Potential Community Impacts from Shale Energy Development

Health Effects Institute

Public Workshop: Understanding Potential Impacts of 21st Century Oil and Gas development in the Appalachian Basin

– Research Needs

December10th 2014 – Wheeling, West Virginia

Jeffrey B. Jacquet
Assistant Professor of Sociology and Rural Studies
South Dakota State University
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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

<u>Much more knowledge of:</u>

- **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 land owners
- Taxes and revenues to Government

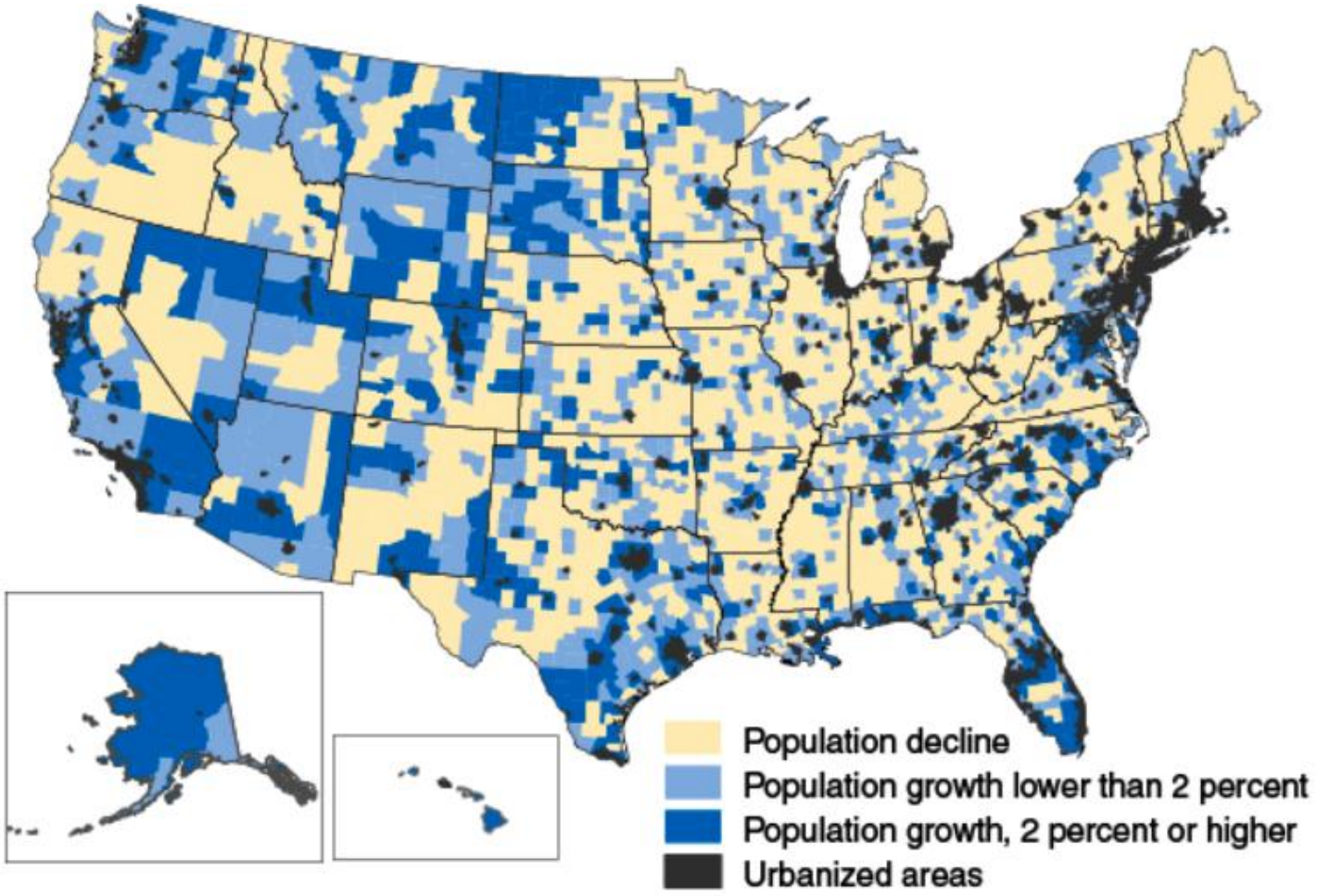
Photo: Brian Hall

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

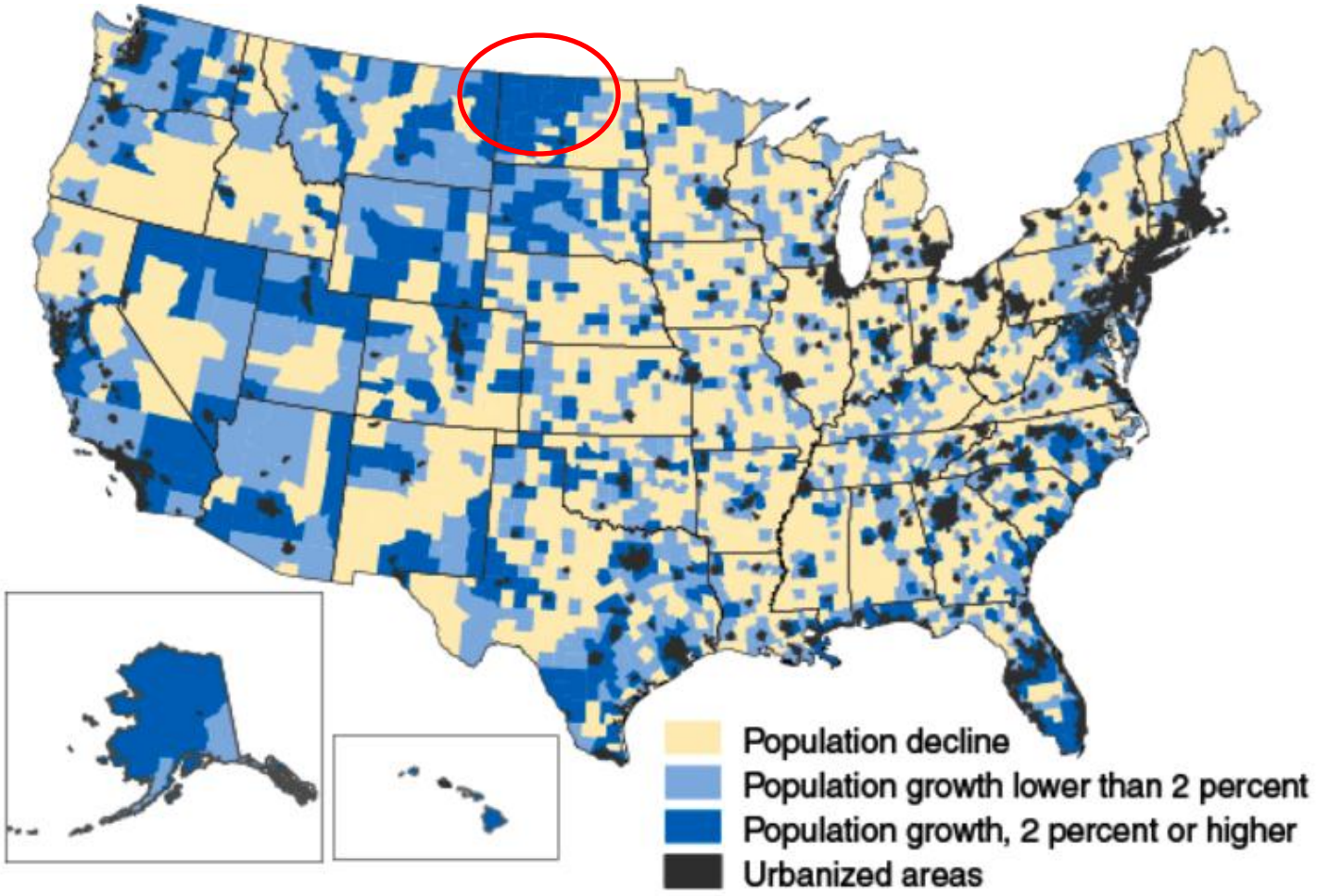
The Blessing of Natural Resources



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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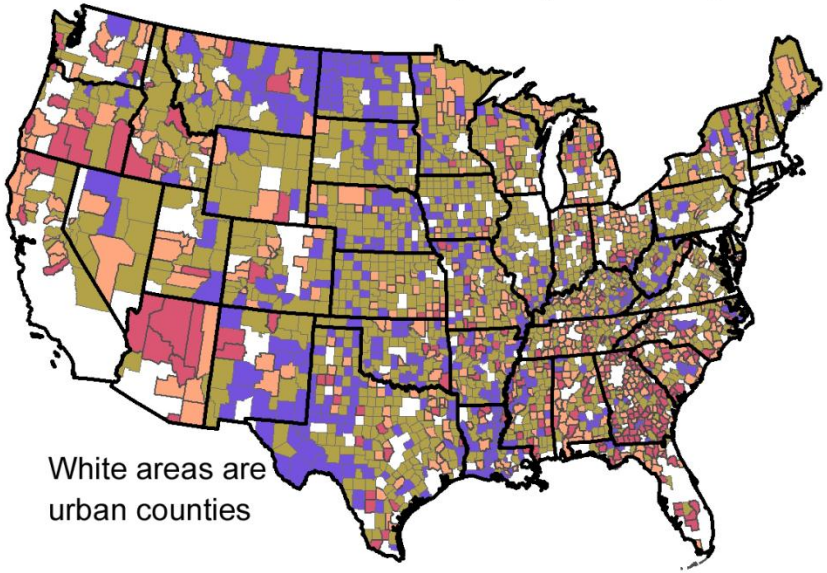
The Blessing of Natural Resources

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%.



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

The Blessing of Natural Resources

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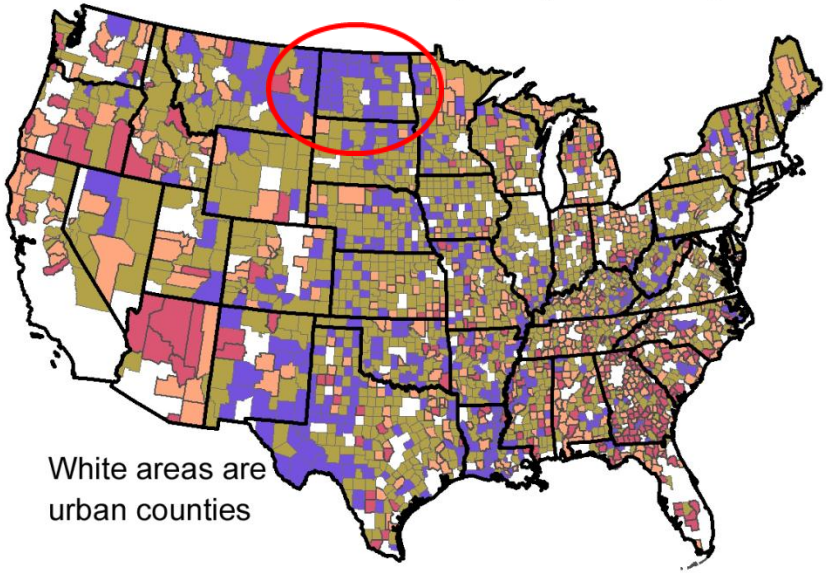

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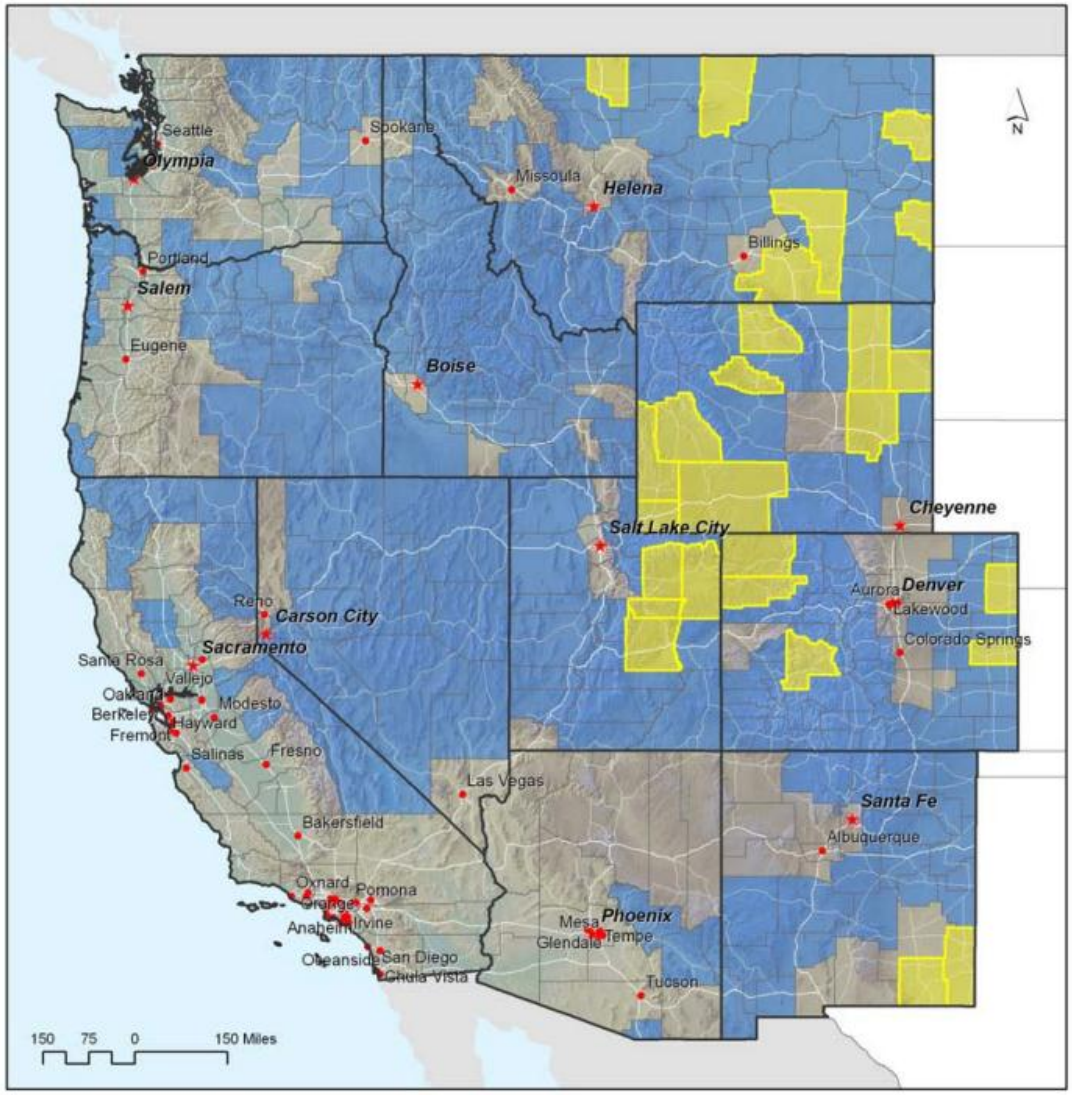
Headwaters Economics Study (2009)



Fossil Fuel Extraction as a County Economic Development Strategy Are Energy-focusing Counties Benefiting? (2009)

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

Counties
- Energy Focusing Counties
- Peer Counties

Major Cities
- State Capital
- Population > 100,000

Major Roads
- Limited Access Highway
- Principal Highway

Data Sources: US Census County Business Patterns 2005, US Bureau of Economic Analysis Regional Economic Information System 2005, US Geological Survey

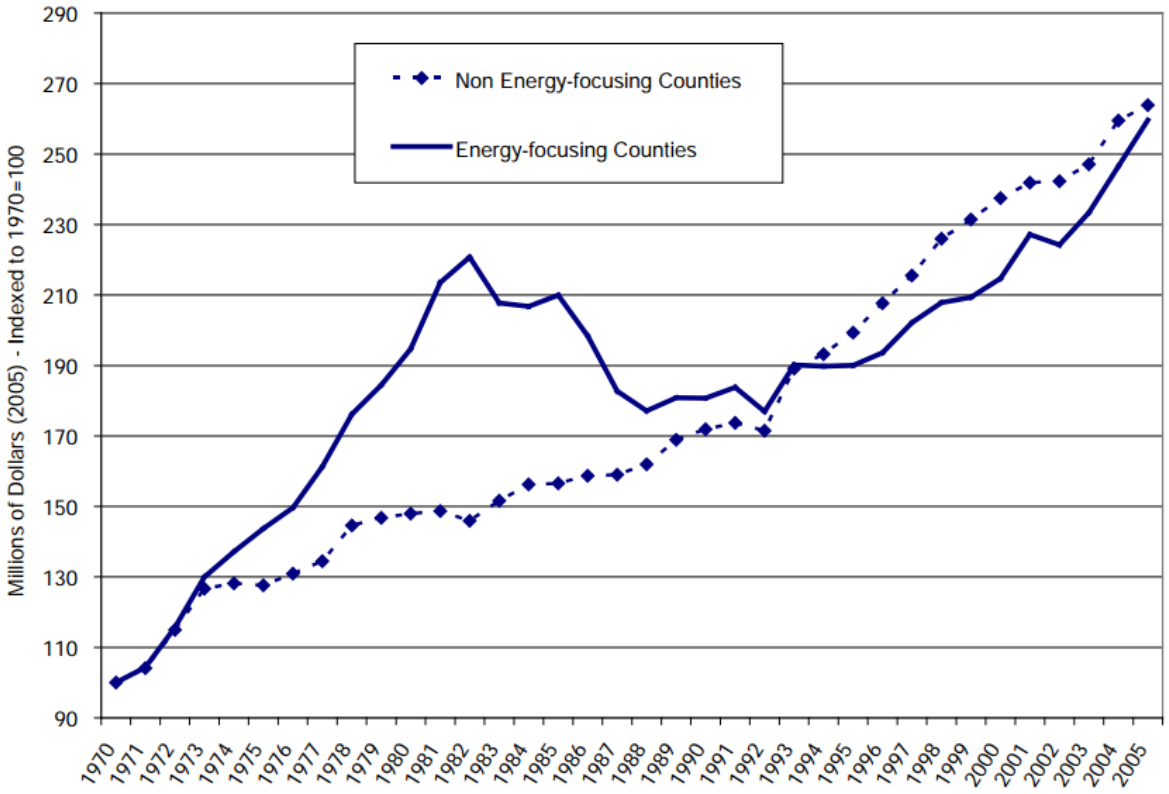
World Mercator Projection

Map Date: 8/7/2008

HEADWATERS ECONOMICS

Headwaters Economics Study (2009)

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



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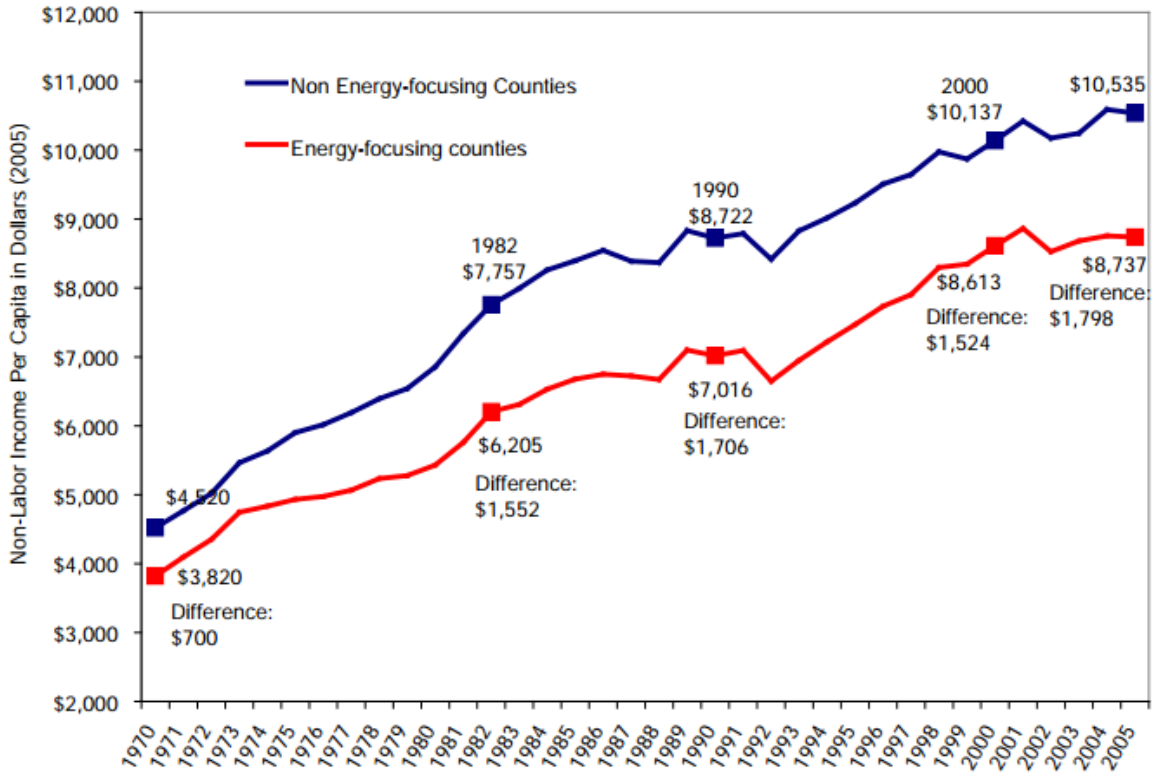
Headwaters Economics Study (2009)

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



Fossil Fuel Extraction as a County Economic Development Strategy Are Energy-focusing Counties Benefiting? (2009) http://headwaterseconomics.org/energy/western/fossil-fuel-extraction/

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**

Police Magazine, 1981

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

Photo: Joe Riss

Results have varied, depending on:

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

John Mireles

Rows of trailers used as housing for oil workers in Williston, North Dakota. *Ben Garvin / Reuters*

John Mireles

John Mireles

John Mireles

The Oil Boom Impact: Williston, North Dakota (2010-2011)

Average Monthly Rent: $2,400 (one and two bedroom apartments)

+17%

+75%

Williston Airport Boardings

+22%

Williston Amtrak Station Boardings

Housing Units Built

School District 1 Enrollment (2011 to 2012)

+45%

+83%

+366%

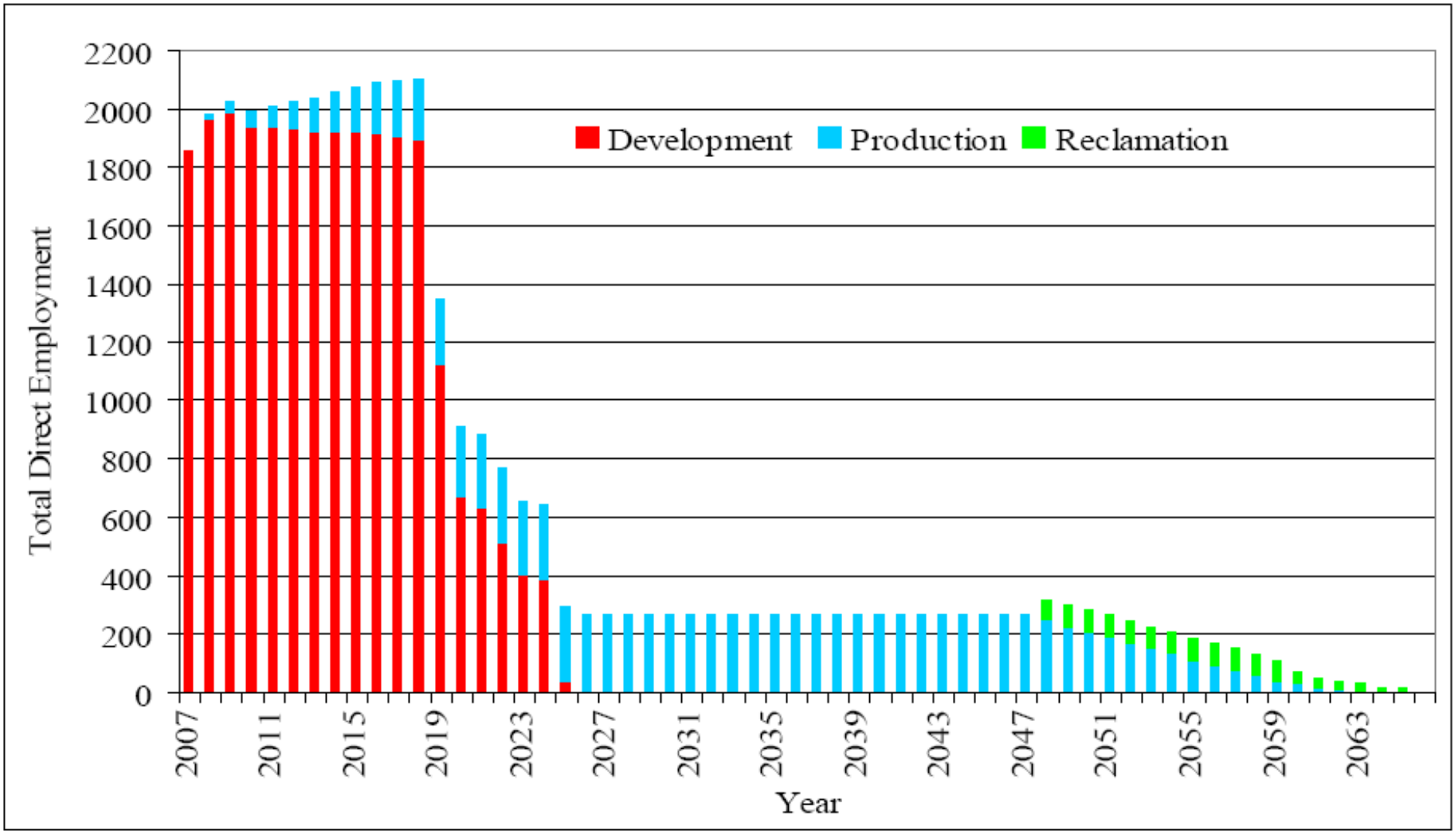
New Building Values (based on building permit valuations)

+8.8%

Fastest Growing City in US (Population <200,000)

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



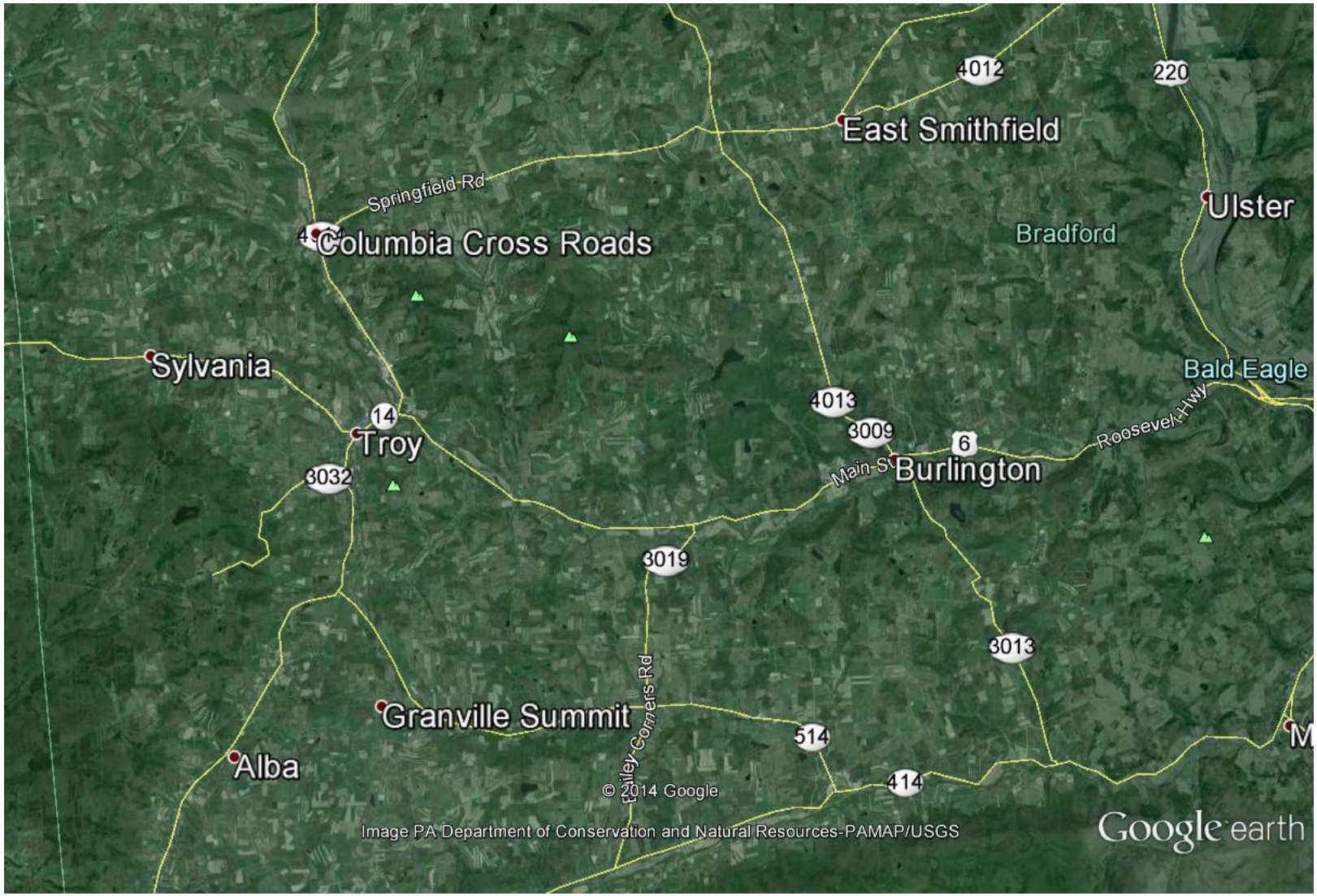
(ERG 2008/Jacquet).

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)


Cora
352
Willow Island
Daniel
Pinedale
Sublette
191
© 2014 Google
Image USDA Farm Service Agency
Google earth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220
East Smithfield
Springfield Rd
Ulster
Columbia Cross Roads
Bradford
Sylvania
Bald Eagle
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Roosevelt Hwy
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Troy
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Main St
Burlington
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3019
3013
Granville Summit
Tuley Corners Rd
514
Alba
414
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Image PA Department of Conservation and Natural Resources-PAMAP/USGS
Google earth

Pontiac
BUICK PONTI
TR

Police chief: Gas drilling causing increase in crime locally

Published: September 9, 2009

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Review Photo/JAMES LOEWENSTEIN Towanda Borough Police Chief Mitch Osman speaks to the Towanda Borough Council on Monday.

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."


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LATEST ON THE
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- Preliminary ma County's county
- Pickett co-chai quality issues r

Skyrocketing rent in Bradford County: Influx of gas workers creating shortage of affordable housing

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

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E-MAIL THIS SHARE THIS

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

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Natural gas lease: 'Roughnecks' move in amid plans to build 'Man Camp' in Athens, Pa.

BY TOM WILBER • TWILBER@GANNETT.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.

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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

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(TOM WILBER / Staff Photo)

A 180-bed Man Camp to house crews working for Chesapeake

Gas boom catches community off guard

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

Recommend 233 people recommend this. Be the first of your friends.

By Steve Hargreaves, senior writer October 28, 2010: 4:15 PM ET

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

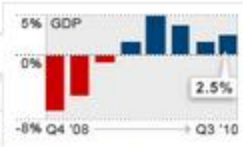
The town, some 60 miles northwest of Scranton, is ground zero in Pennsylvania's development of natural gas found in shale rock, a boom that's spreading to many parts of the nation.

89 Share | 1 Tweet | Share

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.

Right Now

- Economic growth picks up steam
- Stocks tumble on Korea jitters
- Existing home sales slow down



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If Congress continues to drag its feet, paychecks could get smaller on Jan. 1. Policymakers could prevent it, but will they? Pay attention to your W-4!
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These shoppers have Black Friday down to a science.
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Coming up with a brilliant new Web venture is easy. Buying a great dot-com name for it. Here's how Facebook and others bought their names.
More

Job Search *See 121,104 new jobs added today*

job title or company | location | Search

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-Marts 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**

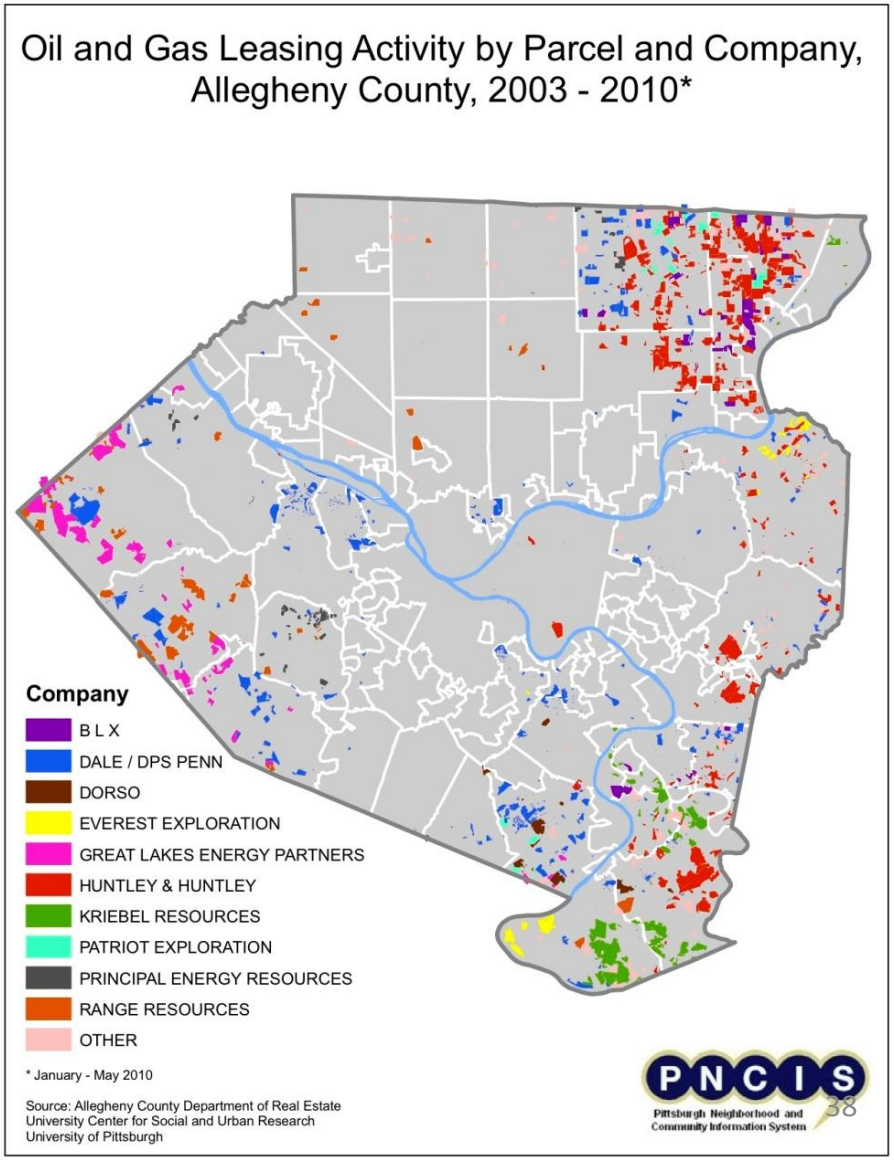
Risk to Communities: "Corrosive Communities"

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

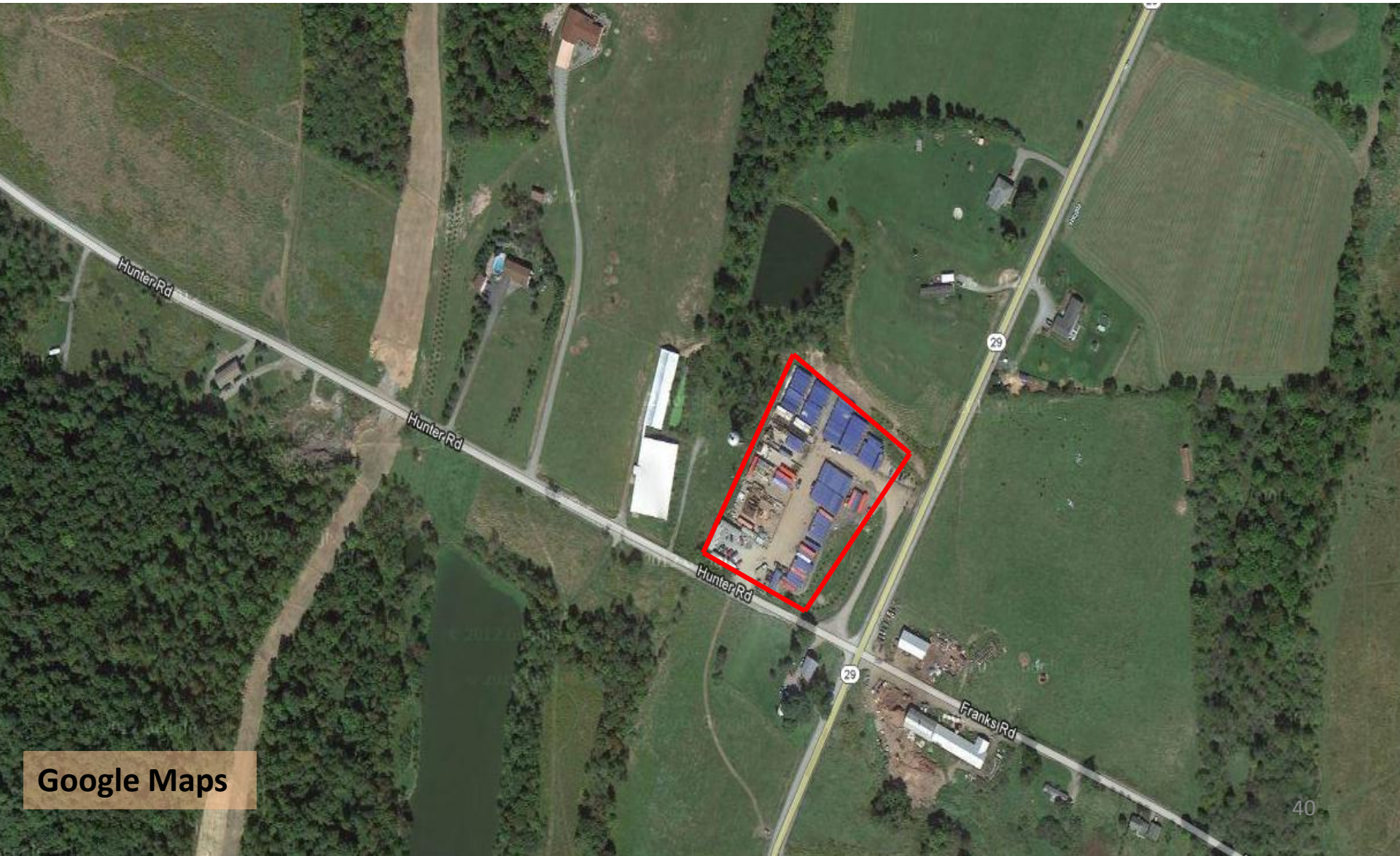
- **Leasing and Royalties are not uniform**
- **Non-landowners not eligible**
- **Landowner benefits will vary**



Risk to Communities: Unequal cost and benefit

Google Maps

Risk to Communities: Unequal cost and benefit



Google Maps

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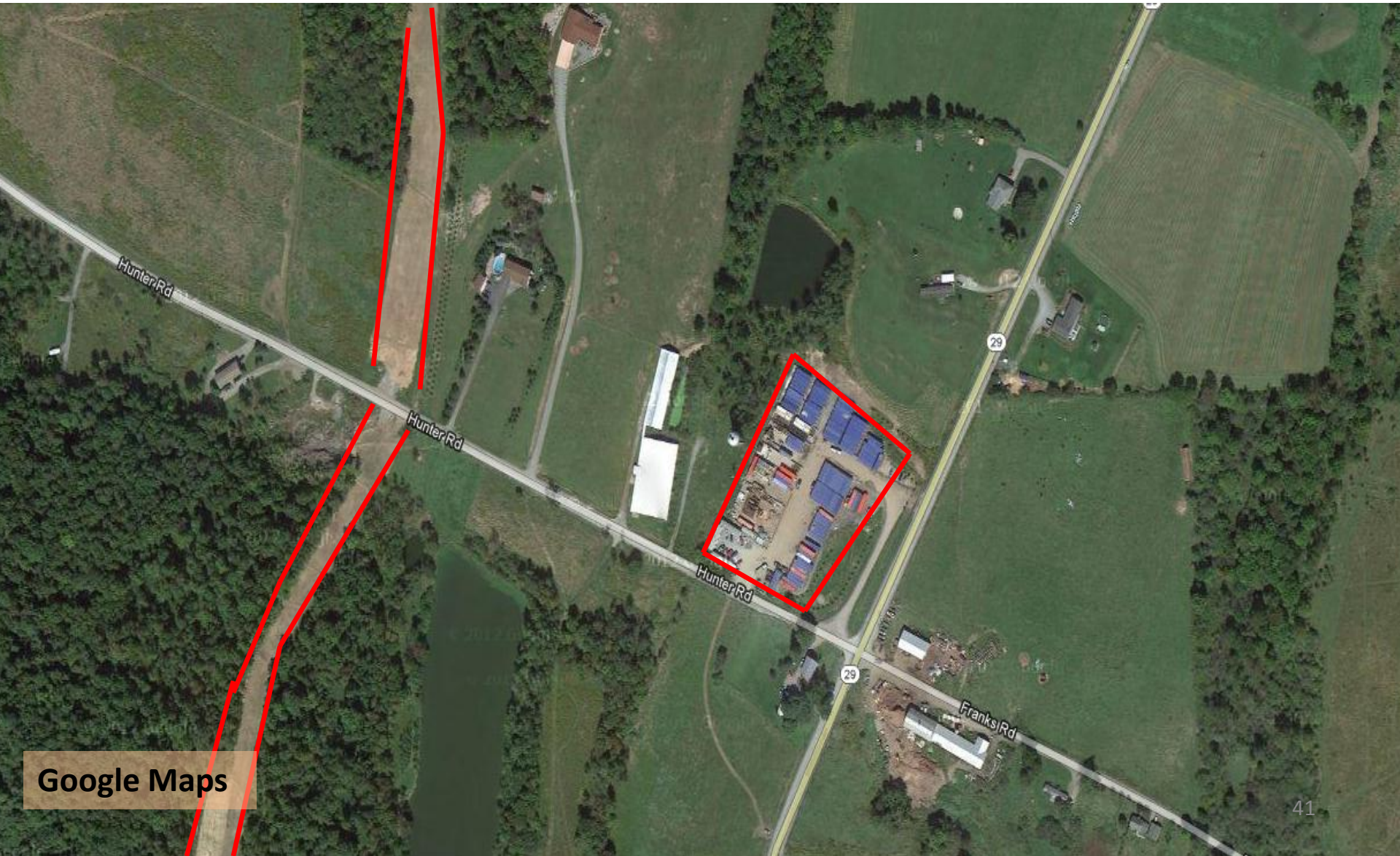

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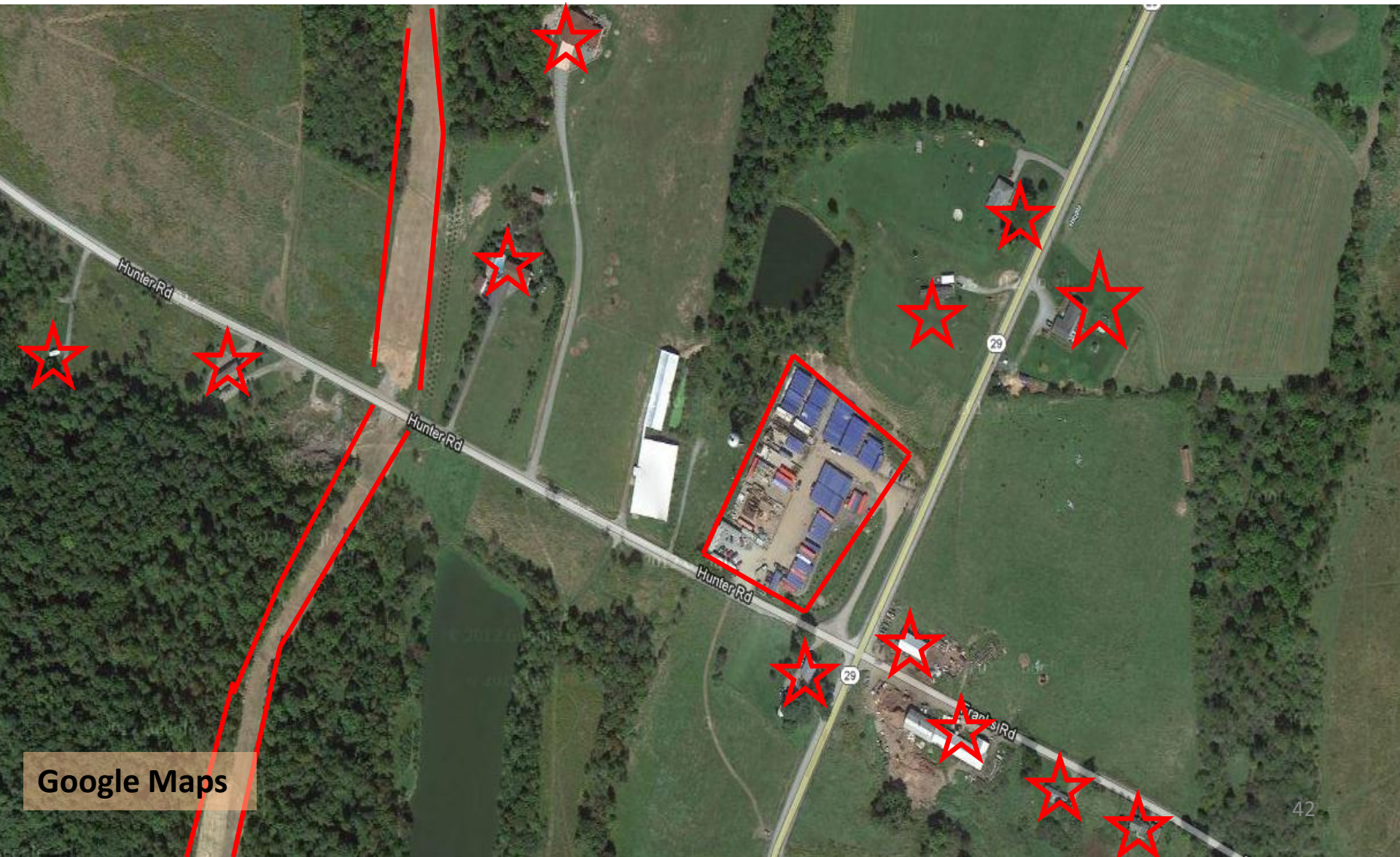
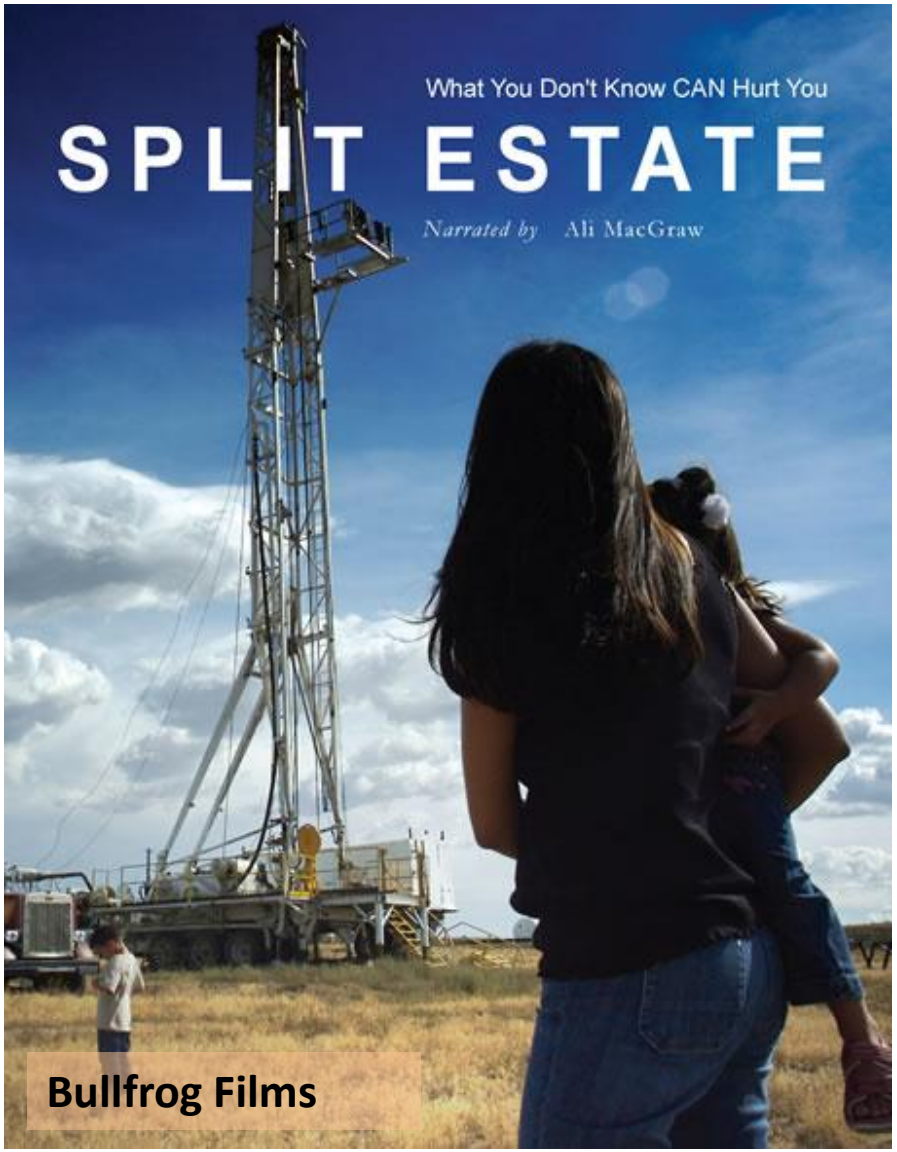
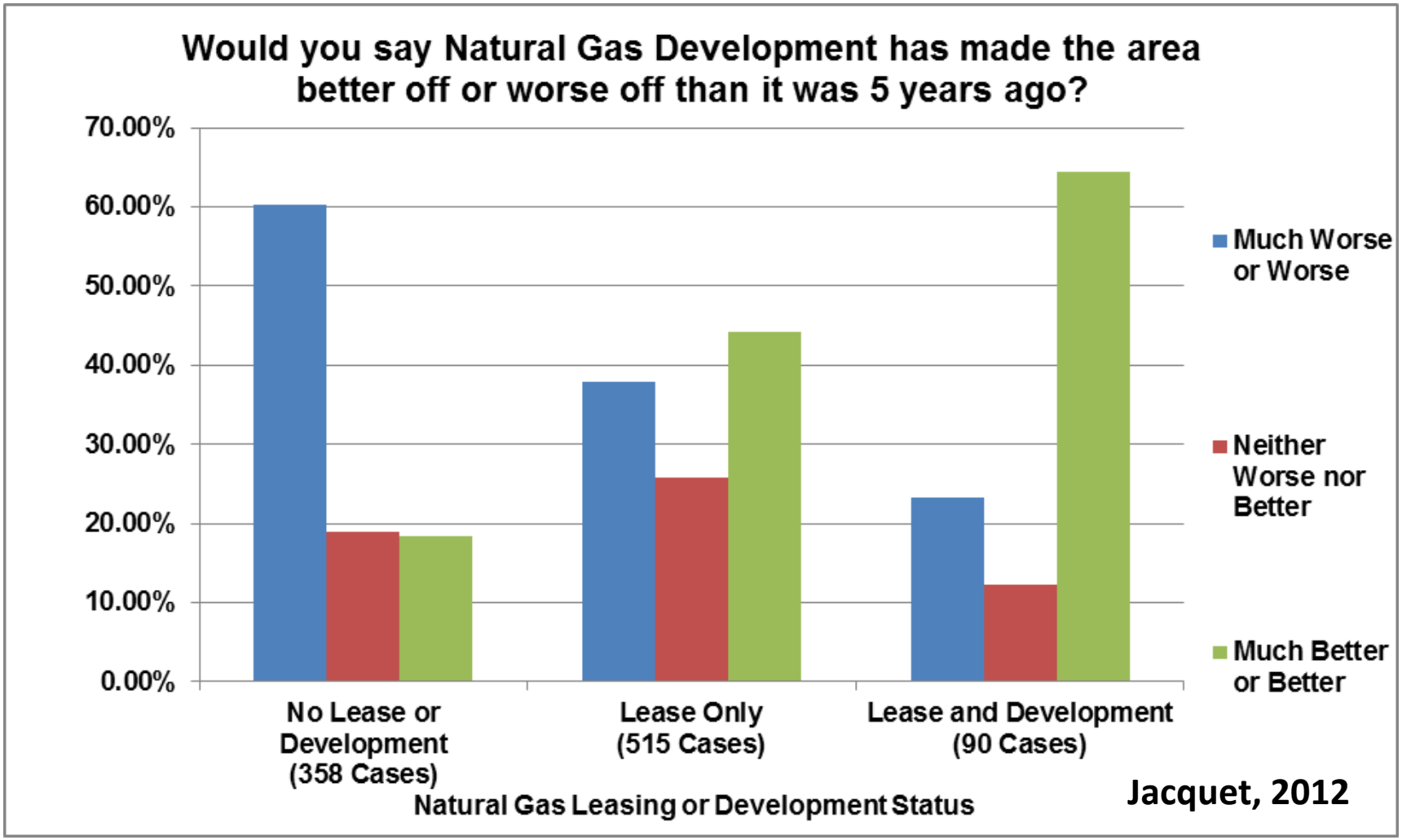


Risk to Communities: Unequal cost and benefit

- **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"



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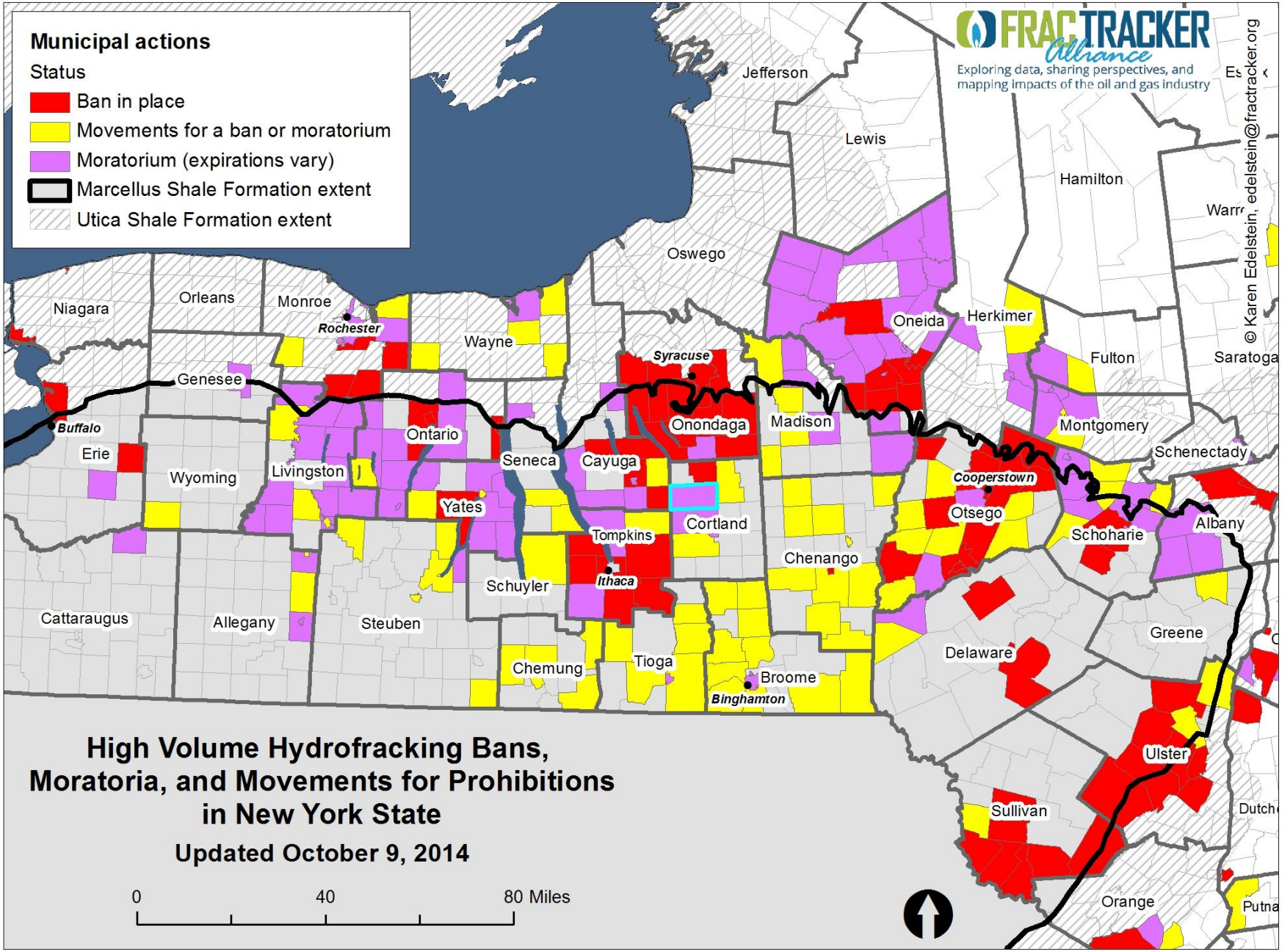
Municipal actions
Status
Ban in place
Movements for a ban or moratorium
Moratorium (expirations vary)
Marcellus Shale Formation extent
Utica Shale Formation extent
FRACTRACKER Alliance
Exploring data, sharing perspectives, and mapping impacts of the oil and gas industry
© Karen Edelstein, edelstein@fractracker.org
Jefferson
Lewis
Hamilton
Oswego
Niagara
Orleans
Monroe
Rochester
Wayne
Oneida
Herkimer
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Fulton
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Buffalo
Onondaga
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High Volume Hydrofracking Bans, Moratoria, and Movements for Prohibitions in New York State
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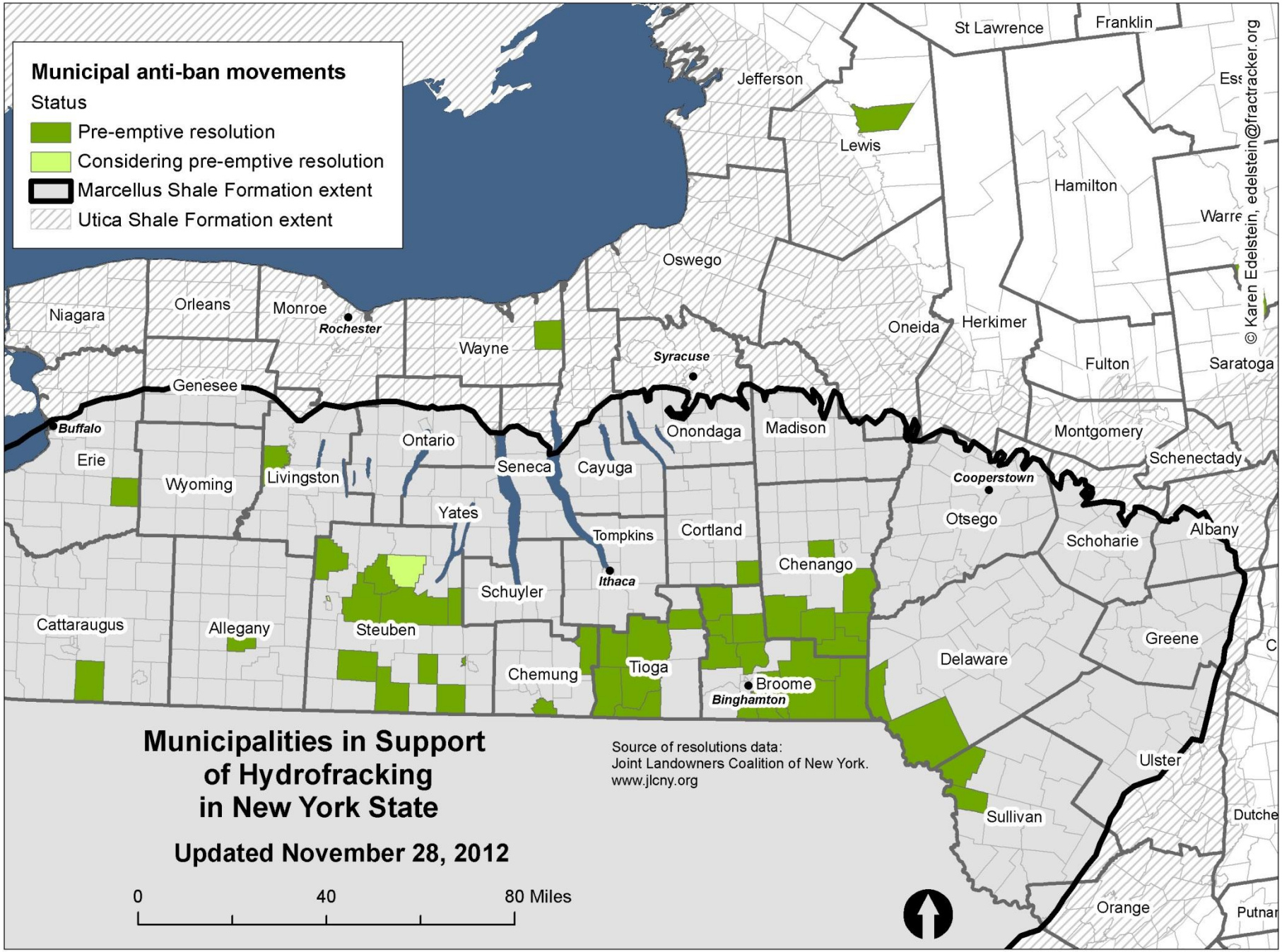
Municipal anti-ban movements
Status
Pre-emptive resolution
Considering pre-emptive resolution
Marcellus Shale Formation extent
Utica Shale Formation extent
St Lawrence
Franklin
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Niagara
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Monroe
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Municipalities 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
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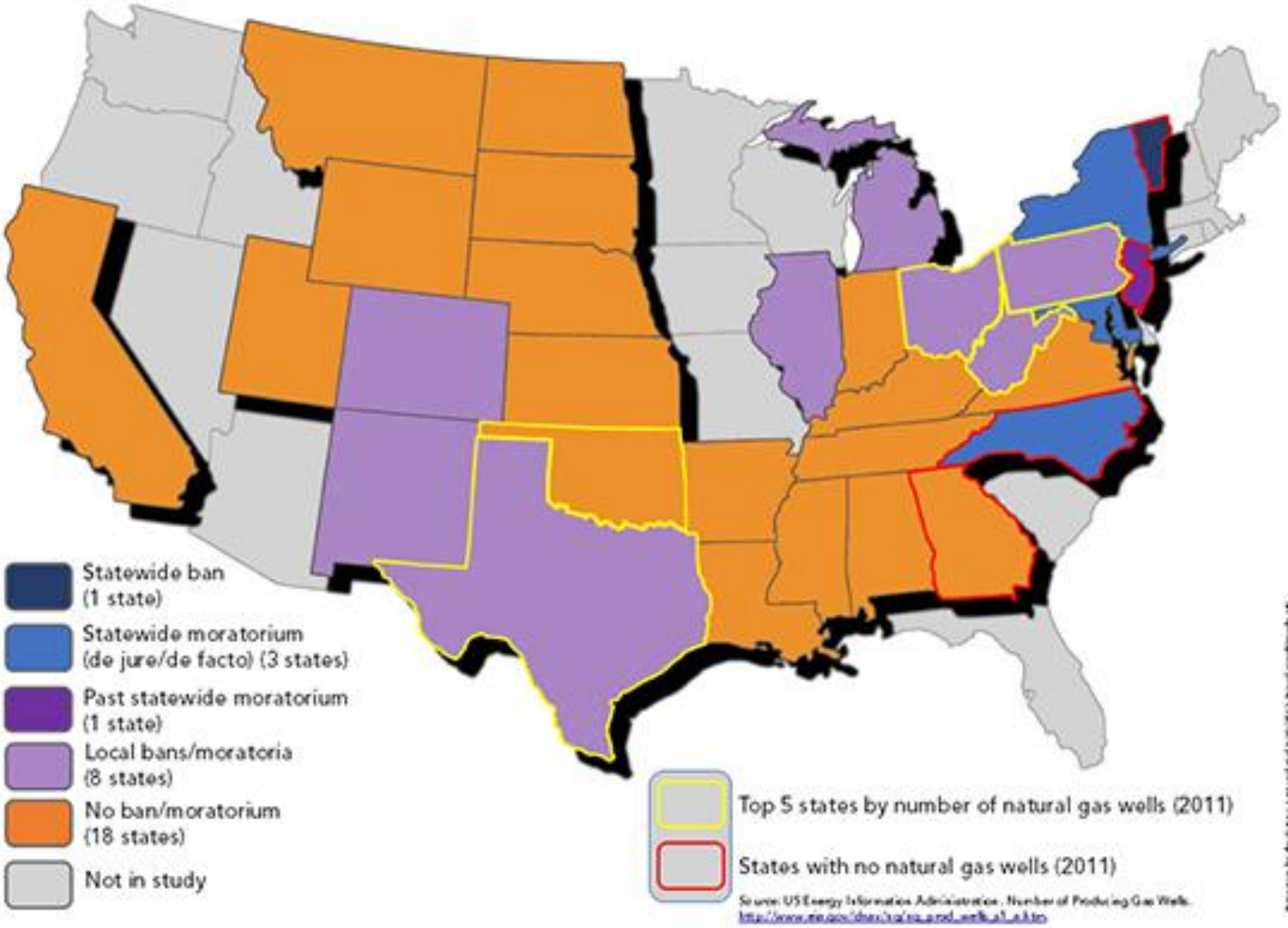
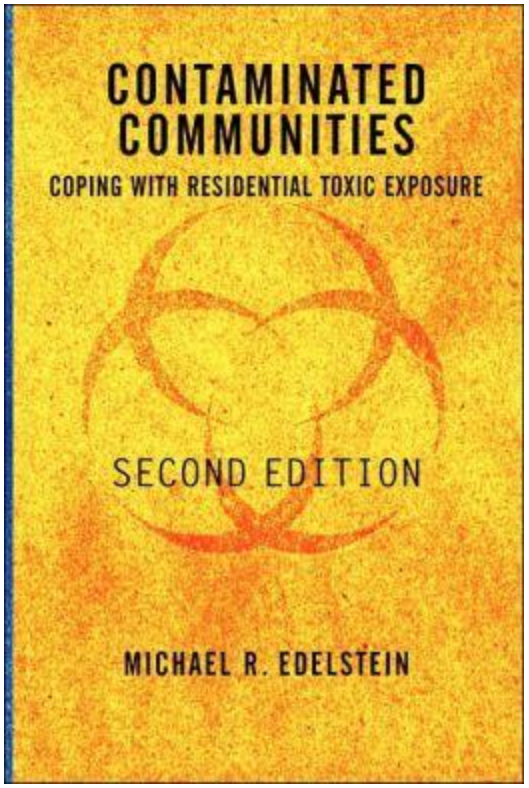
Fracking Bans and Moratoria



Risks to Communities

- Rapid Industrialization
- Uneven Cost and Benefits
  - "Corrosive Communities"
- **Social-psychological Stress**

Risk to Communities: "Contaminated" Communities



Edelstein, 1988/2003

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

Risk to Communities: "Contaminated" Communities

3 Mile Island Disaster:

$2.4 Billion in Property Damages
(Sovacool, 2008)

No health problems reported from radiation.

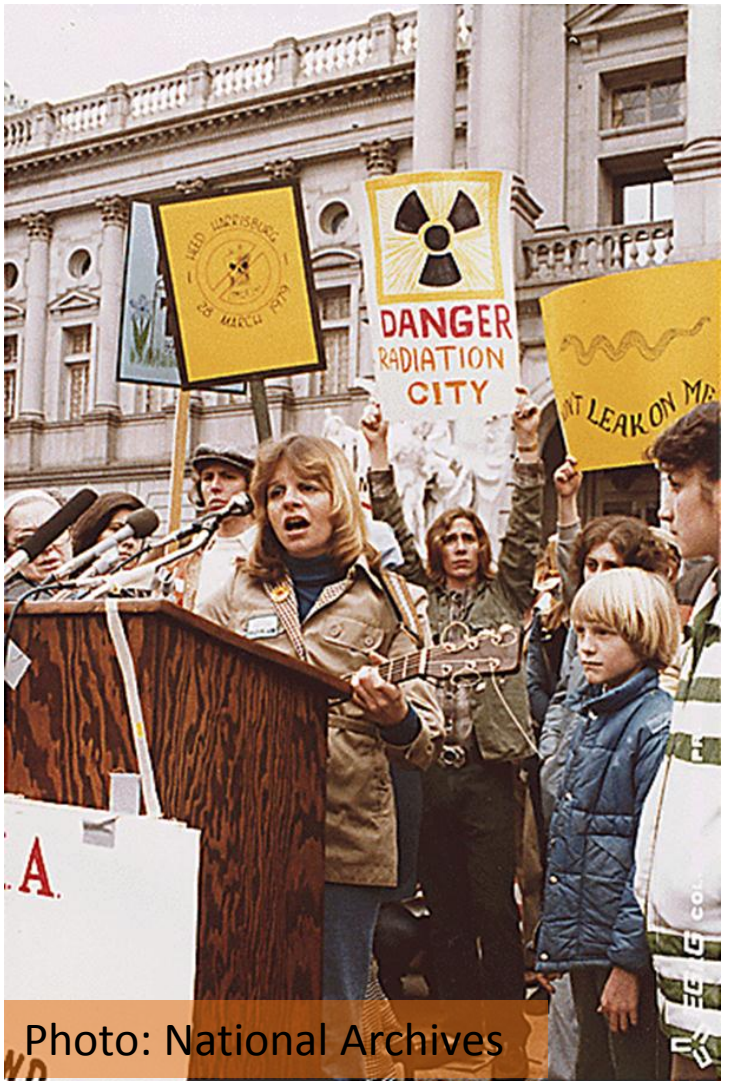


Photo: National Archives

Risk to Communities: "Contaminated" Communities

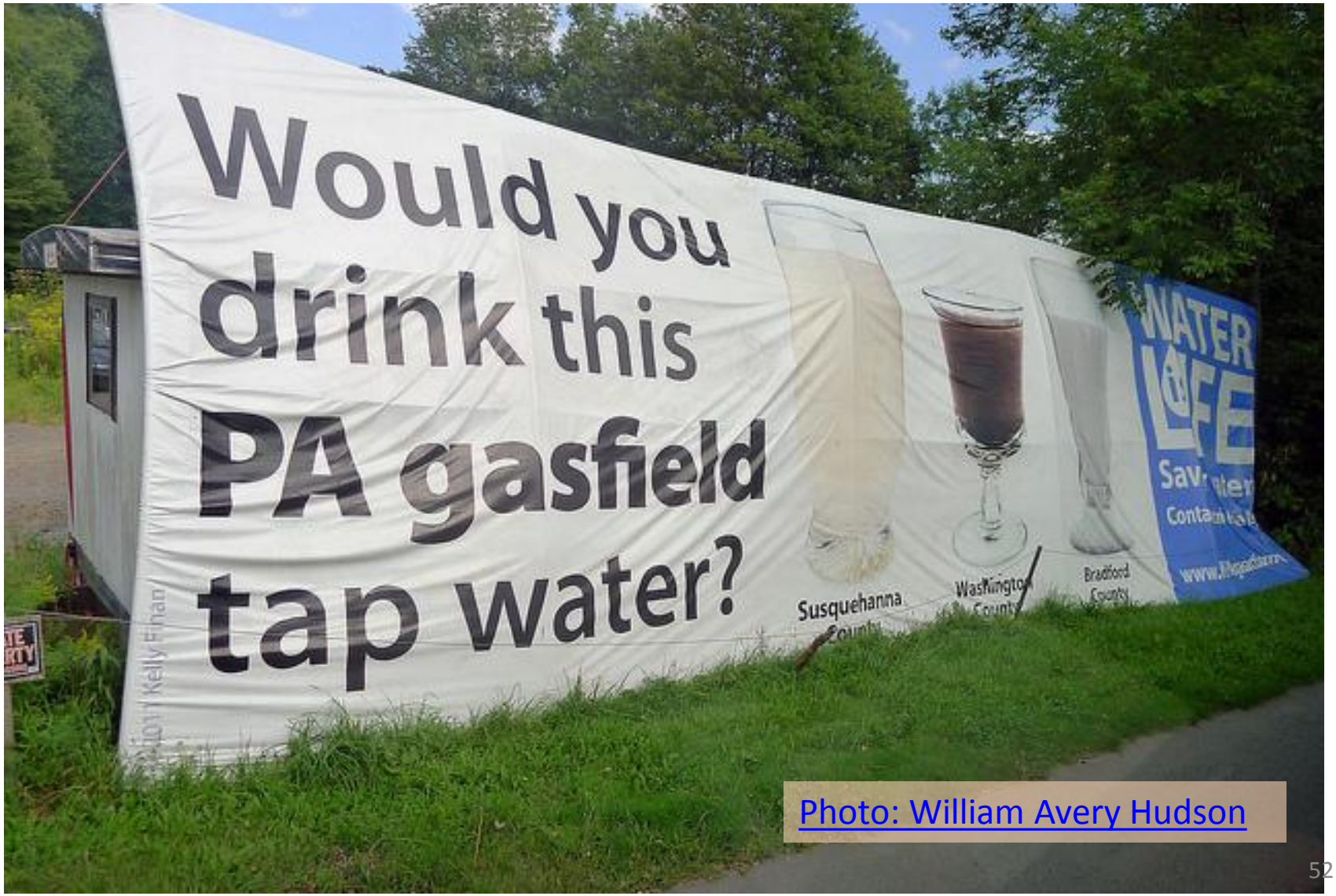
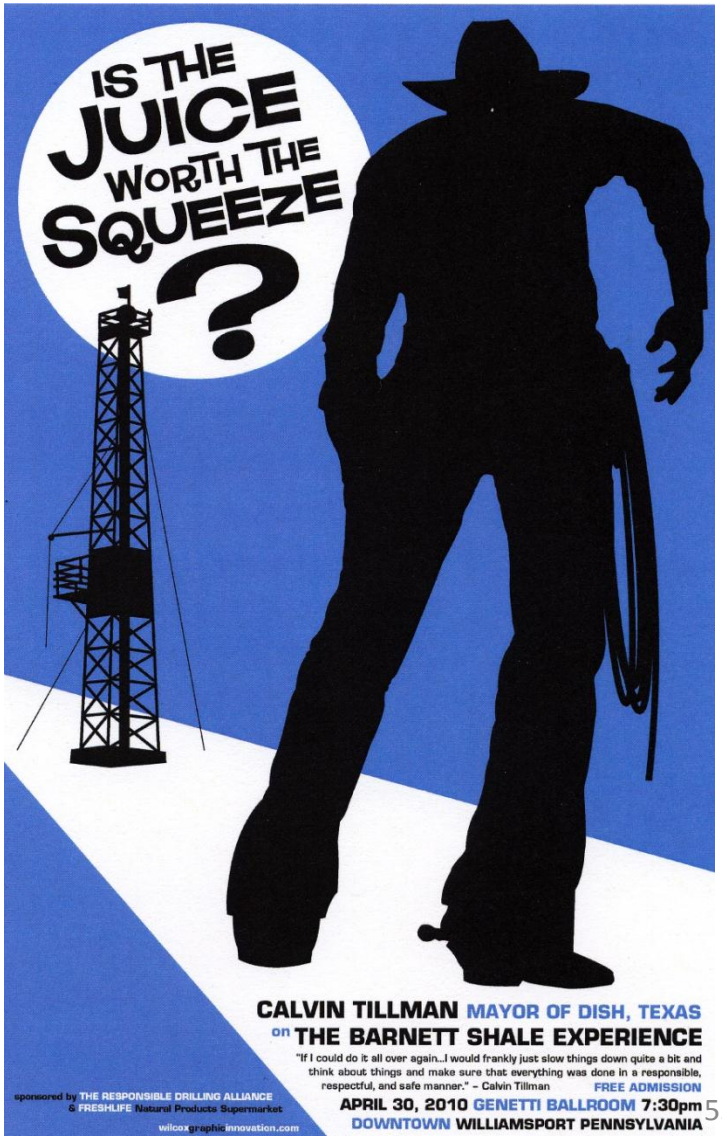


Photo: William Avery Hudson

Risk to Communities: "Contaminated" Communities

Contemporary Examples:

- Dimock, PA
- Dish, TX
- Pinedale, WY
- Pavilion, WY



Risk to Communities: "Social-Psychological Disruption"

- **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"

- **Place-based identities are powerful**
  - **My community defines "<u>who I am</u>"**
  - **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

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

Study	Sample type	Sample size (*n*)	Prevalence	
			T1[a]	%
1986 Chernobyl nuclear reactor accident, Ukraine (26 April 1986)				
Havenaar *et al.* (1997)[b]	Community	*n* = 1617 from Gomel (near accident) and *n* = 1427 from Tver (far from accident)	6.5 years	2.4% in Gomel, 0.4% in Tver
1989 Exxon Valdez oil spill, Alaska (24 March 1989)				
Palinkas *et al.* (1993)[b]	Community	*n* = 593 from variably affected communities	1 year	9.4%
2001 Chemical factory explosion, Toulouse, France (21 September 2001)				
Godeau *et al.* (2005)[b]	Community	*n* = 1477 students from directly and indirectly exposed communities	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)

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

(Neria, Nandi and Galea, 2008)

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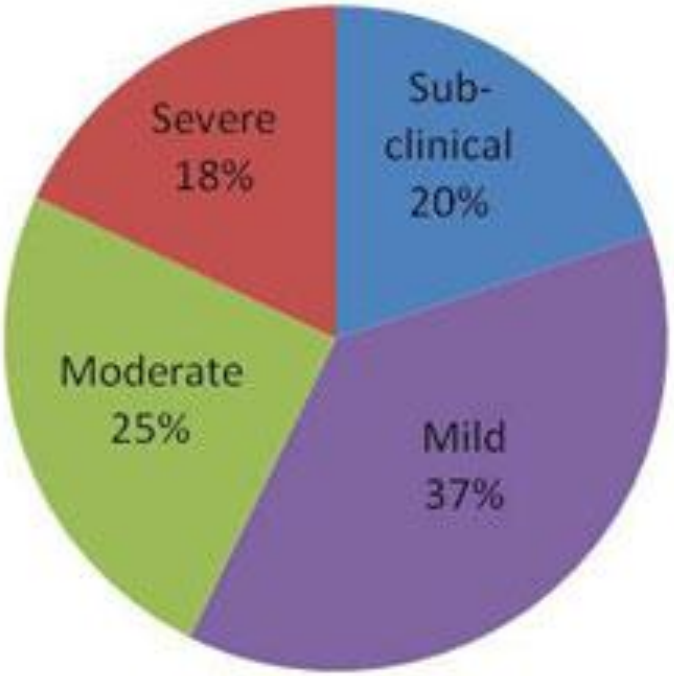
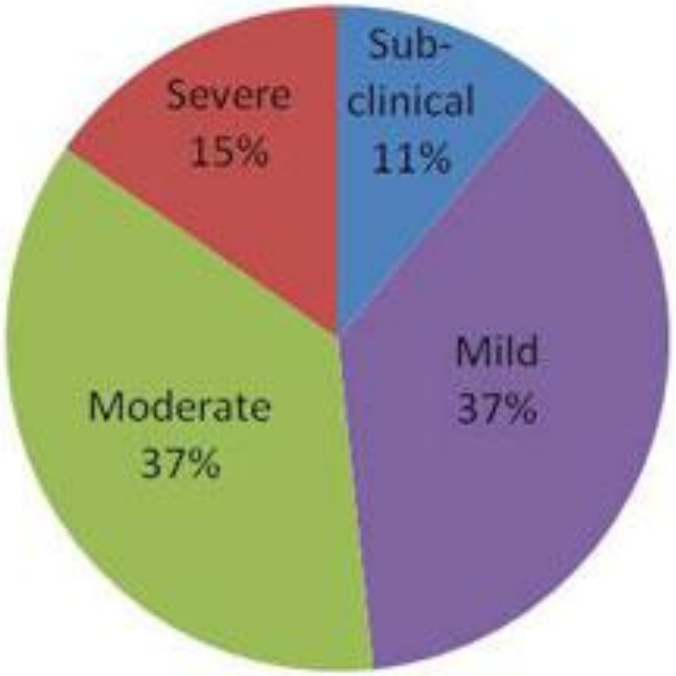
Impact of Event Scale (IES) Clinical Categories:

South Mobile County, 2010



Cordova, Alaska 1989



Gill, Picou, and Ritchie, 2011

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

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

Gill, Picou, and Ritchie, 2011

Risk to Communities: “Social-Psychological Disruption”

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"

<u>Those likely to be most susceptible:</u>

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"

<u>Those likely to be most susceptible:</u>

Residents….

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<u>Compounded by…..</u>

Perceived pollution/contamination

Actual pollution/ contamination

Risk to Communities: "Social-Psychological Disruption"

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**

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