impacts of oil and gas. It might be the lights, shining in a bedroom window from a drilling rig or completions operation, or it might be noise, that's a big one, and one of the biggest ones and most problematic when it occurs is odors, so if there are odors emanating from an oil and gas site or activity, imagine if you're in your home, you're not too happy about that. And you're feeling a little rattled, rather infringed upon.¹⁶

This interviewee is emphasizing the importance of fracking for the local economy but at the same time recognizing that there are negative impacts of oil and gas activity, tangible and intangible. This person highlights the difficulty of quantifying all impacts of fracking. On average, wages are easily recorded in monetary value but impacts are not. Analyzing the cost and the benefits in this case is very difficult. This is an example of

¹⁵ Interview July 17, 2015, Grand Junction

¹⁶ Interview September 9, 2015, Rifle

what political economists refer to as neoliberal discourse. Just as Himley (2012) describes in research related to mega-mining in Peru, the issue of fracking is framed by government officials and the energy industry as a cost benefit trade-off in order to normalize negative impacts (Finewood et al., 2012). Describing the way industry and government professionals may frame impacts of fracking as trade-offs, one community activist explains and questions:

They use the situation of acceptable collateral damage. This is, they know that there is going to be higher death rates from the asthma and respiratory problems and stuff like that. If you have so much ozone, but the greater good is served to more people [and] they have more convenience and better living at the expense of that collateral damage, [then] they paint it as an acceptable level. But if that level is greater than what you actually measured, is it still acceptable? There is the moral question. How far will you stretch your limits? Will you actually hold your limits?¹⁷

This interviewee believes that industry professionals and government representatives underplay the negative impacts of oil and gas development. She/he criticizes the trade-off approach to development and questions the existence of limits of acceptable harm.

The possible health impacts of fracking are both a point of uncertainty and concern for many of the people I interviewed. One community activist and practicing physician described her/his view this way:

Health, those effects remain to be seen. I don't think anyone has proven it, but that's because no one is really studying it, because there's no money to study it. Because who's got the money for those kind of things? Government, the oil industry? Well they're not going to do that. Because intuitively you know that they're going to be there. If you can demonstrate that there is a severe health

¹⁷ Interview September 8, 2015, Battlement Mesa

impact by proximity to oil and gas operations, then there might be some legislation put in place to limit that.¹⁸

This person described that the problem with studying health impacts of oil and gas development is the lack of funding for research outside of the energy industry. It would not be in the industry's best interest to study the health impacts of fracking because restrictions on development may come from that.

People living in close proximity to the proposed well pads in Battlement Mesa expressed concern for the health of themselves and their neighbors. One resident shared her/his worry:

There's a couple I know, they're beyond me in years, they still have a great vitality, but that D pad is going to be within a 1000' [of their house] and they know they will not survive that. Their vitality now will be diminished by it, and if they had any hope of getting so many years more, it's gone. One person had cancer, the other person is on oxygen, or enriched air enhancement if you will. But the point is, they know it's going to take away from remaining time. I sympathize. And I feel totally helpless because I just can't run out there and say "stop this". It doesn't happen that way; it takes long arduous fights and eventually you might be right, but it doesn't make any difference.¹⁹

For the vulnerable population of people aged 65 and older in Battlement Mesa, there is a fear that the side effects of living in close proximity to gas wells will diminish the quality and longevity of their lives. This is an example of the unevenness that results from capitalist development benefiting the larger U.S. population on a broad scale while placing a heavy burden on the local population of communities with natural gas extraction like Battlement Mesa. Another resident asserted:

¹⁸ Interview September 10, 2016, Grand Junction

¹⁹ Interview September 8, 2015, Battlement Mesa

I [refer to people who are] symptomatic as our canaries... you know, they put canaries in coal mines a long time ago, and they were the first to get sick. Well, that's what [is happening to] our people with more sensitive immune systems. They're getting nose bleeds, they're getting headaches, they're getting dizziness, and they're getting nausea. What I'm concerned about, is that once Ursa starts drilling in the community, it won't just be the canaries, it will be the rest of us that get sick. And maybe, you know, maybe it won't be for 20 years that we get cancer. But it will take off 20-30 years of our lives.²⁰

This person has a familiar fear- that if drilling occurs in Battlement Mesa, quality of life and longevity will be diminished for the more vulnerable populations. Remember, many retirees in Battlement Mesa are living on a fixed income; much of their wealth comes in the form of assets such as their land and houses. Simultaneously, residents believe that close proximity natural gas drilling will cause a decrease in property values and negatively impact health. The big distinction between retirees and other populations living in Battlement Mesa is the difficulty felt by retirees to pick up and move.

After the 2008 housing bubble collapse, home values have largely rebounded across the U.S. In Battlement Mesa, however, housing prices are still 60% lower than they were in 2008. This is at least in part due to the heavy activity of oil and gas drilling around Battlement Mesa, and the situation may worsen due to Ursa's plans to drill up to 100 wells within the boundaries of the PUD. Informants shared feelings of frustration over their lack of ability to prevent any of this from happening. Showing resolve, one Battlement Mesa resident reflected on how community attitudes had changed over the course of the last six years:

²⁰ Interview September 21, 2015, Battlement Mesa

I guess I would say there used to be a sense of general optimism- that isn't there anymore. It's kind of a sense of resignation, not resignation from trying to prevent it from happening. It's more [discouraged] “well this is how things are”- Learning to live with it.²¹

This community member described the struggle felt by long-standing members of the BCC. Another founding member articulated, “We’re trying to build a movement that can grow, but people have to realize what it is costing them not to do it. That's hard; it’s hard to convince people.”²² This interviewee is speaking about the difficulty of convincing other Battlement Mesa residents to pay attention to gas development that may negatively affect them in the future. By focusing on the cost of inaction, this interviewee attempts to engage fellow community members before the negative impacts of fracking are felt and there is nothing residents can do to change their situation.

Conclusion

Data presented in this chapter suggests Battlement Mesa residents are dealing with a number of social impacts. Community divisiveness is one major impact residents described to me; they explained that community views on fracking polarized in such a fashion that some residents feel that cannot talk to others. This is consistent with the community divisiveness described by other social scholars who study fracking (Hudgins et al., 2014; Malin, 2014; Mercer et al. 2014; Perry 2012a, 2012b). Consistent with findings in De Rijke (2013a, 2013b) and Pearson (2013) residents fear the impacts of

²¹ Interview September 21, 2015, Grand Junction

²² Interview September 8, 2016, Battlement Mesa

fracking activities (environmental, health, property value decline) and experience a sense of disempowerment because they are not able to prevent said impacts. This is an example of social and ecological conflict resulting from the commodification of nature as argued in critical resource geography (Bridge, 2000; Delgado, 2012; Himley, 2013). Representatives from the energy industry and government officials at the local and state level narrowly frame impacts to include only the nuisance impacts associated with fracking activities. Impacts are then normalized as tradeoffs for the economic benefits of natural gas operations; this dialog is an example of neoliberal discourse (Finewood et al., 2012; Perreault, 2006). Industry and government officials dismiss links between negative health impacts and natural gas development for lack of hard data (as in the case of the HIA) but present a huge concern for residents. In the context of political economy (Blakie & Brookfield, 1987), this dichotomy represents the link between environmental transformation (natural gas drilling) and political and social processes (the study of health impacts). For retirees, the outcome of this relationship may be further feelings of disempowerment.

To apply environmental justice theory, there are several factors in need of consideration -- namely, the intention of the capital investment, the flow of capital from Battlement Mesa to other areas in Garfield County that do not have a split estate and require energy companies to invest capital in order to secure mineral rights. One way this may happen is through property value decline (Figure 7) associated with natural gas development as demonstrated by the following excerpt presented earlier in this

chapter. This relates to the environmental justice issues because the economic decline maybe caused in part by processes of environmental transformation associated with resource extraction. Furthermore, homeowners have almost no control of the natural resource extraction.

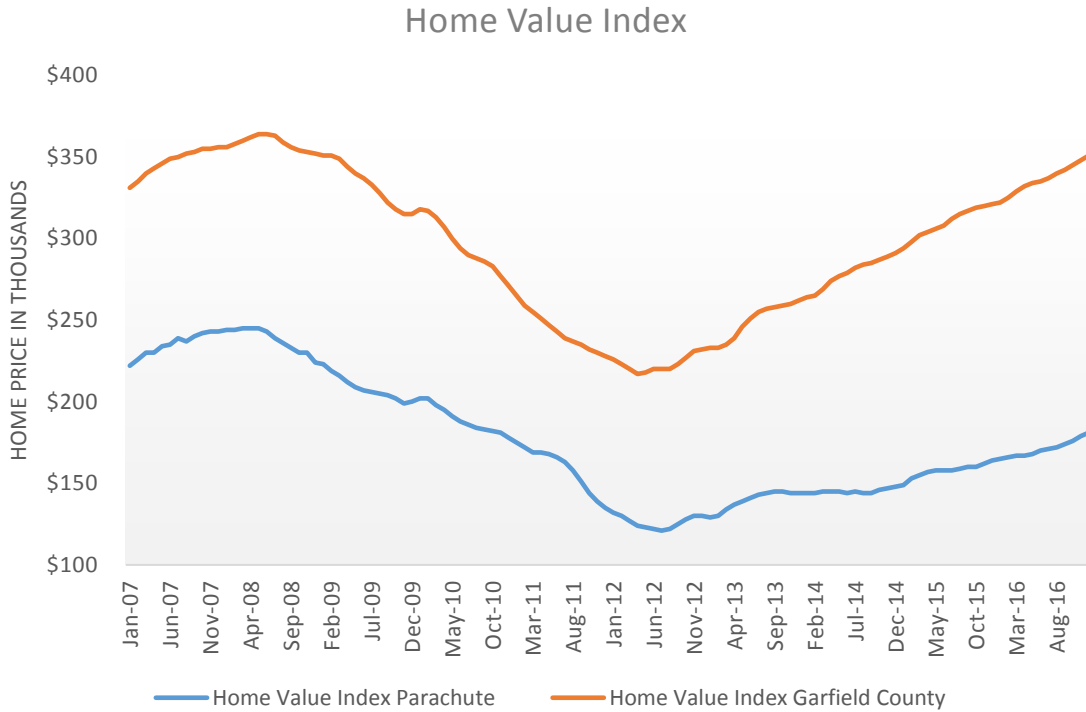


Figure 7: Home Value Index Battlement Mesa/ Parachute vs Garfield County. Adapted from Zillow home prices (2017)

One of our members now, he wants to move, he put his house on the market, he got a prospective buyer, and the buyer backed out when he heard there was going to be oil and gas drilling. So he can't sell his house.²³

Capital diminished for this homeowner in the form of home value when prospective buyers learned of planned fracking activities. The value of the home (capital) may not

²³ Interview September 21, 2015, Grand Junction

have disappeared. It is possible that increased profits for drilling on split estate land where compensation is not required, was used to lease minerals in another geographic location.

Battlement Mesa was built with the original intention of housing employees of an oil shale production facility. The intention to move capital in the form of resources is explicitly there; we can see this by looking at the separation of mineral and surface ownership and the transfer of mineral rights from Exxon, to Antero Resources, to Ursa Resources. It is clear that capital intentionally marked this land for energy development, be it natural gas or oil shale, and relied on the existence of homeowners to extract capital in time between drilling projects. Drilling on split estate land requires less capital investment by energy companies than drilling on land with one owner of both the mineral and surface rights. This is the case because gas companies may not spend as much time in costly negotiation and litigation. Additionally, compensation to the homeowner for drilling on split estate land is much lower when the homeowner does not own the mineral rights. This is especially true when the homeowner is not receiving other benefits from the energy company such as employment or compensation as part of a SUA.

Going forward, Chapter V explores the issue of fracking in Garfield County from a top-down approach. This is done through an examination of economic and political factors at the regional, national, and international level to evaluate causes for drilling in Battlement Mesa.

CHAPTER V
WHY NOW? COMMODITY PRICE, EXPORT POTENTIAL, AND A
SUPRANATIONAL TRADE AGREEMENT

After years of talking about it, we are finally poised to control our own energy future. We produce more natural gas than ever before- and nearly everybody's energy bill is lower because of it...The natural gas boom has led to cleaner power and greater energy independence. We need to encourage that -President Obama (White house, 2013a).

Introduction

Well into my interview with one community activist, the conversation turned toward politics and the broad picture of energy development in the U.S. We sat outside a café in downtown Grand Junction and spoke above music playing in the overhead speakers, and through stretches of loud construction equipment. With respect to the U.S. energy future, the activist concluded;

They think they're [energy companies] securing the economic future of the United States. Well, they're [energy companies] securing the economic future of their shareholders, yeah, but the United States, I don't think so. Otherwise, they [policy makers] would fight against the crude oil export ban from lifting. We need to keep the resource here.¹

This person is referring to the notion that energy companies are pushing to export U.S. oil and natural gas supplies and policy makers do not seem to be opposing that ambition. The interviewee points out a dichotomy between rhetoric presented by government officials and gas companies, and the actions they are taking with regard to fracking activities.

¹ Interview September 10, 2015, Grand Junction

In the case of fracking, negative impacts are framed as trade-offs for the economic benefits of increased natural gas production (Finewood, et al., 2012). But, as Bridge (2004) mentions, commodifying natural gas is made difficult by its physical nature; it is an “uncooperative commodity: it may have use-value and be in plentiful supply, but producing its exchange value requires the labors of science, capital, and law” (Bridge, 2004 p. 396). In other words, technological fix, significant capital investment, and friendly regulatory framework may be necessary for commodification of natural gas on a global scale. I established in Chapter II of this thesis that all of the factors Bridge states are required are present in Battlement Mesa. As natural gas drilling increases, growing concern for environmental degradation and inherent crises of capitalism, such as overaccumulation, and devaluation do as well.

In his work on New Imperialism (2003, p. 19) David Harvey explains that in order to understand the inner workings of an issue we must not only look at where the problem is occurring but also consider the geopolitical condition of the region as a whole. Harvey focuses his research on the connection between U.S. imperialist actions of the Iraq war and the oil resources in the region. In his analysis, Harvey (2003) argues that “spacio- temporal fixes” are sought using capitalistic logic that drives imperialism (p. 89). In this chapter, I adopt Harvey’s approach to understanding issues and analyze why fracking activities occur in Garfield County in a global context.

U.S. political leaders such as President Obama and the natural gas industry tout the benefits of increased natural gas drilling for the ordinary U.S. citizen. For instance,

the U.S. Secretary of Energy under President Obama, Ernest Moniz, references job creation as a benefit: “This natural gas revolution is driving economic growth across the country, lowering energy prices and creating jobs.” (Moniz, 2014). President Obama highlighted jobs and energy cost in his 2013 speech on climate change: “The bottom line is natural gas is creating jobs. It’s lowering many families’ heat and power bills.” (The White House, 2013b). What they are not saying, is that positive impacts of the most recent fracking boom exist in the form of increased profits for the U.S. government and corporations with ties to the energy industry. The government has interest in continuing fracking as described by this passage from an article in *Dissent Magazine*:

Fracking is a clear example of how direct government research and consistent support turned an impractical, expensive process into one that is now seen as the key to domestic energy independence. Oil and gas companies are extremely profitable and have been for several decades. Yet much of their current success was the result of not just favorable tax incentives and subsidies but also direct federal research (Mijin Cha, 2013).

This statement could be interpreted in different ways. First, that discourse, stating that fracking is imperative for energy independence, is a result of a U.S. government strategy to continue fossil fuel extraction. Second, that the federal government has a stake in continuing the U.S. fracking boom because of past support and investment.

The concerns here are two-fold. Are government officials and energy company executives using neoliberal discourse to normalize the impacts of oil and gas development? In addition, will the U.S. government regulate fracking activities if such policy hurts something they have so consistently supported? The primary objective of

this chapter is to consider these questions as they relate to potential U.S. natural gas exportation. In addition, I aim to compare political rhetoric to resident perceptions on why gas companies continue fracking activities.

While Chapters III and IV focused on a fine-grain case study analysis, this chapter takes a top down approach with the intention of understanding fracking in Garfield County in a global context. I divide this chapter into three sections. First, I note geopolitical factors that may have a connection to the fracking activity in Garfield County. This includes discussion of high prices for natural gas in Asia and the potential for U.S. natural gas exports. Then, I discuss the supra national trade agreement known as the Trans-Pacific Partnership (TPP). I present resident opinions on why energy companies continue to drill in Colorado despite the low commodity price of natural gas. To conclude this chapter I present empirical and secondary evidence that suggests Garfield County and local operators who continue to drill in a low price climate, have plans to export fracked gas. I argue that potential for natural gas exportation may incentivize continued drilling in places like Battlement Mesa. In doing so I highlight the discrepancy between policy rhetoric and actual motivations for continuing to drill.

Geopolitical Factors

At the time of my field work in the summer of 2015 there were a number of conflicts involving the U.S. on the international stage. A little over a year had passed since the Russian annexation of Crimea (Herrmann, 2015). The U.S. and Iran were in the midst of negotiations on the Iran Nuclear deal. An already tense Venezuela- U.S.

relationship was strained by new U.S. sanctions (Planas, 2015). Additionally, the U.S. and Saudi Arabia saw strained relations due to a respective disagreement of military policy in the Middle East (Council on Foreign Relations, 2016). In lieu of these factors, the U.S. may have used the natural gas boom strategically to influence cooperation with OPEC and Russia. According to an article published by the Chicago Energy Policy Institute; “with domestic production soaring, the U.S. is less dependent on other nations for energy supply and so less vulnerable to the demands and strife of oil-supplying countries” (Endicott, 2016).

Additionally, a study by Pierce Jr. (2013) on the geopolitical implications of the U.S. fracking boom articulates:

Reducing Russia’s leverage over Europe attributable to Gazprom’s dominance of the European gas market, reducing Iran’s leverage over India attributable to India’s heavy reliance on energy supplies from Iran, and eliminating completely the risk that Russian President Vladimir Putin will be successful in his efforts to create a natural gas version of the OPEC cartel (P. 8).

As the quote suggests, OPEC and Russia rely heavily on natural gas exports, making them vulnerable to a flood of supply and fossil fuel price fluctuations. The fracking boom in the U.S, at least in part, increases leverage aboard when concerning other natural gas producing countries.

While Russia and OPEC saw negative reverberating impacts of the U.S. natural gas boom, Japan viewed it as an opportunity (Cutler, 2015). Japan’s energy policy calls for a diversified energy portfolio due to its large volume of imports (Vivoda, 2012 p. 137). Japan imports more than 30% of the global market share of liquefied natural gas

(LNG) annually with the majority of supplies coming from Australia and countries in Asia and the Middle East (International Atomic Energy Agency, 2016a). In 2013, no single country supplied more than 21% of Japan's imports (Table 11).

Table 11
Japan's LNG Imports by Source, 2013

Country	Percentage of Imports (%)
Australia	21
Qatar	18
Malaysia	17
Russia	10
Indonesia	7
United Arab Emirates	6
Brunei	6
Other	6
Oman	5
Nigeria	4

Source: Adapted from Energy Information Administration (2016a)

Following the Fukushima nuclear disaster of 2011, Japan shifted its energy supply away from nuclear power, permanently shutting down 16 of its nuclear reactors (International Atomic Energy Agency, 2016b). Japan increased natural gas imports from 109 billion cubic meters (bcm) in 2010, to 128.3 bcm in 2012 (International Energy Agency, 2013). This sudden and substantial increase in demand caused a considerable rise in the commodity price of natural gas in Asian markets. In addition to the rise in demand, the price of natural gas is loosely tied to the price of petroleum in Japan, making LNG prices less susceptible to volatile price fluctuations seen in North America (Figure 8). While natural gas prices in Japan and the U.S. were relatively similar from 2000 to 2008 and both dipped after the 2008 financial crisis, Japan's prices rose substantially after 2008

and the U.S. prices remained flat. This created a gap of nearly \$10/MMbtu between the price of natural gas in Japan and the price in the U.S.

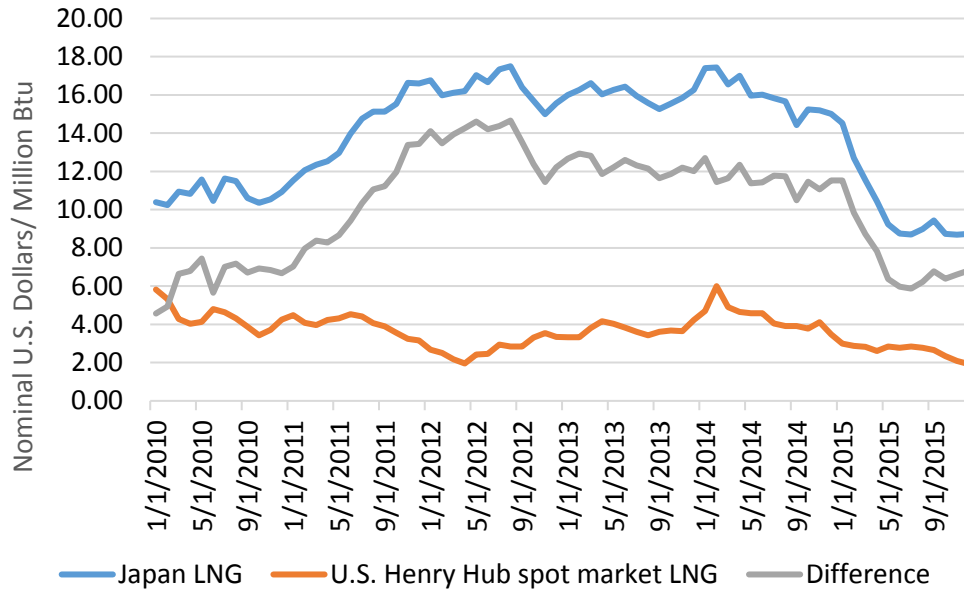


Figure 8: *Monthly Nominal Henry Hub vs. Nominal Japan LNG Prices 2010-2015*
Adapted from Energy Information Administration (2016c)

From a strictly economic standpoint, long-term contracts between countries in North America and Japan would be mutually beneficial. The U.S. has an abundance of natural gas supply available at a low price due to the most recent fracking boom, and Japan has a high demand in a high price environment.

Japan wants to import U.S. gas, and U.S. companies have gas they want to sell to Japan. But, before an export agreement can be arranged the U.S. public interest must be taken into account. The Natural Gas Policy Act of 1978 gives the U.S. Department of Energy (DOE) the authority to issue permits for natural gas exports through a public process (Energy Information Administration, 2016b). Each LNG export proposal must be in the American public’s best interest in order to be issued a DOE permit. However, the

DOE is required to issue permits immediately for export agreements with countries whom the U.S. has a Free Trade Agreement (FTA). Although the U.S. has exported LNG to Japan in the past², the two countries have never agreed to an FTA (Office of the U.S. Trade Representative, 2016). FTAs can be very complex and take years to negotiate. Aside from a hypothetical situation where the DOE is stripped of its regulatory power by congress, the quickest option facing Japan and the U.S. may be to join an existing agreement and the TPP may provide such opportunity.

Let's Get an FTA

The TPP evolved from a trade agreement enacted in 2006 among New Zealand, Chile, Brunei, and Singapore, known as the Pacific Four (P-4). In 2008, the U.S. joined the P-4 and began negotiations for an expanded TPP under President Bush. They were followed quickly by Australia (2008), Peru (2008), Vietnam (2008), Malaysia (2010), Mexico (2012), Canada (2012), and finally Japan (2013) (Office of the United States Trade Representative, 2016). The timing of Japan's decision to join TPP negotiations coincides with the time when natural gas was in high demand in Japan and cost was very low in the U.S. LNG export facilities were gaining approval from regulatory bodies like the DOE (Cutler, 2015).

The TPP is widely criticized for language that bolsters corporate power and lacks obligatory clauses on human rights protections and environmental regulations

² For more information on U.S. LNG exports to Japan see Conoco Phillips (n.d.)

(Granvillie, 2015).³ Noam Chomsky is quoted in an interview about the TPP with the *Huffington Post* as saying: “It’s designed to carry forward the neoliberal project to maximize profit and domination, and to set the working people in the world in competition with one another so as to lower wages to increase insecurity” (Carter & Grim, 2014). Experts disagree on whether this economic agreement is beneficial to the U.S. or not (Calmes, 2016). The TPP agreement does not specifically address energy policy. Following the lead of NAFTA, natural gas is classified as a commodity, sharing the same guidelines as other goods such as textiles and automobiles in the treaty’s text (Cutler, 2015). It is difficult to say what the residual impacts of the TPP agreement will be on the natural gas industry, but it is clear that an increase in U.S. LNG exports will coincide with an increase in fracking at home.

During my fieldwork in Colorado, few informants spoke about export potential for Garfield County natural gas. The interviewees who brought up LNG exports did so after I asked: “Why do energy companies in Garfield County continue to drill despite the low commodity price of natural gas?” Of the people who spoke about exports, opinions on it varied. Aside from export potential, the answers I received to that question were centered on commodity price and rule changes. For example, one state government employee stated:

They’re still drilling because, I think most of them probably think the price for oil will rebound... A lot of them are still being fairly aggressive putting in wells, and moving forward. And part of it might be that they foresee another change in our

³ For more information on the TPP see Granville (2015).

rules. We went through this governor's task force⁴ process last year and they came up with a bunch of recommendations. A couple of them were for more involvement of local governments, and uh, so some of the operators are probably foreseeing a rule change that's going to make it somewhat more difficult to get permits and longer so they're proceeding now until the rules change.⁵

This informant has a mixed opinion on why energy companies in Garfield County are still drilling for natural gas. She/he believes that potential COGCC rule changes as well as the commodity price of natural gas are impacting the decision to continue drilling. During archival work, however, it became clear that most major energy companies had quit drilling in Garfield County by the time of my field work. The Town of Parachute discusses decreased drilling activity in the following excerpt from their 2015 comprehensive plan:

Declines in commodity prices have resulted in a dramatic decrease in new natural gas well development. In 2014, Encana Corporation announced that it would not drill any new wells in the basin due to low commodity prices. WPX Energy followed suit and halted completion on newly drilled wells, cut the number of drilling rigs it operates, and downsized much of its workforce within the community. As mentioned earlier in this report, only three (3) drilling rigs are active in Garfield County at the present time (Parachute Comprehensive Plan, 2015 p. 17).

To clarify, Encana Corporation and WPX were the two main producers of natural gas in Garfield County and they decided in 2014 that drilling new wells would not be profitable for them. The natural question for me to ask here is why can Ursa afford to continue their fracking activities when other energy companies who operate locally cannot. To

⁴ The Governor's task force is a multi-stake holder group put together by Governor John Hickenlooper in 2014 in an effort to better regulate fracking in Colorado and keep a state-wide fracking ban off the November 2014 ballot.

⁵ Interview September 15, 2015, Glenwood Springs

put this in the context of the main goal of this chapter, it is possible that Ursa plans to export Battlement Mesa gas, hence making it drilling activity still profitable.

Drilling activity in Garfield County peaked in 2008 with 1,689 well starts (COGCC, 2016). For comparison sake, the county had just 94 drill starts in 1999, 500 in 2013, 362 in 2014, and 173 in 2015 (COGCC, 2016). Table 12 shows the volume of natural gas production (including coal bed methane) in Garfield County from 1999 to 2016. Values for natural gas production continued to increase after the peak drilling year (2008), likely caused by a lag in the time it takes to drill a well and when the well starts producing, and then dips dramatically down to 2007 levels by 2016.

Table 12
Garfield County Coal Bed and Natural Gas Produced by Year

Year	Gas Produced (bcf)	Year	Gas Produced (bcf)
1999	56,915,929	2008	566,554,247
2000	70,316,336	2009	608,195,580
2001	88,480,768	2010	649,355,891
2002	117,039,783	2011	676,895,481
2003	150,094,659	2012	701,707,392
2004	210,359,085	2013	653,571,153
2005	270,779,492	2014	615,074,096
2006	351,640,214	2015	555,990,449
2007	445,820,658	2016	482,200,000 ⁶

Source: Adapted from Colorado Oil and Gas Conservation Commission (2016)

While interviewees did not say they were in a bust period during my field work in 2015, they were well aware of the boom and bust resource cycle. One Garfield County EAB member discussed the impacts of boom and bust on the local economy and saw

⁶ Estimate based on the mean average for the first five months of 2016.

LNG exports as a way of preventing drastic booms and difficult busts. The EAB member said:

I cannot even comprehend balance because there are so many extenuating circumstances. When things are good, some people are good and some people are bad. When things are bad, everybody is bad. What gets left behind after a boom breaks is typically people who are not really employable...I think exportation will bring some balance.⁷

This interviewee is referring to the fact that in a boom cycle some individuals in the community experience economic gain and some do not, but in a bust cycle, nobody experiences an economic gain. In other words, this person believes LNG exports have the potential to provide a steady demand for Garfield County gas, creating a more stable socio-economic situation in the region for all citizens. The Town of Parachute discusses exporting LNG in the following excerpt from their 2015 comprehensive plan:

LNG exports present a significant opportunity for the natural gas industry, if commodity prices increase. In addition to the Gulf of Mexico and Atlantic Coast ports that have been approved for LNG exporting by the Department of Energy, there are two (2) port facilities in Oregon (Oregon LNG and Jordan Cove LNG) that are in the planning stages. Pipelines could transport the natural gas from the Basin to these port facilities. The Basin is approximately 1,000 miles from the Gulf Coast and 900 miles from the Oregon Coast. Most of the infrastructure necessary to transport natural gas from the Basin to one of the ports is already in place (Town of Parachute, 2015 p. 15).

From this excerpt we learn that the Town of Parachute is well aware of the potential for LNG exports and views exportation as a noteworthy opportunity should the commodity price of natural gas increase. One of the Oregon terminals mentioned in the Parachute report, the Jordan Cove export facility, has since been denied and then re-opened by the

⁷ Interview September 7, 2015, Debeque

Federal Energy Regulatory Commission (FERC). Regulators see the Jordan Cove project, and a pipeline project, the Pacific Connector, as a package deal. Both projects depend on whether or not operators are able to secure long-term contracts to sell the LNG (Webb, 2016). Quoted in an article published by the *Glenwood Post Independent*, one Garfield County Oil and Gas Association representative articulated his associations view on the export project:

The project would provide a significant economic benefit to multiple western states and their local communities where energy development has historically been a major economic driver... The City of Rifle requests the Department of Energy and FERC afford Colorado this economic opportunity by reconsidering its decision regarding the Jordan Cove LNG terminal and ensuring that companies in the Rocky Mountain region are supplied with the demand needed to justify future natural gas production (Hoffman, 2016).

Essentially, this spokesperson is requesting that the DOE and the FERC approve the Jordan Cove and Pacific Connector projects in order to secure new markets for Western Colorado gas. The regional news magazine *High Country News* Zaffos (2015) published an article titled *The Trans-Pacific Partnership Could Pipe in New Business for the Western Gas Industry*. The article features the town of Rifle in Garfield County and discusses the 2008 bust, one that Rifle has yet to recover from according to the article. However, the article suggests the following:

The next bonanza could be just around the corner, though, thanks to the controversial Trans-Pacific Partnership — the largest international free-trade agreement that the United States has ever negotiated. By slashing tariffs and lowering regulatory hurdles, the TPP could make it easier to sell Western natural gas to Japan, potentially igniting another boom (Zaffos, 2015).

In other words, if the TPP is ratified, new trade guidelines with Japan could incentivize an increase of drilling in Garfield County. This notion relates back to political economy analysis in Chapter II. An abundance in US natural gas supplies (as a result of the most recent fracking boom) has led to over accumulation and a decline in the North American commodity price. Spatial fix is necessary again (second time) to produce profit. This time, the fix is to export gas to a new geographic market (Japan) with higher demand. A supra national trade agreement such as the TPP is one way a new geographic market may be accessed quickly.

What does this mean for the folks in Battlement Mesa? In all of the news articles I included in the Word Cruncher Analysis related to exports, increased drilling is portrayed as having a positive economic impact in Garfield County. However, there seems to be no mention of the social impacts of increased drilling. The fifty most commonly used words from the articles selected ($n = 10$) are most closely associated with political and economic jargon (Table 13).

As explained in the methods section of this thesis (Chapter I) the Word Cruncher Analysis was included in this thesis for data validation. For the *Export Articles* analysis, ten news articles published between January 2013 and May 2016 are included. All the articles focus on U.S. LNG exports, export facilities, or planned pipelines that are vital for some gas markets to access the global economy through export. I ignored commonly used words (he, she, it, then, they, and, so, be, the) and recorded the count and frequency of the 50 most commonly used words among the ten articles. As to be

expected the words gas, LNG, and energy are all in the top five for frequency. Together, export and exports make up the third most frequent word.

Table 13
Content Analysis- Export Articles

	Word	Count	Percent (%)		Word	Count	Percent (%)
1	gas	184	3.02	26	Jordan	21	0.34
2	LNG	122	2.00	27	terminals	21	0.34
3	natural	114	1.87	28	united	21	0.34
4	energy	104	1.71	29	Colorado	19	0.31
5	U.S.	83	1.36	30	point	19	0.31
6	export	61	1.00	31	prices	19	0.31
7	exports	49	0.80	32	new	17	0.28
8	market	40	0.66	33	oil	17	0.28
9	global	34	0.56	34	Oregon	17	0.28
10	price	34	0.56	35	pipeline	17	0.28
11	cove	33	0.54	36	Cheniere	16	0.26
12	bcf	32	0.52	37	facility	16	0.26
13	production	29	0.48	38	support	16	0.26
14	approval	28	0.46	39	economic	15	0.25
15	domestic	27	0.44	40	liquefied	15	0.25
16	terminal	27	0.44	41	percent	15	0.25
17	trade	26	0.43	42	FERC	14	0.23
18	markets	25	0.41	43	process	14	0.23
19	states	24	0.39	44	proposed	14	0.23
20	projects	23	0.38	45	Asia	13	0.21
21	demand	22	0.36	46	billion	13	0.21
22	DOE	22	0.36	47	Japan	13	0.21
23	project	22	0.36	48	planned	13	0.21
24	supply	22	0.36	49	security	13	0.21
25	department	21	0.34	50	Western	13	0.21

The majority of the top 50 words included in this analysis are associated with economic processes (ex: demand, markets, price, trade, supply), geographic locations (Asia, Colorado, Jordon [cove], Japan, Oregon, Western), physical components of infrastructure (facility, pipeline, terminal), regulatory framework (DOE, FERC), or

political developments (approval, proposed, process). Aside from economic terms, no significant mention of social impacts is present.

When I asked a state government official if her/ his agency would regulate Colorado LNG exports this was the response:

We don't really have any jurisdiction over that. Um, we definitely kind of look at it. I went to a conference a few weeks ago where a gentleman was talking about exporting, and they're making headway on increasing that with these ports along the coast. But we basically, our jurisdiction stops at the point of sale, so we don't have much say over, we're definitely interested in what's happening with regards to exporting and importing.⁸

In other words, the state will continue to regulate drilling activity but their power to regulate does not extend beyond the point in time the commodity hits the market. Very few Battlement Mesa community members or community organizers I spoke with talked about why energy companies continued drilling in Garfield County despite a low commodity price climate. The subject of exportation came up during my second focus group with one informant asking the others in the group: "I mean let's face it, why are they drilling now; they're not making any money anyway?"⁹ In response another informant suggested:

Well what they're trying to do is get in, I think they know that it's coming, that they're not going to be able to drill in communities. So they want to get in. This is a simple one, we don't have a huge population, we don't have a large tax base, we don't even have that big of an impact at the polls. So this is kind of like cherry picking, this is the easy one. So [laugh] that's my two cents.¹⁰

⁸ Interview September 15, 2015, Glenwood Springs

⁹ Focus Group, Participant One, September 21, 2015, Battlement Mesa

¹⁰ Focus Group, Participant two, September 21, 2015, Battlement Mesa

This resident believed that it is a strategy by Ursa to drill on the most contentious plots of land first, before a rule change takes place that may limit or ban residential drilling.

The one community activist that I spoke with who mentioned the potential to export as a reason to continue drilling had a larger scale analysis of what was going on. She/he said:

Well there's a couple of reasons why, again, I could go on all day. Literally I could go on all day about this because it gets into politics and what drives our country, capitalist mindset, capitalist ethic, and I'm not against certain forms of capitalism as long as it's conscious. It's all about profit taking, and profit taking now, not about thinking about the future... so what happens is these corporations, they take the profit but they leave Americans with the legacy. They drill these lands, they destroy habitat, they destroy watersheds, they pollute the air, they have these toxic wastewater ponds, and they make gazillions of dollars selling this shit to China and India. So that's why they want to lift the crude oil ban, so they can make profit, drill the hell out of the U.S., empty out the ground of oil. So what happens 25-30 years from now when we really need it? It's gone, they've squandered it, and you can't put money in your gas tank, nor can you eat it.¹¹

This interviewee is commenting on the nature of the capitalist system and the cycle of accumulation leading to contradiction and later spatial fix. She/ he criticizes the environmental injustice that results. While the majority of the benefits go towards the corporations involved in the industry, the majority of the burdens fall on local populations.

Conclusion

This chapter explored why energy companies continue to drill in Garfield County despite the low commodity price of natural gas. I discussed geopolitical implications of the U.S.

¹¹ Interview September 10, 2015, Grand Junction

natural gas boom, including attempts to influence Russia, and OPEC, and the low commodity price climate that has resulted from the boom. Additionally, this chapter explored potential natural gas exports to Japan and the TPP, concluding that export potential may incentivize fracking activities at home. Finally, I discussed resident views on why gas companies continue to drill despite the low commodity price of natural gas covering a few different reasons, to include rule changes, export potential, and the revival of oil shale development.

While local government and industry officials clearly have plans to export Garfield County gas, residents seem to be unaware of these plans. Upon analysis of data presented in this chapter, I argue that the potential for LNG export is-- at least in part-- incentivizing continued drilling in Garfield County. On the global scale, the TPP will provide a fast track to securing contracts for natural gas exports with countries who did not previously have FTAs with the U.S., most notably Japan. As presented in this chapter, natural gas prices in Japan are higher than gas prices in both Europe and North America. Japan also saw a significant rise in demand for natural gas following the Fukushima Nuclear disaster in 2011. This potential new geographic market may be a spatial fix for an overaccumulation problem in the U.S.

While, after reviewing the data, it seems logical to conclude that natural gas exports may be a main driver of natural gas development in the U.S., most residents never brought it up. This in part, is due to the neoliberal discourse framing fracking activities as beneficial for all Americans.

Although I argue that potential exportation is the main driver of continued natural gas drilling, it is also important to note that in Battlement Mesa a potential COGCC rule change may also be an incentive for energy companies to drill early. However, due to the low price climate of natural gas in the U.S. and the higher price climate in Asia, the question about continued natural gas development in Garfield County shifts from considering “if” scenarios--to “when” scenarios’. Meaning, rather than contemplating if LNG exports should be pursued at all, the local government is contemplating when the opportune time for exportation will be. Moving forward, Chapter VI concludes this thesis by revisiting the initial research questions of this study and providing research findings.

CHAPTER VI

FINDINGS AND CONCLUSION

After three hours of conversation with Bruce Anderson on history, politics, and physics, the conversation shifted toward human behavior and community engagement. By this time Bruce's swamp coolers were running full blast in order to keep his home cool. It was an early September day where you can almost see the desert heat through the windows of the cooled house. Bruce articulated a concern for the complacency that he has observed in his community:

We're trying to build a movement that can grow but people have to realize what it is costing them not to do it. That's hard; it's hard to convince people . . . You know if you live here and you get a nice 401k and a company that is still paying retirement and Social Security, and you can go to Arizona six months out of the year. These problems are only part your thing. And you come here and you're playing golf and [saying] "well, I don't see a drilling right yet; it's no big deal". That person is hard to convince. Or they don't care. Or, on the other hand, there is a couple I know, they're beyond me in years, they still have a great vitality, but that D pad is going to be within a 1000 feet and they know they will not survive that. Their vitality will now be diminished by it and if they had any hope of getting so many years more, it's gone...I feel totally helpless because I can't just run out there and say stop this, it doesn't happen that way, it takes long arduous fights and eventually you might be right, but it doesn't make any difference.¹

In this statement Bruce remarked on the different attitudes of his peers in the Battlement Mesa Community. He highlighted frustration over part-time residents' passive dismissal of concerns while at the same time he is saddened by other residents who believe that Ursa's project will cause them to live out the duration of their lives in a diminished capacity.

¹ Interview September 8, 2015, Battlement Mesa

Bruce's words encapsulate four central themes to this thesis. First, that the difference between people who oppose fracking activities and those who support them may be the financial well-being needed to avoid impacts (they have the ability to move). Second, that many people are concerned with the physical or nuisance impacts that Ursa's planned development will have upon residents. Multiple nights of bright lights shining into a person's window or constant loud noise has the potential to elevate stress and affect human health. Third, there are non-tangible impacts of disempowerment and helplessness resulting from the lack of control residents have in the negotiation and planning process. Finally, that community residents who oppose fracking activities in Battlement Mesa have joined to form a movement to fight drilling activity in the PUD.

This thesis provides a snapshot of the way natural gas activities affect residents of Garfield County. The timing and substance of this thesis are particularly important because members of the BCC believe that, one way or another, Battlement Mesa will be used to set precedent for residential drilling in Colorado. If drilling is allowed to proceed as planned, Battlement Mesa will be used to set the norm for other neighborhoods. Conversely, if community organizations and residents are able to convince the county or state to deny permits for drilling in Battlement Mesa, precedent may be set to keep drilling out of residential areas.

The primary study site for this research is Battlement Mesa; however, resident views outside the community of Battlement Mesa are taken into account as well. The research questions this study seeks to address are: RQ1) what are the social impacts of

fracking in Garfield County? RQ2) How are residents responding to impacts? And RQ3) Why are energy companies continuing to drill in Colorado despite the low commodity price of natural gas?

To answer RQ1) social impacts, I have identified four major areas of concern for residents. Main concerns include disempowerment, health, environment, and community cohesiveness. Battlement Mesa is located on split estate land, meaning that residents own the surface land where their homes are located, but do not own the rights to the minerals located underneath their property. As one community activist articulated, many residents were completely unaware of the split estate until they learned of plans to drill:

You know I don't think people understand split estate particularly well, and again who writes the laws? People will go buy property, they think it's going to be wonderful -- their retirement home, they're going to raise a family, whatever, and all of a sudden they find out they don't own the minerals.²

Minerals may be owned by the local, state, or federal government, a private citizen, a corporate interest, or a combination of all three groups. As explained in Chapter III, in split estate situations, resident power to negotiate with oil and gas companies, or not, seems to influence their perception of development. The ability to negotiate may or may not lead to a more favorable outcome for the homeowner, but it allows for the homeowner to have some power in relation to the gas company. In order to negotiate, the land-owner must have some sort of leverage. One example of leverage is owning

² Interview September 10, 2015, Grand Junction

some portion of the mineral rights underneath the surface of the land.

In the case of Battlement Mesa, the majority of mineral rights are owned by the natural gas extraction company Ursa Resources. Mineral right holders in Colorado are legally allowed to use the surface land to access their minerals, and surface landowner (homeowner in most cases) have little say in the process. Under the split estate law, the rights of mineral holders supersede the rights of surface owners. For this reason the split estate law makes preventing oil and gas drilling in Battlement Mesa extremely difficult for residents. As a result, residents may be subjected to close proximity oil and gas development in the near future. Split estate mineral rights and residents' lack of control to prevent drilling activity are sources of feelings of disempowerment as articulated by Bruce in the introduction of this chapter.

Close proximity drilling imposes a variety of current and future social impacts on residents. Health impacts are one concern articulated by residents such as this interviewee:

I [refer to people who are] symptomatic as our canaries... you know, they put canaries in coal mines a long time ago, and they were the first to get sick. Well, that's what [is happening to] our people with more sensitive immune systems. They're getting nose bleeds, they're getting headaches, they're getting dizziness, and they're getting nausea. What I'm concerned about, is that once Ursa starts drilling in the community, it won't just be the canaries, it will be the rest of us that get sick. And maybe, you know, maybe it won't be for 20 years that we get cancer. But it will take off 20-30 years of our lives.³

This interviewee lists both immediate and long-term health concerns that create worry

³ Interview September 21, 2015, Battlement Mesa

for Battlement Mesa residents. While some people feel they are already getting sick due to the fracking activities, government officials and energy representatives plant doubt that fracking activities are to blame. One government official I spoke with articulated:

If someone says they got a bloody nose, I treat that as a medical issue, I don't sit there and judge it going, "well it's dry" ___ you know, I call the right authorities, if it's a medical thing I don't try to sit there and read between the lines. It's not my job to judge people.⁴

While this response displays professionalism on behalf of the government official, it also suggests she/he is doubtful that fracking activities cause nosebleeds. While I agree with her/him, it is important not to judge, it is just as possible that fracking activities did cause the nosebleed as opposed to the dry climate. The point here is there is a level of uncertainty surrounding health impacts of natural gas development that is used to plant a seed of doubt. One community organizer I spoke with also works as a physician, she/he articulated:

Health, those effects remain to be seen. I don't think anyone has proven it, but that's because no one is really studying it, because there's no money to study it. Because who's got the money for those kind of things? Government, the oil industry? Well they're not going to do that. Because intuitively you know [health effects] are going to be there. If you can demonstrate that there is a severe health impact by proximity to oil and gas operations, then there might be some legislation put in place to limit that.⁵

Government officials in Garfield County view natural resource extraction as a vial part of the local economy; they are heavily dependent on tax revenue to fund vital infrastructure like roads, schools, and hospitals. Hence, they are unlikely to support

⁴ Interview September 9, 2015

⁵ Interview September 10, 2016, Grand Junction

studies on the health impacts that may limit future revenue. If health impacts are not acknowledged, then the cost benefit analysis may still result in favor of fracking. One resident shared concerns grounded in effects to the environment cautioning this sort of trade-off:

They use the situation of acceptable collateral damage. This is, they know that there is going to be higher death rates from the asthma and respiratory problems and stuff like that. If you have so much ozone, but the greater good is served to more people [and] they have more convenience and better living at the expense of that collateral damage, [then] they paint it as an acceptable level. But if that level is greater than what you actually measured, is it still acceptable? There is the moral question. How far will you stretch your limits? Will you actually hold your limits?⁶

This interviewee is concerned with the externalities associated to with increased fossil fuel extraction and again criticizes the cost benefit trade-off used to normalize fracking impacts. Another local resident shared similar thoughts, she/he advocates for adopting the precautionary principle to protect both health and the environment. She/he said:

I had felt that, “Why don't we have legislation that does a complete analysis?”-- Maybe like what they do in Europe--and a rating system like, “Okay, this is how the natural gas will help our economy. This is why it will help lessen pollution in cities if we use [more] natural gas.” Then, on the other side . . . You know, the negative side: “we're polluting the groundwater, we may be making people very ill. We don't know the aftermath of all of this in any event. Our earthquakes caused by rumblings, and stuff like that.” Then we take that information and we just say, “you know what? This is not worth it.”⁷

This interviewee has concerns with illness, pollution, and earthquakes, concerns in her/his eyes are significant enough to stop fracking activities altogether, at least until

⁶ Interview September 8, 2015, Battlement Mesa

⁷ Interview, September 22, 2015, Grand Junction

long-term effects are studied. Until then, gas development remains an important fixture of the collective identity in Garfield County.

Oil and gas development is woven into the social fabric of communities on the Western Slope. Very few interviewees I spoke with were outright opposed to natural gas development in their geographic area. Instead, they are concerned with people residing in close proximity to large--scale oil and gas development. One community organizer articulated the sentiment this way:

We do not officially advocate for bans. But we are trying to keep drilling out of the PUD. Because we don't think that drilling rigs should be that close to people. And when I say we I mean the whole collective organization of people who think that there are places where you drill and there are places where you don't.⁸

This interviewee's stance differs from that of "fractivists" fighting to ban fracking in the Front Range. She/he recognizes the importance of gas development for the local economy and the livelihood of many residents. However, this person believes there should be a separation between industry and residents. The social legacy of oil and gas extractive industries in Garfield County make the current debate about new drilling in Battlement Mesa a polarizing one. One interviewee shared with me her/his experience with community dissension:

We are a close-knit community here, and I don't know that many people, frankly, because like I said I've been back and forth between here and Santa Fe a lot. But what I notice is there are people here that don't think they can talk to other people because they are on different sides of this issue. And I think that is really divisive in a community this small.⁹

⁸ Interview July 17, 2015, Grand Junction

⁹ Focus Group September 21, 2015, Battlement Mesa

The plan to develop well pads inside the PUD is so controversial that it is keeping some neighbors from communicating with others.

Community divisiveness and disempowerment related to fracking activities are causing some local residents to feel stress. These social impacts may differ person by person and do not seem to be directly correlated to one another. Potential health impacts and the risk of illness is a widespread concern and sometimes fear for residents fighting fracking activities. Interviewees that mentioned environmental impacts frequently discussed health concerns at the same time. Finally, residents are critical of government officials and energy company representatives who view environmental and health impacts as trade-offs for the economic benefits of fracking activities. Each social impact articulated above is broken down further in the analysis chapters of this thesis (Chapters III, IV, & V). In my explanation of RQ2) Resident response, I will explain what community members are doing in response to Ursa's plans to drill.

A small group of residents formed the BCC directly after Antero Resources held a community meeting to discuss plans for natural gas development within the PUD. Since then, the BCC has grown steadily in both size and mission. They currently work very hard to advocate for restrictions on fracking activities within the boundaries of Battlement Mesa, and to ensure high standards of protection and mitigation if drilling does occur. They do this through participating in public hearings, writing letters to regulators at the county and state level, and keeping a regular presence at the county EAB meetings. BCC

is active in the community, and even has support from individuals who work in the energy industry. As one member shared:

When we run a petition around-- we've done that a couple of times now-- we even get oil and gas people to sign it. I mean, "no drilling in Battlement Mesa" they signed it. We turned in 416 signatures to the planning and zoning commission.¹⁰

The planning and zoning commission was the first to review Ursa's permit application for two multi-well gas pads and a new pipeline (Figures 4, 5, and 6).

In addition to the civic engagement, the BCC welcomes outsiders (like myself) interested in learning about their fight. During the summer of 2015, I was conducting fieldwork in Battlement at the same time other researchers were filming a documentary about the proposed development. I credit the BCC, GVCA, and WCC, for a great deal of the empirical data included in this thesis.

Resident perceptions as to why Ursa continues to pursue drilling in BM are mixed. Many residents and government officials concluded that Ursa believes the price of natural gas will increase. Government officials also stated rule changes at the state level may have an influence as well. An Ursa representative said they do believe the gas price will increase and that 2015 was a cheap time to drill because of a slowdown at the time. The Ursa representative that I spoke with also said they would eventually like to export gas internationally. Showing support for this, county government officials stated that initiating consistent natural gas exports could bring balance to a region prone to

¹⁰ Interview September 21, 2016, Grand Junction

resource booms and busts. Securing export agreements with countries such as Japan, the TPP may incentivize an increase in natural gas drilling in the U.S. This excerpt was published in an article from High-Country Times:

The next bonanza could be just around the corner, though, thanks to the controversial Trans-Pacific Partnership — the largest international free-trade agreement that the United States has ever negotiated. By slashing tariffs and lowering regulatory hurdles, the TPP could make it easier to sell Western natural gas to Japan, potentially igniting another boom (Zaffos, 2015).

When answering RQ3) Why now?, many factors come into play. I argue that the potential for Western Colorado gas to hit the international market is at least in part incentivizing continued drilling in Garfield County despite the low commodity price of gas.

Analysis

While some people are bullied into leases without compensation through the existence of split estate laws, others are compensated handsomely because of the leverage they possess to negotiate. I argue that capital is extracted from the have-nots (split estate landowners without mineral ownership) and given to the haves (landowners who own both their surface land and mineral rights), creating environmental justice concerns. The mineral owners can be compensated more because the non-mineral right owners are not being compensated. At the same time, increased drilling on split estate land may be incentivized because energy companies are not pulled into costly negotiations or required to pay royalties to the surface landowner for the gas they extract. This requires less capital investment on the energy company's

behalf. If LNG exports are pursued by the U.S. in the future, a supra national trade agreement like the TPP may exacerbate the problem of environmental justice due to fracking activities. This is because the TPP will incentivize further drilling by securing a higher selling cost for U.S. natural gas in Asian markets.

While some Battlement Mesa Residents directly benefit from planned gas development through industry employment, others bear the burden of impacts to social well-being in a very localized fashion.

Limitations

Fieldwork for this thesis took place over a ten-week period in the summer of 2015. Although this yielded a representative range of perspectives, a longer fieldwork period, with a larger number of interviewees would have been beneficial. Limitations for this research also include the quality of the data presented – it is assumed that each interviewee shared their viewpoint honestly. Each interview was transcribed and coded for commonalities but this was done based on the researcher’s perception of the issues and therefore has an inherent bias.

Recommendations

In addition to public education on split estate rights, new policy should be crafted to alleviate some of the issues associated with separate surface and mineral right ownership. Federal legislation on real estate transactions should require disclosure of a split estate and require that any mineral right holder be named to the buyer at the time of sale. In the case of natural gas development in Battlement Mesa, it

is the researcher's opinion that fracking activities should either be limited, or homeowners should be compensated fairly for their decreased property values and diminished capacity of life. Drilling should be kept outside the boundaries of the PUD and a significant distance from concentrated areas of population. Alternatively, if drilling does occur within the PUD, a range of mitigation measures should be explored- affected homeowners within a determined distance (such as ½ mile) of the proposed well pads should be compensated. One way of doing this could be using a formula that considers all social, environmental, and economic factors such as the model Bartik et al., (2016) developed in their willingness to pay analysis. Another reasonable but somewhat extreme solution may be for homeowners in the closest proximity to planned well pads to receive fair market price for their homes through the channel of eminent domain.

Further Research

This research may be reproduced in other communities around the U.S. in order to create a wider body of work. How the state of Colorado plans to deal with aging and abandoned wells, including the sufficiency of bonds posted by gas companies to prevent the breakdown of well casings in perpetuity are of interest to me. Additionally, further research in the field of economics could be done to decipher whether price convergence will occur once natural gas is a regular export commodity for the U.S.

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APPENDIXES

Appendix A

Sample Interview Questions

1. What is your involvement with fracking?
2. What is your general opinion of fracking?
3. In your opinion, what are the social impacts of fracking?
4. Can you tell me about split estate property right agreements?
5. How do the oil and gas companies deal with leases on split estate land?
6. How have people responded to surface use agreements when they do not own their mineral rights and an oil or gas company decides to drill on their property?
7. What kind of regulation on fracking does your organization support?
8. Should local governments have authority to regulate or ban fracking? Why?
9. What makes Western Colorado counties different from the cities north of Denver that have banned or attempted to ban fracking?
10. The economy of Garfield County is partially based on energy development and partially on tourism. How do these two industries coexist here?
11. Garfield County has a history of oil and gas extraction as well as mining. How has this influenced peoples' attitudes toward the current fracking boom in the county?

Appendix B

Acronym Crosswalk

Battlement Concerned Citizens	BCC
Board of County Commissioners	BOCC
Colorado Oil and Gas Conservation Commission	COGCC
Department of Energy	DOE
Energy Advisory Board	EAB
Energy Information Administration	EIA
Fair Trade Agreement	FTA
Federal Energy Regulatory Commission	FERC
Garfield County Administration	GCA
Garfield County Oil and Gas Division	GCOGD
Grand Valley Citizens Alliance	GVCA
International Atomic Energy Agency	IAEA
International Energy Agency	IEA
Liquefied Natural Gas	LNG
North American Free Trade Agreement	NAFTA
Pacific Four	P-4
Surface Use Agreement	SUA
Trans Pacific Partnership	TPP
Western Colorado Congress	WCC
