Potential Community Impacts from Shale Energy Development

Health Effects Institute
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Scope of the talk

1. Impacts to communities from shale gas development
   I. Growth Management Issues
   II. Community Conflict
   III. Social and Psychological Disruptions
2. Applicability across regions
3. Links to public health
Caveats

Not extensive knowledge of community effects of shale energy in particular

Much more knowledge of:

• Energy development from the 1970s and 80s
• Environmental Contamination and Change
• Technological Risk and Disasters
Caveats

Impacts are highly variable across:
• Degree of Rurality and Isolation
• Population Density
• Pace and scale of Development
• Historical and Cultural Energy Experience
An array of positive benefits

- Jobs, Jobs, Jobs
- Economic Activity
- Population increase in towns that need it
- Royalties and lease payments to landowners
- Taxes and revenues to Government

Photo: Brian Hall
But positive *for whom*?

- Un-equal distribution of costs and benefits
  - Among types of residents
  - Among types of communities
  - Among types of regions
  - Across space and time.

Photo: Brian Hall
The Blessing of Natural Resources

Note: Map shows population change from April 2010 to July 2012 as a percentage of the 2010 census population.
Source: USDA, Economic Research Service using data from the U.S. Census Bureau.
The Blessing of Natural Resources

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Change in Rural Poverty Rates 2007-’11
Most rural and exurban counties had higher poverty rates in 2011 than in 2007. Nation’s poverty rate was up 2.9%.

White areas are urban counties

The percent of people living in poverty rose 2.9% in the nation from 2007 to ‘11. Most rural and exurban counties experienced a rise in poverty rates, but less than the nation.

- **Poverty rates up more than 5 points (252 counties)**
- **Poverty rate up 3 to 5 points (527 counties)**
- **Poverty rate up, but less than 2.9 points (1,320)**
- **Poverty rate unchanged or declining (449)**

[dailyyonder.com](http://dailyyonder.com)
The Blessing of Natural Resources

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dailyyonder.com
Headwaters Economics Study (2009)

Fossil Fuel Extraction as a County Economic Development Strategy

http://headwaterseconomics.org/energy/western/fossil-fuel-extraction/

World Mercator Projection
Map Date: 8/7/2008
Headwaters Economics Study (2009)

Figure 4. Growth of Total Personal Income, Energy-focusing (EF) Counties versus Peer Counties in the West, Indexed, 1970–2005

Headwaters Economics Study (2009)

Figure 8. Growth of Per Capita Non-Labor Income, Energy-focusing Counties Compared to Peers, 1970–2005

Risks to Communities

– Rapid Industrialization

– Uneven Cost and Benefits

• “Corrosive Communities”

– Social-psychological Stress
Risks to Communities: Rapid Industrialization

- Rapid Growth
- Strained Municipal Services
- Poor Quality of Life
- Out-migration of residents
- Overbuilt and Unplanned Construction
Social Impacts

• Farming or tourism is no-longer “top dog”
• Environmental quality perceived to be changing
• Social Relations said to have decreased
• Community Satisfaction said to have decreased
• Divide between Newcomers and Oldtimers
• Controversial projects/decisions dividing residents
Current Boomtowns

- Sidney, MT
- Williston, ND
- Dickinson, ND
- Pinedale, WY
- Eagle Ford, TX
- Montrose, PA
- Towanda, PA

annual growth rates: ~12-17%

Photo: Joe Riss
Current Boomtowns

Results have varied, depending on:

- population density,
- pace/scale of development
- mitigation funds available

Photo: Joe Riss
Rows of trailers used as housing for oil workers in Williston, North Dakota. Ben Garvin / Reuters
The Oil Boom Impact: Williston, North Dakota (2010-2011)

- Average Monthly Rent: $2,400 (one and two bedroom apartments)
  - +17%
- School District 1 Enrollment (2011 to 2012)
  - +45%
- Williston Airport Boardings
  - +75%
- Williston Amtrak Station Boardings
  - +22%
- New Building Values (based on building permit valuations)
  - +366%
- Housing Units Built
  - +83%
- Fastest Growing City in US (Population +200,000)
  - +8.8%

Source: North Dakota Aeronautics Commission, Amtrak, Williston School District #1, Williston Economic Development, U.S. Census Bureau, North Dakota Association of Builders, City of Williston Building Department
Workforce will Change Over Time

(ERG 2008/Jacquet).
Energy boomtowns in the Eastern US

– Less Rurality and Isolation
– More Local Ownership and Control
– Wider footprint over time and space

– New Corporate Behavior

(Jacquet and Kay, 2014)
Police chief: Gas drilling causing increase in crime locally
Published: September 9, 2009

BY JAMES LOEWENSTEIN

TOWANDA - Gas drilling activity is resulting in an increase in crime in the borough, the borough police chief said on Monday.

The issue came up at Monday's Towanda Borough Council meeting, when borough council member Bob McLinko asked Police Chief Mitch Osman whether the "extracurricular activity in the borough, along with population increase, has resulted in problems."

By extracurricular activity, McLinko was apparently referring to drinking at the bars in Towanda.

Osman replied that police calls have gone up as workers in the gas drilling industry have moved into the county, "especially the severity of the calls."
Skyrocketing rent in Bradford County: Influx of gas workers creating shortage of affordable housing

BY JAMES LOEWENSTEIN (STAFF WRITER)
Published: January 22, 2010

Due to the influx of workers in the natural gas industry, the rents for housing in the Bradford County area have doubled, tripled or gone up even higher, according to two realtors and the head of a local agency that helps homeless people.

They were among seven heads of local agencies and others who testified at a hearing held Thursday in Wysox Township by the Department of Environmental Protection and the Pennsylvania Department of Health on companies seeking permits to drill for natural gas.
Natural gas lease: 'Roughnecks' move in amid plans to build 'Man Camp' in Athens, Pa.

BY TOM WILBER - TWILBER@GANNET.COM - NOVEMBER 18, 2010, 12:00 AM

They have physiques for hard labor, a fondness for steak and a home away from home called a Man Camp.

They are roughnecks, and they are bringing a new dimension to the region's demographic as drilling crews migrate from places like Texas, Oklahoma and Louisiana to pursue the gas-rich Marcellus Shale under the Twin Tiers.

In Athens Township, Pa., Chesapeake Energy and Nomac Drilling are planning a 180-bed gated compound to house their crews when they're not pulling 12-hours shifts, seven days a week, on derricks being erected throughout the countryside.

Many are expected to show up in Broome County next year, after New York finalizes a regulatory plan for shale gas.
Gas boom catches community off guard

Traffic in downtown Towanda is one example of how a drilling boom takes a town.

By Steve Hargreaves, senior writer. October 20, 2010. 4:15 PM ET

TOWANDA, Pa. (CNNMoney.com) -- Downtown Towanda is literally choking in traffic.

The town, some 60 miles northwest of Scranton, is ground zero in Pennsylvania's development of natural gas found in shale rock, a boom that's spreading to many parts of the nation.

But this shale gas, too costly to develop just a few years ago, requires vast amounts of water to tap -- water that must be trucked in.
Implications for Community Health

– Effects for both newcomers and old-timers
– Stressful housing/cost of living
– Strained health care services: from counseling to ambulances
– Increased traffic and accidents
– Disrupted social support networks for old timers; Isolation for newcomers
– Possible revenues to improve capacity
Risks to Communities

– Rapid Industrialization

– Uneven Cost and Benefits
  • “Corrosive Communities”

– Social-psychological Stress
Risk to Communities: “Corrosive Communities”

- Trust and perceived fairness is a key variable in controversial developments
  - *Everything from….*
    - **Nuclear waste to Nano-technology** (Slovic et al. 1991; Macoubrie, 2006)
    - **Wal-Mart to Wind Farms** (Jacquet, 2014; Wallner and Jacquet, Forthcoming)

  “Stakeholders more concerned about the process than the outcome”

Lack of trust = Perceived risk, increased opposition, less satisfaction
Risk to Communities: “Corrosive Communities”

- **Corrosive Communities** (Freudenberg and Jones 1991)
  - Fierce Community Conflict
  - Winners and Losers
  - Distrust
  - Confusion and Uncertainty
  - Litigation
  - Blame over faults
  - Distaste over benefits
Community conflict worse than the environmental problem itself:

– Hampered decision-making, community capacity
– Broken communication and social structures
– Impossible to obtain scientific “facts”
– Disinvestment, outmigration
Risk to Communities: Unequal cost and benefit

• Leasing and Royalties are not uniform

• Non-landowners not eligible

• Landowner benefits will vary
Risk to Communities: Unequal cost and benefit
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Risk to Communities: Unequal cost and benefit

• Split-Estate

• What is the impact of a growing amount of land without mineral rights?

• How money is obtained and spent will Impact communities
Risk to Communities: “Corrosive Communities”

Would you say Natural Gas Development has made the area better off or worse off than it was 5 years ago?

Jacquet, 2012
Risk to Communities: “Corrosive Communities”
High Volume Hydrofracking Bans, Moratoria, and Movements for Prohibitions in New York State
Updated October 9, 2014
Municipal anti-ban movements
Status
- Pre-emptive resolution
- Considering pre-emptive resolution
- Marcellus Shale Formation extent
- Utica Shale Formation extent

Municipalities in Support of Hydrofracking in New York State
Updated November 28, 2012

Source of resolutions data:
Joint Landowners Coalition of New York.
www.jlcny.org
Risks to Communities

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Risk to Communities: “Contaminated” Communities

- “Life-Scape Change”
- Community no longer a “Psychological Refuge”
- Stigmatized as Contaminated
- Little or no relation to actual levels of contamination or health impacts

Edelstein, 1988/2003
Risk to Communities: “Contaminated” Communities

3 Mile Island Disaster:

$2.4 Billion in Property Damages (Sovacool, 2008)

No health problems reported from radiation.

Photo: National Archives
Risk to Communities: “Contaminated” Communities

Would you drink this PA gasfield tap water?

Photo: William Avery Hudson
Risk to Communities: “Contaminated” Communities

Contemporary Examples:

• Dimock, PA
• Dish, TX
• Pinedale, WY
• Pavilion, WY
Shale Energy can produce dramatic changes to:

- Landscape
- Environmental Quality
- Social Relations
- Role and Identity in the Community
- Cost of living and economic position

Risk to Communities: “Social-Psychological Disruption”
Risk to Communities: “Social-Psychological Disruption”

– Place-based identities are powerful
  • My community defines “who I am”
  • What kind of place is this?  
    – Farming Town, place with clean water, a place to raise children, etc.
  • What is my role in the community?  
    – Leader, pioneer, farmer, organizer
  • Who are my friends? Social circle?
Risk to Communities: “Social-Psychological Disruption”

—Bevy of research showing consequences of identity disruption in:
  • Divorce
  • Forced unemployment
  • Chronic/Terminal Illness
  • Accidents/dismemberments

—Key variable: perceived lack of control
Risk to Communities: “Social-Psychological Disruption”

– Weisz (1979)
  • Gillette, Wyoming average of 308 on the SRRS (>300 = “major life stress”)
  • 49% of stressed experienced physical illness; 9% of non-stressed

– Kassover & McKeown (1981); Bacigalupi and Freudenburg (1983); Witter et al. (2010); Ferrar et al. (2013)
  • “Stress” of impending change is among greatest health impact of gas drilling

– Ferrar et al. (2013)
  • Stress is most frequently reported illness symptom by individuals in Marcellus
Risk to Communities: “Social-Psychological Disruption”

– Ayers, et al. (1987)
  • Found stress as major impact of ski resort-boom town of Park City, Utah

– Arata et al. (2000), Plankais, et al. (1993); Neria, Nandi and Galea, 2008
  • Alaskan communities surrounding the Exxon Valdez shown clinical signs of Post Traumatic Stress Disorder
Risk to Communities: “Social-Psychological Disruption”

Table 2. Summary of key studies assessing post-traumatic stress after technological disasters

<table>
<thead>
<tr>
<th>Study</th>
<th>Sample type</th>
<th>Sample size (n)</th>
<th>Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1986 Chernobyl nuclear reactor accident, Ukraine (26 April 1986)</td>
<td>Community</td>
<td>$n=1617$ from Gomel (near accident) and $n=1427$ from Tver (far from accident)</td>
<td>6.5 years, 2.4% in Gomel, 0.4% in Tver</td>
</tr>
<tr>
<td>1989 Exxon Valdez oil spill, Alaska (24 March 1989)</td>
<td>Community</td>
<td>$n=593$ from variably affected communities</td>
<td>1 year, 9.4%</td>
</tr>
<tr>
<td>2001 Chemical factory explosion, Toulouse, France (21 September 2001)</td>
<td>Community</td>
<td>$n=1477$ students from directly and indirectly exposed communities</td>
<td>9 months, 44.6% (directly exposed 11- to 13-year-olds), 28.5% (directly exposed 15- to 17-year-olds), 22.1% (indirectly exposed 11- to 13-year-olds), 4.4% (indirectly exposed 15- to 17-year-olds)</td>
</tr>
</tbody>
</table>

*a Timing of assessment(s) after the disaster.
*b Cross-sectional study design.

(Neria, Nandi and Galea, 2008)
Risk to Communities: “Social-Psychological Disruption”

Impact of Event Scale (IES) Clinical Categories:

South Mobile County, 2010
- Severe: 18%
- Sub-clinical: 20%
- Moderate: 25%
- Mild: 37%

Cordova, Alaska 1989
- Severe: 15%
- Sub-clinical: 11%
- Moderate: 37%
- Mild: 37%

Gill, Picou, and Ritchie, 2011
## Risk to Communities: “Social-Psychological Disruption”

<table>
<thead>
<tr>
<th>Institution</th>
<th>M</th>
<th>SD</th>
<th>Coefficient</th>
<th>Impact of Event Scale</th>
<th>Intrusive Stress</th>
<th>Avoidance Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>BP Corporation</td>
<td>2.12</td>
<td>1.21</td>
<td>-.237***</td>
<td></td>
<td>-.242***</td>
<td>-.202***</td>
</tr>
<tr>
<td>Federal government</td>
<td>2.25</td>
<td>1.32</td>
<td>-.032</td>
<td></td>
<td>-.063</td>
<td>.003</td>
</tr>
<tr>
<td>Federal courts</td>
<td>2.60</td>
<td>1.28</td>
<td>-.052</td>
<td></td>
<td>-.103*</td>
<td>.005</td>
</tr>
<tr>
<td>U.S. Coast Guard</td>
<td>4.21</td>
<td>1.03</td>
<td>-.045</td>
<td></td>
<td>-.027</td>
<td>-.058</td>
</tr>
<tr>
<td>Minerals Management Service</td>
<td>2.73</td>
<td>1.35</td>
<td>-.007</td>
<td></td>
<td>-.070</td>
<td>.057</td>
</tr>
<tr>
<td>Environmental Protection Agency</td>
<td>2.87</td>
<td>1.36</td>
<td>.025</td>
<td></td>
<td>-.018</td>
<td>.065</td>
</tr>
<tr>
<td>National Oceanic and Atmospheric Administration</td>
<td>3.51</td>
<td>1.19</td>
<td>-.067</td>
<td></td>
<td>-.056</td>
<td>-.069</td>
</tr>
<tr>
<td>Food and Drug Administration</td>
<td>3.00</td>
<td>1.32</td>
<td>-.074</td>
<td></td>
<td>-.104*</td>
<td>-.033</td>
</tr>
<tr>
<td>Alabama state government</td>
<td>2.77</td>
<td>1.24</td>
<td>-.147**</td>
<td></td>
<td>-.171***</td>
<td>-.104**</td>
</tr>
<tr>
<td>Local government</td>
<td>3.01</td>
<td>1.31</td>
<td>-.187***</td>
<td></td>
<td>-.196***</td>
<td>-.153**</td>
</tr>
</tbody>
</table>

*p < .05. **p < .01. ***p < .000 (one tailed).

Gill, Picou, and Ritchie, 2011
Solastalgia: “the homesickness you have when you are still at home”.

– Their sense of place, their identity, physical and mental health and general wellbeing were all challenged by unwelcome change. **Moreover, they felt powerless to influence the outcome of the change process.** From the transcript material generated from the interviews the following responses clearly resonate with the dominant components of solastalgia: the loss of ecosystem health and corresponding sense of place, threats to personal health and wellbeing and a sense of injustice and/or powerlessness. (Albrecht et al, 2007, S96, emphasis added)
Risk to Communities: “Social-Psychological Disruption”

Those likely to be most susceptible:

Residents....

• with deep attachment to community
• Who perceive changes counter to identity
• who perceive a lack of control
• who perceive little personal gain
Risk to Communities: “Social-Psychological Disruption”

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Compounded by.....
Perceived pollution/contamination
Actual pollution/ contamination
Many Research Gaps:

– Thresholds for population growth, rurality, housing, investment/disinvestment

– Longitudinal analysis that measures relationship between social-psychological disruption and stress
  • Controlling for other stressors
  • Measuring variability among populations

– Governance best practices and success strategies for mitigating community conflict
References Cited


References Cited


