SOCIAL IMPACTS OF MARCELLUS SHALE EXPLORATION:
A RESEARCH SUMMARY

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ARC Livable Communities Workshop
August 16, 2012, California, PA
Unconventional Wells
112 wells in 2007
<table>
<thead>
<tr>
<th>Title (Funder)</th>
<th>Investigators</th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community Impacts: Case studies</td>
<td>Brasier, Filteau, Goetz, Jacquet, Kelsey, McLaughlin, Stedman, Rhubart</td>
<td>2009-2010</td>
</tr>
<tr>
<td>Community Task Forces</td>
<td>Brasier, Filteau, Goetz, Jacquet, Kelsey, McLaughlin, Stedman, Rhubart</td>
<td>2009-2010</td>
</tr>
<tr>
<td>Marcellus Family Project</td>
<td>McLaughlin, Martin, K. Davis, Brasier, Gunsallus</td>
<td>2011-2012</td>
</tr>
<tr>
<td>Community Dialogue Project</td>
<td>Brasier, Kelsey, Whitmer</td>
<td>2011-2012</td>
</tr>
<tr>
<td>Marcellus Shale Impacts Project</td>
<td>Brasier, L. Davis, Filteau, Glenna, Kelsey, McLaughlin, Rhubart, Schafft</td>
<td>2012-2013</td>
</tr>
</tbody>
</table>
PA Counties in Case Studies, Surveys

*New York Counties: Broome, Chemung, Delaware, Schuyler, Steuben, Sullivan, Tioga, and Tompkins.
## Case Study Summary

<table>
<thead>
<tr>
<th>County</th>
<th>Region</th>
<th>Rural/urban*</th>
<th>Wells drilled 2008-2010</th>
<th>Interviews</th>
<th>Year Interviews conducted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bradford</td>
<td>NC</td>
<td>Rural</td>
<td>513</td>
<td>15</td>
<td>2009</td>
</tr>
<tr>
<td>Washington</td>
<td>SW</td>
<td>Rural**</td>
<td>309</td>
<td>15</td>
<td>2009</td>
</tr>
<tr>
<td>Lycoming</td>
<td>NC</td>
<td>Rural**</td>
<td>144</td>
<td>18</td>
<td>2009</td>
</tr>
<tr>
<td>Greene</td>
<td>SW</td>
<td>Rural</td>
<td>189</td>
<td>12</td>
<td>2010</td>
</tr>
<tr>
<td>Susquehanna</td>
<td>NC</td>
<td>Rural</td>
<td>184</td>
<td>13</td>
<td>2010</td>
</tr>
<tr>
<td>Westmoreland</td>
<td>SW</td>
<td>Urban</td>
<td>111</td>
<td>16</td>
<td>2010</td>
</tr>
</tbody>
</table>

*Center for Rural PA definition where rural = < 284 persons per square mile

**lies within a metropolitan statistical area
Household Survey

- Sample of 6000 households in 21 PA counties and 8 NY counties

- Mail survey conducted Oct. 2009 – March 2010

- 1917 out of 5479 valid surveys returned (35%)

Early visible, tangible effects
Concerns about future effects
Effects on place

RESEARCH SUMMARY
‘Boomtowns’ and ‘Boom and Bust’

- Rapid industrialization of small, isolated rural communities
- Focused on energy development in intermountain West in 1970s and 1980s
- ‘Social disruption’ lens: rapid population growth and change stress infrastructure and social relations, create jobs and economic growth
- Distribution of costs/benefits uneven across place, stage of development, social position
- Boom-Bust-Recovery model
Economic Impacts

• Economic effects
  – Employment in industry, related businesses
  – Personal income, leasing/royalty income

• Issues
  – Competition for workers, materials
  – Localized inflation reported

• Economic future in rural places
  – Workforce education
  – Stem ‘brain drain’

• Agriculture: save it or kill it?

“[Company] has put their... headquarters here. So that provides opportunities for skilled labor... and white collar jobs... It will change some of our youth.”

“So far there have been a lot of new millionaires in this area”

“Are millionaires going to milk dairy cows?”

Source: Community Impacts Case Study Interviews
Infrastructure

- Transportation and roads
- Public safety
  - Traffic
  - Crime
- Housing
- Displacement of disabled, low-income families
- Stress on human service agencies, court system, schools

“You can’t swing a dead cat in our county right now without hitting a water truck.”

“for our homeless programs we would put people up at the local hotels and we wanted to put someone up two weeks ago and the next available room is [four months later]. So there is no short term housing.”

Source: Community Impacts Case Study Interviews
Environmental Quality

- Issues mentioned:
  - Public and private water sources
  - Water quality
  - Forest fragmentation
  - Wildlife, habitat
  - Air quality

- Recreation & tourism impacts

- Comparison to coal legacy

“... but the fact that there’s millions of gallons of water being injected under ground at high pressure’s gonna create some turbidity in some private wells...”

Source: Community Impacts Case Study Interviews
Effects on Place

• Population growth and change in rural areas
• Threat to rural identity, quality of life
• Increased diversity, changing social networks
• Social conflict
• Attachment to place and its natural and social amenities

“Our biggest influx of people….is hunting season.”

“. . . a lot of the workers ... don’t feel the need to take care of this area.... they don’t care if they trash the place or spend all their money on booze....”

“... [seasonal residents] not as concerned... as the people who live here full time.... If they’re up here three weeks a year ... they don’t have to worry....”

“I’ve turned down many opportunities to go other places and work for bigger pay... it’s such a beautiful ... place to live that I hate to see those values be degraded.”

Source: Community Impacts Case Study Interviews
Quality of Community Features

<table>
<thead>
<tr>
<th>Feature</th>
<th>Rating of Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>natural envir</td>
<td>78%</td>
</tr>
<tr>
<td>neighborliness</td>
<td>75%</td>
</tr>
<tr>
<td>drinking water</td>
<td>71%</td>
</tr>
<tr>
<td>public schools</td>
<td>70%</td>
</tr>
<tr>
<td>health care</td>
<td>64%</td>
</tr>
<tr>
<td>recreation opp</td>
<td>57%</td>
</tr>
<tr>
<td>freedom from crime</td>
<td>57%</td>
</tr>
<tr>
<td>cultural events</td>
<td>43%</td>
</tr>
<tr>
<td>affordable housing</td>
<td>41%</td>
</tr>
<tr>
<td>roads/streets</td>
<td>39%</td>
</tr>
<tr>
<td>job training opp.</td>
<td>20%</td>
</tr>
<tr>
<td>avail. of jobs</td>
<td>9%</td>
</tr>
</tbody>
</table>

Source: Community Satisfaction and Change: A Study of Communities in the Marcellus Shale Region.
## Expectations of Changes

<table>
<thead>
<tr>
<th>Marcellus development will make...</th>
<th>Get better</th>
<th>Stay same</th>
<th>Get worse</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good jobs</td>
<td>42%</td>
<td>34%</td>
<td>2%</td>
<td>23%</td>
</tr>
<tr>
<td>Job training</td>
<td>30%</td>
<td>43%</td>
<td>4%</td>
<td>23%</td>
</tr>
<tr>
<td>Roads/streets</td>
<td>10%</td>
<td>42%</td>
<td>31%</td>
<td>17%</td>
</tr>
<tr>
<td>Affordable housing</td>
<td>9%</td>
<td>51%</td>
<td>20%</td>
<td>20%</td>
</tr>
<tr>
<td>Recreation</td>
<td>5%</td>
<td>58%</td>
<td>16%</td>
<td>22%</td>
</tr>
<tr>
<td>Neighborliness</td>
<td>4%</td>
<td>65%</td>
<td>10%</td>
<td>21%</td>
</tr>
<tr>
<td>Natural environment</td>
<td>4%</td>
<td>30%</td>
<td>48%</td>
<td>18%</td>
</tr>
<tr>
<td>Drinking water</td>
<td>3%</td>
<td>33%</td>
<td>41%</td>
<td>23%</td>
</tr>
<tr>
<td>Crime/violence</td>
<td>3%</td>
<td>52%</td>
<td>23%</td>
<td>21%</td>
</tr>
<tr>
<td>Overall quality of life</td>
<td>14%</td>
<td>48%</td>
<td>19%</td>
<td>20%</td>
</tr>
<tr>
<td>Overall cost of living</td>
<td>9%</td>
<td>42%</td>
<td>28%</td>
<td>21%</td>
</tr>
</tbody>
</table>

*Source: Community Satisfaction and Change: A Study of Communities in the Marcellus Shale Region.*
Context Matters

- Perceptions of social effects vary by:
  - Social, cultural, economic history (esp. extractive)
  - Speed, scale, and type of development
  - Geographic location and proximity to infrastructure
  - Human and social capacity to respond to change

- Examples:
  - Most rural, with least infrastructure, w/o history of fossil fuel extraction => most visible change, most difficulty absorbing change
  - ‘Hubs’ with business infrastructure may be able to ‘keep the dollars local’
  - Areas with seasonal residents and in-migration may have conflicting perspectives
Overall attitudes: “This could be a good thing - if it’s done right”
Perceptions of risk
Trust in managing institutions

RESEARCH SUMMARY
“How do you feel about natural gas extraction from the Marcellus Shale?”

Source: Community Satisfaction and Change: A Study of Communities in the Marcellus Shale Region.
Overall Attitude by Region

- **North central PA**: 15% Oppose, 26% Neither Oppose nor Support, 60% Support
- **Northeastern PA**: 24% Oppose, 27% Neither Oppose nor Support, 49% Support
- **SW/Pitt region**: 20% Oppose, 34% Neither Oppose nor Support, 45% Support
- **Central PA**: 19% Oppose, 37% Neither Oppose nor Support, 45% Support
- **Alleghenies**: 13% Oppose, 44% Neither Oppose nor Support, 43% Support
- **New York**: 31% Oppose, 30% Neither Oppose nor Support, 39% Support

Source: Community Satisfaction and Change: A Study of Communities in the Marcellus Shale Region.
Perceptions of Risk Related to Marcellus

- negative impacts can be prevented (preventability)
  - agree: 58%
  - neutral: 28%
  - disagree: 14%

- only few benefit (equity)
  - agree: 48%
  - neutral: 32%
  - disagree: 20%

- benefits outweigh costs (cost-benefit trade-off)
  - agree: 31%
  - neutral: 45%
  - disagree: 24%

- worry about catastrophic accident (dread)
  - agree: 30%
  - neutral: 38%
  - disagree: 32%

- we know enough to move forward (understandability)
  - agree: 27%
  - neutral: 44%
  - disagree: 30%

- negative impacts can be fixed (reversibility)
  - agree: 22%
  - neutral: 41%
  - disagree: 37%

Source: Community Satisfaction and Change: A Study of Communities in the Marcellus Shale Region.
Statistical Analysis of Risk Perceptions

• Those with perceptions of greater risk....
  – Have less trust in natural gas industry and science institutions, more trust in environmental groups
  – Hold a worldview in which humans are part of ecological system (as opposed to dominant over nature)
  – Expect environment and jobs to get worse with Marcellus
  – Report less knowledge of economic and social issues and more knowledge of environmental issues
  – Are male
  – Do not own mineral rights
  – Live in New York
  – Have friends or family with drilling
Institutional Trust

<table>
<thead>
<tr>
<th>Institution</th>
<th>'some' or 'great deal of' trust</th>
<th>'no' or 'very little' trust</th>
<th>don't know</th>
</tr>
</thead>
<tbody>
<tr>
<td>scientists</td>
<td>72%</td>
<td>16%</td>
<td>12%</td>
</tr>
<tr>
<td>extension</td>
<td>65%</td>
<td>19%</td>
<td>17%</td>
</tr>
<tr>
<td>envir groups</td>
<td>57%</td>
<td>29%</td>
<td>13%</td>
</tr>
<tr>
<td>DEP/DEC</td>
<td>57%</td>
<td>31%</td>
<td>12%</td>
</tr>
<tr>
<td>NG industry</td>
<td>48%</td>
<td>40%</td>
<td>12%</td>
</tr>
<tr>
<td>NG task forces</td>
<td>47%</td>
<td>33%</td>
<td>20%</td>
</tr>
<tr>
<td>SRBC/DRBC</td>
<td>43%</td>
<td>25%</td>
<td>32%</td>
</tr>
</tbody>
</table>

Source: Community Satisfaction and Change: A Study of Communities in the Marcellus Shale Region.
## Institutional Trust

<table>
<thead>
<tr>
<th>Fiduciary Responsibility</th>
<th>Competence</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Natural Gas Industry</strong></td>
<td></td>
</tr>
<tr>
<td>• Perception of fairness, consistent communication</td>
<td>• Can industry manage risks of new technology?</td>
</tr>
<tr>
<td>• Direct behaviors (landmen)</td>
<td></td>
</tr>
<tr>
<td>• Asymmetry of information</td>
<td></td>
</tr>
<tr>
<td>• Lack of transparency</td>
<td></td>
</tr>
<tr>
<td>• Perceptions of motives</td>
<td></td>
</tr>
<tr>
<td><strong>State Regulatory Agencies</strong></td>
<td></td>
</tr>
<tr>
<td>• Integrity</td>
<td>• Do they have capacity in time of tight budgets?</td>
</tr>
<tr>
<td>• Commitment to protect people</td>
<td>• Do they have needed expertise?</td>
</tr>
<tr>
<td><strong>State Government</strong></td>
<td></td>
</tr>
<tr>
<td>• Indecision about severance tax or how money might be allocated</td>
<td>• Are they too reactionary?</td>
</tr>
<tr>
<td>• ‘Fire-sale’ leasing of state land</td>
<td></td>
</tr>
<tr>
<td>• ‘Ulterior motives’</td>
<td></td>
</tr>
</tbody>
</table>

*Source: Community Impacts Case Study Interviews*
Summary: Attitudes toward Marcellus Shale Development

- Hydraulic fracturing is the ‘face’ or point of conflict - but not the only issue
  - What is at risk – environment, community, place
  - Risk perceived holistically, across multiple dimensions
  - Effects of trust in critical institutions (esp. industry, scientists)

- Polarization
  - Don’t forget the middle! Large group of people mixed or unsure about development
  - Polarized groups have fundamentally different orientations toward natural environment and sources of trusted information
MARCELLUS SHALE IMPACTS STUDY: Chronicling Social and Economic Change in North Central and Southwestern Pennsylvania

2012-2013 Research Project

**Penn State Project Team:** Kathy Brasier, Lisa Davis, Matt Filteau, Leland Glenna, Tim Kelsey, Mark Leach, Diane McLaughlin, & Kai Schafft
Marcellus Impacts Study

• Project Goals
  – Identify and document indicators of change
  – Understand and interpret trends related to Marcellus activity
  – Describe the experiences of critical populations and institutions
  – Evaluate organizational management strategies

• Funded by the Center for Rural Pennsylvania

• Dates: February, 2012 – August, 2013
Marcellus Impacts Study

• Case study counties: Bradford, Lycoming, Washington, and Greene

• Collect publicly available data and examine trends in relation to:
  – Other Pennsylvania counties in and out of Marcellus shale region
  – Historical trends for that county

• Collect primary data in case study counties
Opportunities and Challenges

TAKING ACTION LOCALLY TO SHAPE IMPACTS
Challenge #1: Education

• Strong need to help public understand what is occurring, implications, and what is being done to regulate
  – Competing, partial information, lack of scientific certainty, misinformation
  – Strident dialogue and polarizing public debate
• Recognize both the emotional and fact components of peoples’ attitudes towards gas development – both are valid and need to be acknowledged
• Within the context of fractured trust in institutions
Challenge #2: Coordination

- Changes from Marcellus:
  - Are rapid
  - Will look different from one community to another
  - Will require unique, evolving responses
  - Involve several jurisdictions and lines of authority

- Any efforts will require...
  - Coordination and communication among jurisdictions, agencies, organizations, and private sector
  - Broad public awareness and understanding
  - Resident and taxpayer acceptance and support
  - On-going monitoring, dialogue and discussion
Challenge #3: Thinking Long Term

• Need to focus on how to make the community better AFTER the boom
  – Frame Marcellus as a potential means to improve economy, social organization, human capital, physical infrastructure
  – Draw on public resources (social networks, collaboration, communication, leadership) to address the Long Run
  – Identify how Marcellus fits into past, present, and future of the community

• Allocating impact fees from Act 13
Challenge #4: Public Choices

• Need to make public decisions about:
  – Local resource allocation across services
  – Leasing of public land
  – Local investment opportunities
  – Revenue generation
  – Land use and development
    • Building for current (worker housing, industrial sites) and future needs
    • Infrastructure (roads/bridges, railways, etc.)
    • Environmental protection, valued areas
Community Action Examples

• Formation of new groups
  – Monitoring (WaterDogs), watershed groups
  – Opposition groups (Damascus group, Responsible Drilling Alliance)
  – Landowner coalitions
  – Natural Gas task forces

• Public dialogue efforts
  – Charting the Future of Our Community (Tioga County)
  – Centre County Public Issues Forum
Natural Gas Task Forces

• Mission: Maximize opportunities; mitigate negative impacts

• Objectives and activities
  – Advise County Commissioners
  – Coordinate, communicate
  – Educate task force members, public and industry
  – Manage discussion and dialogue
  – Provide valid, reliable information
  – Build on economic potential
  – Share model ordinances, best practices, recommendations
ACKNOWLEDGEMENTS

Projects described here were conducted by teams from Penn State, Cornell, and the Institute for Public Policy and Economic Development, including:

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