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**STAKEHOLDER PERCEPTIONS OF SOCIOENVIRONMENTAL
IMPACTS FROM UNCONVENTIONAL NATURAL GAS
DEVELOPMENT AND HYDRAULIC FRACTURING IN THE
HAYNESVILLE SHALE***

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ABSTRACT

Environmental controversy over unconventional natural gas development utilizing horizontal drilling and hydraulic “fracking” has been on the rise in recent years. While most of the media attention has been focused on the conflicts in states like Pennsylvania, New York, Texas, and Colorado, the discovery of huge natural gas reserves in the Haynesville Shale formation in 2008 set off a drilling rush that has resulted in differential benefits and risks for various residents. Drawing on current research and extensive interview data collected from a relevant cross-section of community stakeholders, this study offers a descriptive and comparative analysis of the types of benefits and opportunities perceived to accompany increased unconventional natural gas development, the range of perceived negative impacts and threats associated with such development, and the extent to which respondents viewed the benefits of the Haynesville boom as outweighing the costs. While most stakeholders perceived that natural gas development offered the community a host of positive socioeconomic benefits in the form of increased jobs, tax revenues, services, and new economic opportunities for local businesses and landowners, a substantial minority of residents also associated shale development with a larger number of negative social, economic, and environmental impacts. Those included the degradation of water resources; increased road damage, noise, and traffic accidents; and other assorted threats to public health, animals, and the rural landscape. Moreover, while most Haynesville residents believed that the socioeconomic benefits of development had outweighed the collective socioeconomic/environmental costs to the region, a substantial minority of respondents was also skeptical or disagreed that the benefits to date had been worth the risks. These findings both support and extend existing sociological research in several key respects. The implications of the study, both for the region and the national debate over fracking, are discussed.

Increasing numbers of Americans are being targeted by industry advertising campaigns extolling the virtues of the “Natural Gas Revolution” and its potential to provide a century’s worth of clean, climate-friendly, domestic energy to U.S. households (Friedman 2012; Wright 2012; Yergin 2011). Driven by technological advancements in horizontal drilling techniques and hydraulic fracturing—more commonly known as “fracking”—natural gas extraction from shale formations (and other methane sources) has risen tenfold since 2005 and has allowed fossil fuel

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companies access to massive gas reserves that were unreachable a decade ago. Almost a half-million shale gas wells have been drilled in more than thirty states across the country to date and more than twenty-five thousand gas wells are hydraulically fractured each year, a process constituting more than 90 percent of shale gas production today (Anderson and Theodori 2009; McQueen-Borden 2011). While “unconventional” shale gas production utilizing horizontal drilling and fracking (compared with older, “conventional” methods involving vertical drilling into shallower gas deposits) currently accounts for about one-third of U.S. gas supplies, it is predicted to generate nearly one-half of total natural gas production by 2035 (Lavelle 2012; Theodori 2011).

Despite the prominent role that hydraulic fracturing has played in creating new energy development, economic growth, and individual wealth in many communities, it has also spawned a growing anti-fracking movement and an escalating number of community conflicts from Wyoming to Pennsylvania. First developed by Halliburton in the late 1940's, fracking represents a controversial well stimulation/completion technique whereby millions of gallons of water, sand, and chemicals—many of which are believed to be hazardous and potentially toxic—are injected into deep underground shale deposits to fracture the rock and release the natural gas trapped inside (Katusa 2011). While supporters view fracking technology as essential to U.S. energy independence, reductions in CO₂ emissions, and the economic revitalization of depressed rural areas, opponents warn of potential groundwater contamination, depletion of aquifers, methane releases, damage to roads and landscapes, earthquakes, and myriad negative impacts on farming, livestock, tourism, and public health (Clark 2012; Food & Water Watch 2011; Goodman 2013; Hightower 2012; Lohan 2013). Fueled in part by filmmaker Josh Fox's academy award-nominated documentary, *Gasland* (Fox 2010), the controversy over fracking has generated at least four independent films, a Hollywood movie, a New York Times investigative series, a *60 Minutes* broadcast, and dozens of protest rallies and concerts fronted by famous actors and musicians, as well as increasing attention from the mainstream media and scientific community (Eisenburg 2010; Fox 2010; Plushnick-Masti and Rubinkam 2011; Urbina 2011). To date, fracking bans have been instituted in towns across New York, Maryland, New Jersey, and Vermont; nationwide moratoriums have been declared in France, Ireland, and Bulgaria; and debates over shale drilling are growing across the European Union, South America, and Australia (Chapman 2010; Food & Water Watch 2012; Lacey 2011; Schiller 2011; Wright 2012).

While most of the national attention devoted to natural gas fracking has focused on the impacts and disputes taking place in states like Colorado, Texas, West Virginia, New York, and Pennsylvania, northwest Louisiana has recently joined other shale regions of the country that have been experiencing a range of opportunity-threat and socio-environmental impacts typically associated with rapid energy development (Gramling and Freudenburg 1992). The discovery of huge shale gas reserves in the Haynesville Shale region, situated between the oil-rich Brown Dense Shale region to the north and the Tuscaloosa Marine Shale region to the south, has put northern Louisiana at the forefront of domestic natural gas production and has set in motion a drilling/fracking bonanza that promises both riches and risks for local stakeholders (Schleifstein 2011a; Thompson 2011a, 2011b). With the Haynesville Shale currently the nation's second largest gas field, Louisiana has been successful in attracting new industrial plants, businesses, and liquefied gas facilities to the state to take advantage of its low natural gas prices (Thompson 2012). Simultaneously, the natural gas boom in northern Louisiana has brought the region increased scrutiny by state and federal regulators, the national media, and various environmental groups concerned with the effects of hydraulic fracking on water resources, air and soil pollution, animals, and human health (Schleifstein 2011b; Thompson 2012). Because of these recent developments, northwest Louisiana has become another social laboratory (alongside other key shale regions like the Barnett and Marcellus Shales) for the study of the socio-environmental impacts associated with unconventional shale gas development in the United States (Chapman 2010; Theodori 2011; Weigle 2011).

Drawing on the extant literature, as well as data collected from extensive fieldwork and archival documents, this article analyzes interview responses from a sample of stakeholder groups/residents regarding their perceptions of the local-level impacts associated with unconventional natural gas production and hydraulic fracturing in the Haynesville Shale region of northwest Louisiana. Following previous research by Anderson and Theodori (2009) and others, I analyze the types of benefits and opportunities perceived to accompany increased unconventional natural gas development, the range of perceived negative impacts and threats associated with such development, and the extent to which the benefits of development are viewed by respondents as outweighing the costs. The implications of these findings are discussed, both for the future of fracking in the Haynesville region and for the growing national controversy at large.

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BACKGROUND OF THE HAYNESVILLE GAS BOOM

The Haynesville Shale formation is a layer of sedimentary rock more than two hundred feet thick and more than ten thousand feet below the surface of a nine thousand square mile area of northwestern Louisiana. The geological boundaries of the region—which covers most of Caddo, Bienville, Bossier, DeSoto, Red River, and Webster parishes (counties)—also extends into a small portion of southwestern Arkansas and eastern Texas. The one-hundred and fifty million-year-old shale formation, created during the Jurassic Period, is estimated to contain sixty-six trillion cubic feet (tcf) of recoverable natural gas, making it the second largest gas play in the United States, and equivalent to a decade’s worth of North American consumption (Lavelle 2012). Though more than twenty-four hundred wells have been drilled in the Haynesville Shale to date, state officials project that some ten thousand wells will eventually be needed to extract all the gas in the formation over the next twenty to thirty years (Louisiana Department of Natural Resources 2011; Schleifstein 2011a).

In late 2007, after several years of experimental drilling and testing by Chesapeake Energy and other companies, the Haynesville Shale made headlines as one of the largest discoveries of natural gas in history. Within months, a modern-day gold rush and energy boomtown sprang up around the Shreveport area—a traditionally blue-collar and largely rural region tied to oil, farming, livestock, and timber. As drilling rig activity and gas prices took off, companies scrambled to sign mineral leases on residential properties, pine forest, and pasture land with as many landowners as possible. Signing bonuses that had gone for a few hundred dollars an acre at the beginning of the boom soon soared to \$20,000 and as much as \$30,000 an acre occasionally (Nolan 2011). Energy companies were also required to pay property owners for the right to lay pipelines on their land, as well as monthly royalties based on the gas produced. By early 2011, Chesapeake Energy, the largest company operating in the Haynesville Shale, reported that it had paid out more than \$34 million in royalties to land owners in DeSoto Parish, the “sweet spot” of the boom, causing local bank deposits to soar. Like the proverbial tale of *The Beverly Hillbillies* character Jed Clampett, stories of overnight “drillionaires” made rich by the natural gas strike began to circulate through the media (Nolan 2011).

The Haynesville gas boom has had a profound impact on Louisiana’s economy, creating personal wealth in one of the state’s poorest areas, as well as buffering some of the worst impacts of the national recession on the region (Schleifstein 2011a; Welborn 2008, 2009e). One study found that the Haynesville Shale

generated more than \$16.3 billion in business and household earnings; 57,637 new jobs; and \$912.3 million in state and local taxes in 2009 alone (Scott & Associates 2010). In DeSoto Parish particularly, sales tax revenue from 2008-2009 hit \$43.4 million, more than 80 percent higher than the previous year, while the small town of Mansfield saw their sales taxes rise by 37 percent (Welborn 2009c). New public school buildings and hotels were erected; teacher salaries were raised; and a new animal shelter, public park, bank, and convention center were built along with other infrastructure improvements (Nolan 2011). Given the struggling national economy, one energy executive summed up the impact of the Haynesville Shale as a “flu shot for northern Louisiana” (Jervis 2010:1A). Ironically, the gas boom’s fiscal impact on state revenues would have been far greater were it not for the generous state tax exemption granted to energy producers on the first two years of well production when output is usually at its peak (Schleifstein 2011a). Nevertheless, it was predicted that by 2014, the Haynesville would produce an additional \$61 billion in business sales; more than \$15 billion in household earnings; and more than \$1 billion in leases, royalties, and tax revenue for state and local governments (Scott & Associates 2010).

Citizen Responses to Natural Gas Development and Fracking

At the beginning of the Haynesville boom in 2008, the perceived economic benefits of the gas strike appeared to greatly outweigh whatever citizen concerns might have existed over the potential problems posed by hydraulic fracturing. There was little of the environmental controversy that had erupted in Pennsylvania, New York, or West Virginia over the introduction of fracking in the Marcellus Shale formation or other shale regions in the United States (Fox 2010; Schleifstein 2011a), nor were there any prominent protests over the types of social dislocation associated with other energy “boomtowns” (e.g., Albrecht 1978; Freudenburg 1982; Freudenburg and Gramling 1992). While a few public meetings were held in Shreveport, Mansfield, and neighboring towns in 2008 to give local citizens information about the Haynesville discovery, most of the residents’ questions were limited to the financial considerations surrounding mineral rights, bonus and royalty payments, the harm of drilling on residential properties, and how to organize neighborhood and regional alliances that could negotiate more lucrative leasing contracts with energy companies (Reynolds 2008). Although residents were cautioned by a few community activists to consider environmental factors like noise and road damage alongside the economic value of their land and mineral rights, the

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key issue for most citizens was how to cash in on the leasing and drilling frenzy to the fullest extent possible.

In the weeks and months to follow, as natural gas prices climbed to an all-time high, some landowners were persuaded to sign leasing contracts with companies for as little as \$25 an acre. Others, often in the same area, held out for as high as \$30,000 an acre. Besides leasing issues, concerns about environmental impacts also began to emerge in 2009, as the pace of exploration and fracking activity throughout the Haynesville Shale increased. Noise complaints from drilling rigs and truck traffic were among the first to be voiced, as well as anxiety about the high decibel levels from the enormous compressor stations used to pump gas from well sites (Pierson 2009a). Since neither the state nor the local parishes had any noise ordinances regarding natural gas drilling, officials held hearings to consider regulations that would parallel those erected in Texas in response to the Barnett Shale boom. Complaints about cracked and rutted roads, traffic congestion, and car accidents with heavy saltwater and wastewater trucks also increased during this period. With the state hesitant to act on what it deemed local government issues, mitigation efforts were largely left up to the industry or the parishes. While some companies did elect to install sound-dampening fences around their drilling rigs, only DeSoto and Bossier Parishes took any steps to regulate overweight trucks on their roads—actions that immediately drew angry protests from hundreds of area truckers (Pierson 2009b).

After a gas well blowout in south Caddo Parrish, an editorial in *The Shreveport Times* urged state legislators to be more proactive in addressing the public health and environmental issues concerning rig safety, noise, pollution, and most of all, industry use of public ground and surface waters for fracking wells (*The Shreveport Times* 2009). Indeed, concerns over the enormous volume of freshwater used to drill and frack wells (which can run between three and nine million gallons) seemed primary for many of the region's residents, particularly rural landowners who drew their drinking water from domestic wells fed by the Corrizo-Wilcox aquifer, the major groundwater source for northwest Louisiana. In response to complaints of well pumps burning out from dropping water tables, amplified by a serious summer drought in 2009, the Louisiana Office of Conservation within the Department of Natural Resources (DNR) issued a groundwater use advisory encouraging gas companies to shift from groundwater to surface waters (such as the Red and Sabine rivers) to supply their drilling and fracking operations, as well as to attempt to recycle part of their exploration and production wastewater (Kent and Welborn 2009; Welborn 2009b). However, citizen fears that fracking chemicals or methane

could contaminate local aquifers and groundwater supplies, as well as pose significant air quality problems, were rarely covered by the local media and were consistently dismissed by the gas industry and state regulators. Unlike many environmental debates unfolding in other U.S. shale regions over the potential for fracking to contaminate local water supplies (Food & Water Watch 2011; Fox 2010), only issues of water demand and availability in northwest Louisiana were given much attention or legitimacy by state and industry officials (Kent 2009; Kent and Welborn 2009).

Hesitant to impose any new restrictions on the natural gas industry that might negatively affect the jobs and state revenue tied to the Haynesville boom, the DNR and the Office of Conservation have limited their regulatory oversight to issues of well setbacks, drilling and production operations, dust, odors, lighting, and work hours (Welborn 2009a). Even when several shale-related accidents between 2009 and 2010 resulted in instances of livestock poisoning, methane releases, well blowouts, rig malfunctions, dozens of human injuries, and five deaths, state regulatory representatives held only one public hearing in Bossier Parish to address community concerns (Welborn 2009d). While most of the questions and complaints fielded by officials dealt with potential water pollution issues, the regulators themselves used the forum to voice their own political fears that pending federal regulations on fracking might slow down or stop work on “the greatest thing that has ever happened to our area” (Pierson 2010:2).

By the arrival of the third anniversary of the boom in 2011, the region’s residents appeared largely adapted to the presence of fracking in northwest Louisiana and only a handful of lawsuits over mineral rights and leasing inequities were still working their way through the courts. Despite the success of the academy-award nominated documentary, *Gasland* (Fox 2010), in drawing increased nationwide attention to the environmental risks of fracking, the film was largely dismissed or ignored by most residents in the oil and gas-friendly culture of Shreveport. In contrast, the locally-produced documentary, *Haynesville* (Kallenberg 2011), celebrating the comparative positive benefits of shale gas for Louisiana residents and the nation’s energy future, was received by many local residents with considerable interest and praise (Zaitchik 2012). With the Haynesville Shale surpassing the Barnett Shale in Texas as the region’s largest gas play, shale gas production in the Gulf states and across the United States began to peak, creating new national and international markets for unconventional natural gas reserves, while dropping gas prices to their lowest level in ten years (Welborn 2011).

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With more utilities, businesses, and consumers taking advantage of the explosion of cheap gas, the historic economic relationship between oil and gas prices was severed and energy companies responded by shifting many of their drilling operations from shale gas to oil production (Carlson 2010). In turn, rig counts in the Haynesville (like other shale regions) fell dramatically—from a peak of more than 180 in 2010 to around 20 by October of 2012. Currently, shale gas production in the Haynesville has essentially flat-lined and most of the exploration companies like Shell, Chesapeake, Encana, and others are in a temporary holding pattern since the current market value of natural gas hovers around \$4 per thousand cubic feet. Unless future natural gas prices rebound to at least \$5-6, many industry observers do not anticipate the Haynesville reverting back to its “boomtown” fame anytime soon (Shire 2012).

CONCEPTUAL FRAMEWORK

Environmental and rural sociologists have long been interested in how individuals and institutions respond to resource extraction and energy development in their communities. Researchers have examined the “boom-bust” cycles of growth and decline, for instance, that often accompany rapid development, resource depletion, and recovery (Albrecht 1978; Cortese and Jones 1977; Freudenburg and Fricke 1994; Gramling and Brabant 1986) as well as how residents’ perceptions change throughout the temporal phases of development (Freudenburg 1981; Gilmore 1976; Gramling and Freudenburg 1992). As a boomtown scenario unfolds, some studies have suggested that public attitudes can move through four different stages: enthusiasm, uncertainty, panic, and adaptation (Brown, Dorius, and Krannich 2005; Brown, Geertsen, and Krannich 1989). Others have found that beliefs can vary widely by time, place, historical experiences, physical conditions, social factors, and the specific type of development being proposed (Freudenburg and Gramling 1993; Gramling and Freudenburg 2006). Moreover, community responses also often reflect the differential perceptions of the opportunity-threat impacts associated with a particular type of extractive industry (Gramling and Freudenburg 1992). The impacts of offshore oil drilling, for example, are different from those found in western boomtowns or conventional drilling communities—particularly regarding rapid population growth, social and economic disruption, and public perceptions of environmental harm (Brasier et al. 2011; Forsyth, Luthra, and Bankston 2007). While unconventional natural gas development is similar to offshore oil drilling in several respects, its potential impacts on metropolitan residential populations, landowners, mineral rights, water resources, and assorted

quality of life issues differentiate it from other types of energy development in significant ways (Wynveen 2011).

Recent sociological research on local attitudes toward unconventional shale gas development and fracking has consistently identified both positive and negative impacts for the community (Anderson and Theodori 2009; Brasier et al. 2011; Theodori 2009, 2011; Weigle 2011; Wynveen 2011). In a survey of residents' perceptions toward gas development in the Barnett Shale region, Theodori (2009) found that respondents generally considered social and/or environmental issues (e.g., truck traffic and freshwater use) as "getting worse" due to development, but saw economic and/or service-related issues (e.g., poverty, local police and fire protection, school quality, medical and health care services, tax revenues, and job availability) as "getting better" because of the development of natural gas in the area. In a related study, Anderson and Theodori (2009) also found similar paradoxical perceptions among local leaders in the Barnett Shale region. Respondents believed that gas development stimulated economic prosperity for their communities in increased city revenue, property values, household wealth, new businesses, and jobs, as well as improvements in schools and medical facilities. Conversely, respondents also expressed negative apprehensions about the potential threats to public health and safety, environmental concerns, and quality of life issues. Chief among these concerns was increased truck traffic and accidents on country roads; the danger of gas leaks, explosions, and production accidents; the potential for groundwater contamination; and depletion of freshwater supplies. Local leaders also perceived a general decline in the environmental quality and aesthetic value of the landscape, as well as problems connected to noise, lighting, mineral rights disputes, and potential changes in the local power structure. In weighing the benefits and costs of development, however, local perceptions differed widely by site maturity and direct experience with gas development. Leaders in those counties where massive, large-scale development was just beginning to occur unanimously agreed that the benefits of shale production would outweigh the costs. In contrast, respondents in counties where intense production had already been taking place for a decade unanimously reported that the costs of development outweighed the benefits.

In another study, Wynveen (2011) analyzed the qualitative responses of the Anderson and Theodori data set and found more specific positive and negative concerns reflecting the economic, social, and environmental impacts of development. First, respondents often expressed similar sentiments regarding the economic benefits of gas development, including infrastructural improvements to

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roads and bridges, improved community services and schools, and income from the leasing of mineral rights. Some residents, however, expressed the belief that the distribution of economic benefits often favored only mineral rights owners, gas companies, and their employees, allowing some to “get rich off the underprivileged” (p. 17). Second, respondents expressed a wide range of views relating to the social impacts of development on the quality of life and/or community identity and character of the region. Of key importance were concerns over the destruction of property values and scenery; the inconvenience of drilling noise and lights close to residential areas; and anticipated increases in crime, low-income families, traffic congestion, road damage, gas well accidents, and health hazards. Moreover, there were frustrations over justice and equity issues, including the failure of gas companies to demonstrate a credible level of responsibility and accountability, or to incorporate local citizens’ concerns into the development process.

Third, residents expressed several complaints about environmental pollution: from the illegal dumping of wastewaters, diesel fumes, and road dust; to the potential for the contamination of water wells and aquifers, and the diminishment of freshwater supplies by the industry for drilling and fracking. Augmenting the findings of Anderson and Theodori (2009), Wynveen found that concerns over environmental pollution and water contamination, as well as quality of life issues, were clearly more prominent among those residents living in areas where gas development had reached a more mature phase. In areas where production impacts were largely anticipatory and yet to be directly experienced, residents expressed more negative perceptions over issues of health and safety, traffic and road conditions, personal inconvenience, and a loss of community identity and character (Wynveen 2011).

Building on the Barnett Shale research, Brasier et al. (2011) compared perceptions of impacts in the Marcellus Shale region between two counties in New York, where development was suspended by a state moratorium, with two counties in Pennsylvania, which were in the early boom stages of development. While local informants perceived a wide range of economic, social, environmental, agricultural, and physical infrastructure impacts from fracking in their region; attitudes varied by the level of development and previous extractive history of the community. Contrary to earlier studies, the researchers found that residents often reported fewer types of impacts in counties with higher levels of drilling activity and past fossil fuel development, compared with those in counties with lower levels of development and extraction history, who reported more types of perceived impacts. The researchers concluded that a key factor was the respondents’ comfort level with

their knowledge of the industry, its past drilling operations, and access to industry officials. Variations in perceptions of impacts were also related to the community's population size, proximity to population centers and transportation networks, and level of infrastructure development (Brasier et al. 2011). These findings support some past research (Forsyth et al. 2007; Freudenburg and Gramling 1993) suggesting that support for fossil fuel development is often greater in those communities with a history of extraction that gives residents a greater sense of knowledge about and comfort with the industry.

In another study of local stakeholder perceptions and responses to Marcellus Shale development, Weigle (2011) identified more than 400 different concerns related to socioeconomic, environmental, government and planning, and health and safety impacts. Within socioeconomic concerns, the most commonly identified issues were related to jobs and changes within the job force. In addition, residents cited concerns over issues like hotel and housing availability, industrial development/ecotourism/land use conflicts, and inflation due to increased demand for local services, sprawl, and road degradation.

Environmental impacts—especially those revolving around water use, water quality and quantity, and surface and groundwater protection—were also major concerns. Residents were unsure how gas development might affect fishing, ecotourism, and recreation as well as other aesthetic qualities of the region. Impacts on key habitats, animal reproduction and migration, hunting, bird watching, and threatened/endangered species were also cited by residents (Wiegle 2011).

Government and planning concerns focused primarily on the fragmented nature of Pennsylvania's governance structures and the lack of cooperation between state and local units. Of particular interest was the power of the gas industry to influence the ability of local authorities to regulate and zone drilling activities. Many residents also felt that local governments were moving faster than state government to address the problems related to gas development and fracking but were being hindered by bureaucratic red tape, legislation, legal challenges, and other barriers (Wiegle 2011).

Finally, the impacts of development on human health and safety were key concerns for Marcellus Shale residents, particularly issues related to the urbanization of rural areas and the influx of gas well workers and their families. Residents expressed fears that health care availability would be diminished or that the provision of emergency services like ambulance and fire protection would decline. Concerns about the spread of infectious disease from the in-migration of new workers from different parts of the country or world were also expressed by

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some local citizens. Overall, those who lived in recently-drilled areas of the Marcellus Shale formation were more concerned about negative impacts, and were also more highly involved in groups or organizations that addressed their concerns, than those who lived in areas further removed from the immediate effects of gas development. As in previous research, residents' perceptions of impacts were also influenced by their level of knowledge and familiarity with drilling and production practices (Wiegler 2011).

In summary, only a few researchers to date have responded to Anderson and Theodori's initial call (2009:117) for more empirical research "directed at uncovering the potential benefits and/or negative consequences associated with unconventional energy development," as well as studies that focus on the local-level perceptions of diverse stakeholders in other shale regions of the country. While existing research has explored citizen attitudes and perceptions of fracking in important shale communities like the Marcellus and Barnett Shale formations, no sociological research to date has examined similar perceptions of impacts in the Haynesville Shale, the country's second most productive gas field (Ladd 2012b; Lavelle 2012). With Louisiana at the forefront today of gas (and oil) production through multidirectional drilling and hydraulic fracturing, a clearer understanding of the beliefs and perceptions associated with unconventional energy development there—and how such perceptions might correspond with or influence future social impacts—is an empirical issue of vital importance to environmental sociologists and policy makers alike. As "fracking wars" heat up across the country, additional research is needed to understand the social, economic, and environmental concerns that are driving the controversy and their explicit linkages to wider disputes over energy production, water use, appropriate technology, and rural development.

RESEARCH DATA AND METHODS

The findings reported in this research come from a larger study of the environmental controversy and community conflicts surrounding natural gas development and fracking in the Haynesville Shale region of northwest Louisiana. Two types of data were gathered for this project. First, I reviewed available scientific studies, industry publications, pro- and anti-fracking movement literature, news articles, press releases, websites, online sources, films, and various archival documents to identify the prominent issues, historical context, socio-environmental impacts, and proposed policy solutions relevant to the debates over fracking.

Second, I conducted 35 semi-structured interviews with residents, landowners, community activists, industry spokespeople and professionals, business owners,

state regulators, and scientists/geologists who primarily lived in the Haynesville Shale region (e.g., Caddo, DeSoto, and Bossier Parishes) and/or had direct knowledge of fracking impacts on the region. Those selected for interviews were identified through purposeful and snowball methods of sampling involving referrals provided by key informants and individuals in various stakeholder groups or occupational networks, as well as names identified in media accounts and other sources concerning Haynesville natural gas development. Prospective subjects were contacted by phone or email; provided with information about the purpose, scope, and format of the study; and assured of the confidentiality of their names and responses (see Kvale 2007). Each interviewee signed an IRB Informed Consent Form and all interviews were audio-recorded and subsequently transcribed verbatim. All of the interviews were conducted in person at the subject's home or office between July and October of 2012, and lasted generally from forty-five to ninety minutes each.

Each interview transcript was thematically analyzed to identify all of the major social, economic, and environmental impacts that respondents viewed as resulting from unconventional gas development and fracking in the Haynesville region. While the interview schedule consisted of more than twenty guided questions, as well as various demographic measures identified in past research, the findings reported here are derived from the responses to five specific interview questions asked in different parts of the interview process devoted to various types of impacts. Respondents were asked specifically: (1) what they saw as some of the major problems or threats associated with increased natural gas development and fracking in this region of the state; (2) what negative impacts had occurred in the region because of increased natural gas production and fracking; (3) what benefits had occurred in the region because of increased natural gas production and fracking; (4) what new opportunities had opened up in the region because of increased natural gas development and fracking; and (5) so far, whether or not they thought that the positive benefits of gas development/fracking had outweighed the negative costs to the region? Taken together, the responses derived from these five questions allowed for an open-ended documentation of the range of opportunity-threat impacts perceived by stakeholders at the local level, and of how residents comparatively weighed the overall positive and negative impacts for the community at large. Another of the relative strengths of these data are that they were collected in the period *following* the initial Haynesville gas boom (2008-2011)—after the pace of exploration and fracking episodes in the area had peaked, declined, and stabilized. As a result, residents could step back from the most turbulent period of the fracking

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bonanza and assess the various energy development impacts on the region from perhaps a more comprehensive and balanced perspective.

The distribution of the stakeholders interviewed for this study included: ten (10) environmental scientists/geologists; eight (8) concerned citizens/gas lessees; six (6) oil/gas industry professionals/operators; four (4) environmental activists; two (2) gas industry representatives; two (2) parish/state government officials; one (1) newspaper editor/reporter; one (1) environmental attorney; and one (1) top state regulatory official (see Table 1). Although the sample included only five females and one African-American respondent, the citizens interviewed for this study were nevertheless representative of the overwhelmingly white/male demographic base associated with oil and gas production in northwest Louisiana. Accordingly, these data allow for a broad comparative analysis of stakeholder attitudes toward unconventional natural gas development in a major shale region of the United States that has yet to be explored in existing research.

TABLE 1. STUDY PARTICIPANTS/STAKEHOLDER GROUPS.

STAKEHOLDER POSITION	N	PERCENTAGE OF SAMPLE
Geologist/Environmental scientist.....	10	29%
Concerned citizen/Gas Lessee.....	8	23%
Oil/Gas professional/Operator.....	6	17%
Environmental activist.....	4	11%
Oil/Gas industry representative.....	2	6%
Parish/State government official.....	2	6%
Newspaper editor/Reporter.....	1	3%
Environmental attorney.....	1	3%
State regulatory official.....	1	3%
Total.....	35	100%

FINDINGS

A thematic analysis of the interview data revealed a wide range of differential impacts associated with increased natural gas exploration and fracking in northwest Louisiana. Overall, combining the responses from four of the five interview questions described above used for this study, respondents identified a total of forty-

three (43) major issues and concerns that they perceived to be related to the development of the Haynesville Shale. Of these forty-three reported impacts, seventeen (17) represented benefits and opportunities for the region; while twenty-six (26) constituted negative impacts and threats to local citizens, the community, and the environment. In both the positive and negative impact categories, the responses generally clustered around two general sub-themes: socioeconomic impacts and environmental impacts. These findings, as well as how respondents weighted the overall opportunity-threat balance at hand, appear below.

Perceptions of Benefits and Opportunities

Socioeconomic Impacts. Over three-fourths (77 percent) of the stakeholders interviewed believed that the most important benefit of natural gas development in the Haynesville Shale was that it had improved the local economy, as well as having helped shield the region from some of the worst effects of the national recession (see Table 2). Most informants, even those who were critical or skeptical of hydraulic fracking, felt that the Haynesville gas boom had been good for the region economically in the form of increased local and state tax revenues (71 percent), as well as new job opportunities for workers in surrounding parishes (69 percent). In addition, fully two-thirds of respondents (66 percent) indicated that the region had benefited from all the new businesses, restaurants, and other services that had come into the area because of increased drilling and gas production.

As for other benefits and opportunities, more than one-half of the respondents (54 percent) felt that the development of the Haynesville Shale had brought newfound income and personal wealth to local property owners (with mineral rights) who had leased their land to gas exploration companies. Moreover, almost one-half of the respondents (49 percent) believed that increased tax revenues from the gas boom had generated badly-needed funds for the improvement of local schools, teacher salaries, libraries, roads, and police/fire services that would not have occurred otherwise. A similar percentage of respondents (46 percent) also reported that increased gas fracking had created new opportunities for the myriad chemical, sand, and water service companies whose businesses supply the resources required for shale gas development. Additionally, just more than a third (37 percent) of stakeholders felt that the Haynesville boom had positively increased local population growth, housing values, and property tax revenues.

Moving beyond the immediate economic benefits to the community from increased natural gas development, many respondents perceived other positive social impacts for the region. Twenty-nine percent of those interviewed saw natural

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TABLE 2. PERCEIVED POSITIVE SOCIOECONOMIC/ENVIRONMENTAL BENEFITS AND OPPORTUNITIES FROM HAYNESVILLE NATURAL GAS DEVELOPMENT (N=35).

PERCEIVED SOCIOECONOMIC BENEFITS/OPPORTUNITIES	PERCENT	N
Improved local economy/Buffered recession.....	77%	27
Increased local/state tax revenues.	71%	25
Created new job opportunities.....	69%	24
Created new businesses/restaurants.....	66%	23
Increased income/wealth for people with gas leases.	54%	19
Improved local services/schools/libraries/roads.	49%	17
Benefited chemical/energy/water services industry.	46%	16
Increased population/housing/property values.	37%	13
Increased U.S. energy production/security.....	29%	10
Created new markets/uses for natural gas.	23%	8
Reduced natural gas prices.....	20%	7
Created new R&D programs for state universities.....	9%	3
Benefited local charities/nonprofits.	6%	2
Created new awareness/Positive publicity for region.	3%	1
Improved community race relations.....	3%	1
PERCEIVED ENVIRONMENTAL BENEFITS/OPPORTUNITIES		
Reduced CO ₂ emissions/Air pollution/Coal usage.....	20%	7
Forced state to address water conservation issues.	6%	2

NOTE: Total Benefits/Opportunities = 17

gas fracking as a way to increase domestic energy production and free the United States from dependence on foreign oil, while about a fifth of respondents (23 percent) viewed fracking as creating new markets and uses for natural gas, as well as reducing its price for businesses and consumers (20 percent). Less than a tenth of the citizens interviewed (9 percent) felt that natural gas development had created new research and development programs for state universities, provided benefits for

local charities and nonprofit groups (6 percent), created new awareness and positive publicity for northern Louisiana (3 percent), or improved community race relations (3 percent) by providing more jobs and leasing income for local African-Americans.

Environmental Impacts. While the vast majority of positive impacts reported by stakeholders involved socioeconomic benefits for the community, two environmental benefits of gas development were also cited by residents. Twenty percent (20 percent) felt that one benefit of increased gas development in the region was that it would help reduce CO₂ emissions, climate change, and air pollution by reducing the amount of coal used for electrical generation. In addition, 6 percent of respondents reported that the gas boom had also benefitted the region by forcing state regulatory agencies (e.g., the Department of Natural Resources) to address water conservation issues in northern Louisiana for the first time.

Perceptions of Negative Impacts and Threats

Socioeconomic Impacts. While the overwhelming majority of stakeholders perceived natural gas fracking and development as contributing positively to the socioeconomic health of the Haynesville region, a substantial percentage of those interviewed believed that the gas strike had created several negative socioeconomic impacts and threats to the area as well. As shown in Table 3, over one-half (57 percent) of respondents believed that gas development in the Haynesville Shale had greatly increased the truck traffic, road congestion, and automobile accidents in the region, creating dangerous driving conditions for many local residents. In turn, a similar percentage (54 percent) of informants voiced concerns regarding the extent to which the volume of heavy truck traffic tied to hydraulic fracturing had been responsible for increased damage to local streets and roads observed in recent years. In addition, just over one-half of the sample (51 percent) felt that the State of Louisiana, as well as the federal government, had failed to adequately regulate the energy operations of the natural gas industry in ways that positively served the public interest.

Other negative socioeconomic impacts of development on the region were also reported. As shown in Table 3, 40 percent of stakeholders were concerned over the number of well explosions, blowouts, or drilling accidents that could occur (or had occurred since 2008) from increased natural gas exploration and fracking. Moreover, 29 percent of those interviewed reported that the economic benefits of the Haynesville gas boom had not been equitably shared or fairly distributed among the community as a whole. Indeed, an equal share of respondents (29 percent) spoke

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TABLE 3. PERCEIVED NEGATIVE SOCIOECONOMIC/ENVIRONMENTAL IMPACTS AND THREATS FROM HAYNESVILLE NATURAL GAS DEVELOPMENT (N=35)

PERCEIVED NEGATIVE SOCIOECONOMIC IMPACTS/THREATS	PERCENT	N
Truck traffic/Congestion/Accidents.	57%	20
Damage to roads.	54%	19
Inadequate state/federal oversight of industry.	51%	18
Well explosions/Blowouts/Drilling accidents.	40%	14
Lack of citizen control over industry operations.	29%	10
Inequitable leasing contracts/Protection for landowners.	29%	10
Unsafe risks/Conditions for workers.	17%	6
Increased crime/Prostitution/Drugs.	14%	5
Benefits only large landowners and industry.	11%	4
Decreases property values.	11%	4
Harms human health.	9%	3
Creates a local boom and bust economy.	9%	3
Increased potential for political corruption.	9%	3
Number/density of wells drilled.	3%	1
Negative impacts on race relations.	3%	1
PERCEIVED NEGATIVE ENVIRONMENTAL IMPACTS/THREATS		
Amount of freshwater used to drill/frack wells.	80%	28
Potential for groundwater/aquifer contamination.	63%	22
Noise/Dust/Lights/Odors.	34%	12
Harm to domestic livestock/animals/wildlife.	34%	12
Degrades rural landscape/natural habitat.	31%	11
Potential for earthquakes.	29%	10
Air pollution/Methane releases/Climate change.	29%	10
Danger from spilled fracking fluids/wastewaters.	26%	9

PERCEIVED NEGATIVE ENVIRONMENTAL IMPACTS/THREATS (<i>CONTINUED</i>)		
Reduced water quality.	17%	6
Soil contamination.	9%	3
Contributes to continued reliance on fossil fuels.	9%	3

NOTE: Total Negative Impacts/Threats = 26

about the lack of citizen control over the exploration and drilling practices of the gas industry, and did not believe that they could trust the companies to offer landowners equitable leasing contracts that adequately compensated them for their mineral rights. Another 17 percent of stakeholders voiced fears that fracking had created new risks and unsafe working conditions for industry workers, while 14 percent believed that the “boomtown” effects of natural gas development had increased the crime, prostitution, and drugs in the community. In turn, just more than a tenth (11 percent) of respondents felt that the Haynesville strike had primarily benefitted only large landowners and the oil and gas industry, and had decreased the property values of ordinary citizens in the region.

As for the remaining negative socioeconomic impacts identified by respondents, 9 percent felt that increased natural gas development had harmed human health, helped create a boom and bust economy that was unsustainable, and increased the potential for more political corruption in state and local government. Finally, 3 percent of the sample believed that the number and density of gas wells being drilled constituted a negative impact on the community, while an equal percentage (3 percent) perceived that the development of the Haynesville Shale had disproportionately harmed local African-Americans and created an environmental injustice that had damaged race relations in the community.

Environmental Impacts. As expected from past research, water concerns were the most common negative environmental impacts of fracking cited by stakeholders. As shown in Table 3, fully 80 percent of respondents saw the massive amount of freshwater used to drill and frack wells as the chief environmental threat posed by natural gas development, as well as the most important overall impact of any type on the region. Concerns over the potential for fracking to contaminate local groundwater sources or aquifers were also reported by almost two-thirds (63 percent) of respondents, reflecting the related fears of many rural residents that their private water wells could be polluted by fracking chemicals and methane.

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While water issues were, by far, the most common concerns cited by residents, about one-third (34 percent) viewed the noise, dust, lights, and odors associated with natural gas fracking as well as the threat posed to domestic livestock, pets, and wildlife; as constituting further negative impacts on the community's quality of life.

Slightly smaller percentages of respondents voiced concerns that gas fracking had degraded the rural landscape and natural habitat (31 percent); increased the potential for dangerous earthquakes and seismic eruptions in the region (29 percent); contributed to greater levels of air pollution, carbon dioxide, and climate change (29 percent); or led to dangerous spills or discharges of fracking fluids, wastewaters, or other hazardous substances into the environment (26 percent). Finally, less than a fifth of stakeholders (17 percent) viewed fracking as reducing the general water quality of the region, while 9 percent believed it created soil contamination problems, and contributed to the continued reliance of the United States on fossil fuel energy sources.

Comparative Perceptions of Positive versus Negative Impacts

After itemizing the positive and negative consequences of unconventional natural gas development, the final interview question analyzed here asked stakeholders to give their overall impression of whether or not the benefits of gas development so far had outweighed the costs to the region? As shown in Table 4, while the majority (57 percent) of respondents believed that the benefits had outweighed the negative impacts to date, a substantial minority either were unsure (11 percent) or believed that the negative impacts of shale development and fracking (31 percent) had outweighed the benefits of the natural gas boom. Given that most stakeholders interviewed believed that the temporary downturn in Haynesville drilling and well production would rebound again in the coming months as energy demand and gas prices rise, their comparatively positive perceptions of fracking impacts appear consistent, on the one hand, with the generally supportive attitudes found in other shale communities with a history of oil and gas development. On the other hand, such perceptions may also reflect the fact that Haynesville residents, after only four years, had not yet witnessed the kinds of negative socio-environmental impacts that can develop in the more mature stages of site development and production (Anderson and Theodori 2009; Wynveen 2011).

TABLE 4. PERCENTAGE OF RESPONDENTS REPORTING THAT THE PERCEIVED POSITIVE BENEFITS/OPPORTUNITIES OUTWEIGH THE NEGATIVE IMPACTS/THREATS OF HAYNESVILLE SHALE PRODUCTION

POSITIVE BENEFITS GREATER	UNSURE	NEGATIVE IMPACTS GREATER
57% (20)	11% (4)	31% (11)

NOTE: Total percent does not add to 100% due to rounding error.

DISCUSSION

This study supports and extends recent sociological research examining local attitudes toward unconventional natural gas development and hydraulic fracturing in several key respects. First, these findings echo those of the previous studies in identifying many common positive and negative socioeconomic impacts that stakeholders perceive to be associated with gas exploration and fracking in their communities. With few exceptions, Haynesville residents, like those in other shale regions, consistently view natural gas development as a benefit that has positively stimulated economic prosperity in increased tax revenues, jobs, business opportunities, local services, and personal wealth (Anderson and Theodori 2009; Brasier et al. 2011; Theodori 2009; Weigle 2011; Wynveen 2011). Even for stakeholders who were unsure of or opposed to gas fracking in the Haynesville, most perceived it as “probably a good thing” or even a “godsend” in bringing jobs and tax dollars to a poor region of the state already hard pressed by the national economic recession. Likewise, there was substantial support for the infrastructural improvements in schools and parish services created by development, as well as the economic benefits provided to mineral rights owners, gas companies, and their employees.

In addition, respondents also often perceived a wider range of socioeconomic benefits from gas development than those reported in some previous studies (Anderson and Theodori 2009; Wynveen 2011). These included greater profits for businesses providing chemical, energy, and water services to gas operators; higher local home and property values from increased population growth; decreased U.S. reliance on coal and foreign oil; lower CO₂ emissions; new markets and uses for natural gas (such as fuel for cars, city buses, and power plants); and lower natural gas prices for businesses and consumers. In a region of Louisiana and the Gulf South long familiar with the exploration and production of oil and gas reserves (Freudenburg and Gramling 1993), Haynesville residents were generally inclined to view unconventional gas development through a wide and supportive lens. Given

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the current recession, the fracking boom was perceived by most citizens as generating a badly needed “economic boost” for the area and its workers, particularly in the face of the General Motors truck plant in Shreveport being closed in 2012. Other respondents spoke at length about how the Haynesville boom had provided increased tax revenues for schools, libraries, police and fire protection, and other social services that benefited citizens of the surrounding parishes as well as creating spin-off benefits for many local businesses.

Second, relative to perceived negative impacts, Haynesville residents were also similar to residents of other shale regions in their concerns that fracking could deplete local water resources, potentially contaminate private wells and municipal drinking water sources, damage local roads, and lead to more transportation-related accidents from increased truck traffic and congestion (Anderson and Theodori 2009; Brasier et al. 2011; Theodori 2009; Weigle 2011; Wynveen 2011). Clearly, given their reliance on rural aquifers and surface waters for drinking water supplies, as well as for farm or garden irrigation, four out of five Haynesville stakeholders saw the enormous volume of freshwater (three to nine million gallons typically) required to drill and frack natural gas wells as *the* most important single impact posed by development. Indeed, past research suggests that environmental disputes involving water resources—given their essential value to life, politics, and the economy—are often particularly contentious (Krogman 1996; Shriver and Peaden 2009). While industry and state officials have not acknowledged any instances of drinking well or aquifer contamination in Louisiana from gas fracking (nor have they conceded the possibility that it could ever happen), most of Haynesville respondents—similar to their counterparts in the Barnett and Marcellus Shale regions—nevertheless voiced fears that groundwater pollution could occur from the migration of fracking fluids, methane, or drilling wastes into local water tables. Referencing the widely viewed scene from the film, *Gasland* (Fox 2010), one respondent critical of fracking reported that he/she knew of area landowners near gas wells who could “probably light their tap water on fire, just like in the movie.” Additional significant parallels between Haynesville residents and those in other shale regions included citizen concerns over well explosions, drilling accidents, risks for workers, air and soil pollution, noise, dust, odors, harm to animals and rural landscapes, increased crime and drugs, and assorted negative impacts on public health and the community.

Beyond these key common concerns, Haynesville stakeholders also expressed other negative perceptions about natural gas development and fracking that have not generally been emphasized in prior research (but see Wynveen 2011). In relation to socioeconomic impacts, for instance, several respondents spoke at length

in their interviews about the inequitable distribution of power, leasing rights, and legal protection enjoyed by the gas industry and its operatives over ordinary citizens and small landowners. Within this theme, a common refrain was that the only people who really benefitted from the Haynesville boom were “the gas industry, its workers, and a few large landowners,” and that the average citizen in the region had virtually “no control over how the industry operates,” particularly regarding the lack of environmental safeguards that are standard in most leasing contracts (see Urbina and McGinty 2011). Other stakeholders complained about the unfair signing bonuses or low royalty rates they were forced to accept from the gas companies for the mineral rights on their land. In addition, many were concerned that fracking in the area would decrease, rather than increase, their property values and that recent gas development had only created a “local boom and bust economy” that was unsustainable and would ultimately harm the community over time. Moreover, in a state infamous for the political corruption of its elected officials (Ladd 2012b), some residents cynically viewed the economic bonanza associated with the fracking boom as simply another opportunity for Louisiana politicians and their friends in the energy industry to “line their pockets” at public expense.

In terms of their perceptions of newer environmental threats covered recently in the media, several Haynesville residents also echoed recent scientific reports that fracking and the underground injection of drilling wastewater could be associated with increased seismic activity and earthquakes (Clark 2012). Several of those interviewed reported that they had experienced “tremors” and “felt the earth move underneath [their] feet” from the natural gas fracking episodes taking place in their locales. Another reported negative impact for some stakeholders reflected their doubts that natural gas represented a “climate-friendly” alternative source of energy that would reduce greenhouse emissions and climate change. For those respondents, natural gas was simply “another fossil fuel” that not only contributed to more air pollution and continued fossil fuel reliance, but also produced a more potent heat-trapping gas than carbon dioxide (methane) that would only exacerbate global warming.

Third, the findings of this study also extend our understanding of how residents in different shale communities weigh the comparative benefits and costs of unconventional gas development, a key theme in the rising national debate over fracking (Wright 2012). As demonstrated in past research, localities targeted for shale gas exploration clearly experience both positive and negative impacts (Anderson and Theodori 2009; Theodori 2009), as well as differentially weighing such impacts based on the community’s characteristics, extractive history, and level

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of development (Brasier et al. 2011; Weigle 2011; Wynveen 2011). While most Haynesville respondents believed that the socioeconomic benefits of development (jobs, tax revenues, economic opportunities) outweighed the collective socioeconomic/environmental costs to the region (degradation of water resources, infrastructure damage, dangers to public health and the community), more than four out of ten respondents were clearly skeptical about whether the assorted promises of the gas industry and their landmen (leasing representatives) had lived up to expectations. However, despite most of those interviewed viewing the Haynesville strike as an important and beneficial asset to the community at large, stakeholders also associated it with a wider range and greater number of negative impacts than benefits. Focusing on specific impacts, the Haynesville citizens interviewed, like many residents in the Barnett and Marcellus Shale, often weighed the damage done to the quality and quantity of their water resources, as well as the safety of their roads, as more important than the overall economic benefits of development to their communities. In essence, these data support previous research suggesting that unconventional gas development represents a significant paradox for impacted communities. Though citizens dislike the potentially problematic socio-environmental issues perceived to be associated with natural gas development, they generally appreciate and support the economic and/or service-related benefits that typically accompany such development (see Theodori 2009: 111).

CONCLUSIONS

Overall, the findings of this research illustrate the growing concerns and debates over natural gas development and hydraulic fracturing that have come to characterize communities like the Haynesville Shale of Louisiana, a key gas play in the United States that has not attracted the previous attention of rural or environmental sociologists. Drawing on extensive interview data collected from a relevant cross-section of community stakeholders, this study offers a descriptive and comparative analysis of the types of benefits and opportunities perceived to accompany increased natural gas development and fracking, the range of perceived negative impacts and threats associated with such development, and the extent to which respondents viewed the benefits of the Haynesville boom as outweighing the costs. While most stakeholders perceived that natural gas development offered the community a host of socioeconomic benefits in the form of increased jobs, tax revenues, services, and new economic opportunities for local businesses and landowners; among other issues, a significant minority of respondents also associated shale development with many negative social, economic, and

environmental impacts. Those included: the degradation of water resources, increased road damage, noise, and traffic accidents; and other assorted threats to public health, animals, and the rural landscape. Furthermore, while most Haynesville respondents believed that the socioeconomic benefits of development had outweighed the collective socioeconomic/environmental costs to the region, a large minority of respondents was skeptical or disagreed that the benefits to date had been worth the risks. These findings both support and extend existing sociological research in several key respects. Some implications of these data, both for the future of fracking in Louisiana and for the growing national controversy at large, are offered.

With increasing numbers of localities like the Haynesville Shale region experiencing both the immediate and longitudinal impacts associated with natural gas (and oil) production, these communities and their residents are finding themselves being rapidly transformed by the differential opportunities, threats, and adaptation measures accompanying energy resource development today (Gramling and Freudenburg 1992). While the issue of shale gas exploration and fracking in northern Louisiana has not generated the kind of environmental controversy or political protest that have taken place in New York, Pennsylvania, Colorado, and Washington D.C., media reports of future well blowouts, accidents, fatalities, aquifer contamination, or other related problems could potentially ignite the existing undercurrent of ambivalence or skepticism about fracking illustrated in this study. As Johnson and Frickel (2011) have pointed out, the potential for mobilization at the local level is always present when new environmental threats—particularly those previously labeled as “impossible”—emerge and are perceived as leading to a loss of existing resources. Given that the Haynesville region has already experienced several shale-related accidents between 2009 and 2010 resulting in livestock poisoning, methane releases, well blowouts, rig malfunctions, dozens of human injuries, and five deaths, many citizens interviewed feared that a return to the kind of rapid shale development witnessed earlier could produce a new wave of water problems, traffic congestion, and human risks for the area. With memories of the BP (British Petroleum) Deepwater Horizon Oil Disaster (as well as the ongoing federal trial in New Orleans to adjudicate damages) still fresh in the minds of most Louisiana residents (Ladd 2012a), the ever-present threats posed by oil and gas production loom over the issue of fracking.

Due to its unique historical experiences, physical conditions, and social factors, Louisiana has long shown a high level of comfort with and adaptation to the conventional impacts of the oil and gas industry compared with other areas of the

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United States (Forsyth et al. 2007; Gramling and Freudenburg 1992). Whether the same degree of support will hold true for the newer and potentially riskier impacts created by years of unconventional natural gas production, however, remains to be seen. On the one hand, should the exploration and drilling in the Haynesville Shale rebound to its prior level of activity, past research suggests that residents may be more likely to reassess their enthusiasm for unconventional gas development and its associated everyday costs (Anderson and Theodori 2009; Brasier et al. 2011; Wynveen 2011). For instance, despite the millions of dollars spent each year by the natural gas industry to promote itself in the state, a recent annual public opinion survey conducted by Louisiana State University found that less than 40 percent of respondents felt that “fracking” was “somewhat safe” or “very safe,” or that the state should encourage the process (Goidel 2012). On the other hand, other state studies suggest that natural gas-related projects will result in more than \$20.2 billion in new capital investments over the next nine years and produce more than 214,000 new jobs. Ranked third in the United States for total natural gas usage and second in industrial natural gas usage, the industry projects that “Louisiana is poised to reap the benefits of continued natural gas production for decades to come” (AskChesapeake.com 2013:1).

Of key importance to these issues is the near-term stability and profitability of the natural gas market. In the last decade, natural gas and oil production from shale and tight sands skyrocketed, creating a flood of new capital and huge profits for industry and Wall Street investors. With the price of natural gas plummeting by 60 percent since 2008 and well production in the Haynesville operating at a reduced level, gas operators have temporarily shifted their drilling rigs to more liquid-rich oil and gas plays in other regions while they wait for prices to recover (Krauss and Lipton 2012). Simultaneously, many industry observers are forecasting that the recent fracking boom represents little more than an economic bubble that is unsustainable and will not continue to generate the jobs or economic benefits of the past decade (Bump 2013; Goodell 2012; Jorgensen 2012). New federal regulations on the industry will also limit its profits, as the EPA this year will require that the gas industry measure and reduce its methane emissions, which now account for more than one-half of the U.S. total (Lavelle 2012).

Whatever the role of state and market factors in influencing attitudes toward shale development and impacts in the Haynesville, a national political debate over fracking is evidently emerging. From the Bakken Shale in North Dakota and Wyoming (one of the hottest oil fracking regions) to the Barnett and Eagle Ford Shales in Texas, to the Marcellus Shale in the northeast (the nation’s largest shale

gas region with more than 5,800 wells), dozens of communities are now pondering the questions concerning the technology's potential to contaminate water tables through leaking wastewater ponds, injection methods, faulty wells, or fracking fissures as well as to disrupt the land and quality of life (Lavelle 2012). In response to the Obama Administration's major domestic push for widespread natural gas drilling and production, at least two major protest rallies against fracking were staged in Washington D.C. in 2012, along with a coordinated international day of protest in September by activists on five continents dubbed "The Global Frackdown" (Berwyn 2012; Horn 2013; Queally 2013; Rugh 2012). Another highly visible political protest has been the "Don't Frack New York" campaign aimed at persuading Governor Andrew Cuomo to extend the 2010 fracking moratorium in that state (Glick 2012). While Cuomo has delayed his decision twice to allow state agencies to address citizen concerns over the public health impacts of fracking, the issue has generated several large protest rallies and concerts throughout New York, one captured in the independent film, *Dear Governor Cuomo* (Coviello 2012). Indeed, an environmental controversy made famous by Josh Fox's academy award-nominated documentary, *Gasland* (Fox 2010), has now become the subject of new film documentaries; a recent movie entitled *Promised Land*, starring Matt Damon; artistic exhibits; concerts; demonstrations; and the increasing attention of the mainstream media and scientific community (Schiller 2011; Wright 2012). Depending on the interplay of other complex factors—including national policy initiatives on energy development, corporate taxation rates, water use, technological innovation, and rural development, to name but a few—the debate over the use of hydraulic fracturing in gas (and oil) production could develop into one of the most contentious environmental movements of our time.

This study builds on the call of sociologists (Anderson and Theodori 2009; Brasier et al. 2011; Theodori 2009; Weigle 2011; Wynveen 2011) for additional research on how different shale regions and stakeholders perceive the local-level impacts associated with unconventional energy development in their communities. Future studies should also examine the linkages among citizen perceptions, political mobilization factors, and the potential emergence of differential energy policy or regulatory outcomes. In addition, longitudinal research is also needed to track public responses to unconventional energy development if gas boom conditions return to various shale communities, and as the recovery stage begins to set in over time. However, if such research is to be of greater use to rural and environmental sociologists, as well as to policy makers, it must also be situated within the study of other sociological phenomena such as natural resource conflicts, ecological

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modernization, risk perception, the treadmill of production, technological disasters, the recreancy of officials, and many other anthropogenic dangers of modernity that Erikson (1994) has aptly termed “A New Species of Trouble.” While we must clearly analyze whether the *perceived* risks of hydraulic fracturing correlate with its empirically calculated *objective* risks, we must also be attentive to the full range of socio-environmental impacts that can be significant in their human consequences; whatever their anticipatory, conceptual, or political inconvenience. As Gramling and Freudenburg (1992:231) have argued, impacts do not cease to exist simply because they are ignored. If we fail to address the broadest range of impacts associated with energy technologies like fracking, then we will merely end up shifting “the burdens away from the principle beneficiaries of development, imposing them instead on the often-rural communities and residents nearby.”

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